Doc.No. JXC※-OMT0062-A

Operation Manual

PRODUCT NAME

CC-Link Direct Input Type Step Motor Controller (Servo / 24 VDC)

MODEL / Series / Product Number

LECPMJ Series

SMC Corporation

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LECPMJ Series / Controller
1. Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage.
These instructions indicate the level of potential hazard with the labels of “Caution,” “Warning” or “Danger.” They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)*1), and other safety regulations.

*1) ISO 4414: Pneumatic fluid power -- General rules relating to systems.
ISO 4413: Hydraulic fluid power -- General rules relating to systems.
IEC 60204-1: Safety of machinery - Electrical equipment of machines .(Part 1: General requirements)
ISO 10218-1992: Manipulating industrial robots -Safety.
etc.

Caution	**Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
Warning	**Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
Danger	**Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

⚠ Warning

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results.

The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product.

This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly.

The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.

1.The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.

2.When the product is to be removed, confirm that the safety measures as mentioned above are implementedand the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.

3.Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction

4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1.Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.

2.Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping,vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.

3.An application which could have negative effects on people, property, or animals requiring special safety analysis.

4.Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

LECPMJ Series / Controller
1. Safety Instructions

⚠ Caution

The product is provided for use in manufacturing industries.
The product herein described is basically provided for peaceful use in manufacturing industries.
If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.
If anything is unclear, contact your nearest sales branch.

Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”.
Read and accept them before using the product.

Limited warranty and Disclaimer

1.The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.*2)
Also, the product may have specified durability, running distance or replacement parts. Pleaseconsult your nearest sales branch.
2.For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3.Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.
***2) Vacuum pads are excluded from this 1 year warranty.**
A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.
Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

1.The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2.The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

⚠ Caution

SMC products are not intended for use as instruments for legal metrology.
Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country.
Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.

2. Product Outline

2.1 Product features

The followings are the main functions of this controller:

■ Connect with CC-Link

Operation from CC-Link, reading information and writing are possible by connecting with CC-Link.

■ Electric Actuator Control

Positioning operation and Pushing operation, at a specific speed and force, of the electric actuator are possible by controlling the Step motor (24 VDC servo).

■ Specified force operation

Control the pushing force (or the pressing force) of the electric actuator.

■ Separated power supply

The power supply is separated into the drive power and the control power. Therefore, even when the drive power is off, if the control power is on, the position information from the encoder will be maintained and the CC-Link communication and serial communication parallel I/O control are still available.

■ Return to origin

Return the electric actuator to the home position by sending a signal of return to origin instruction from CC-Link

■ Alarm detection function

Automatically detect the abnormal conditions and output the appropriate alarm signal via the CC-Link communication and serial communication. The alarm information will be recorded into the memory in the controller.

■ 64 step data

Control the electric actuator according to the step data specified by operating memory that corresponds to controller's input/output ports of DRIVE signal and INP signal, etc. from CC-Link.
It is possible to setup various parameters for each operation pattern.

■ Area output

The area output terminal will be activated if the electric actuator position is within the range specified by “Area 1” and “Area 2” in the step data.

■ Data input method

It is possible to perform a parameter setup, status monitoring, trial run and alarm reset via the operation in CC-Link communication or the serial communication with a PC installed with the controller setting software or the teaching box.

■ Easy mode and Normal mode

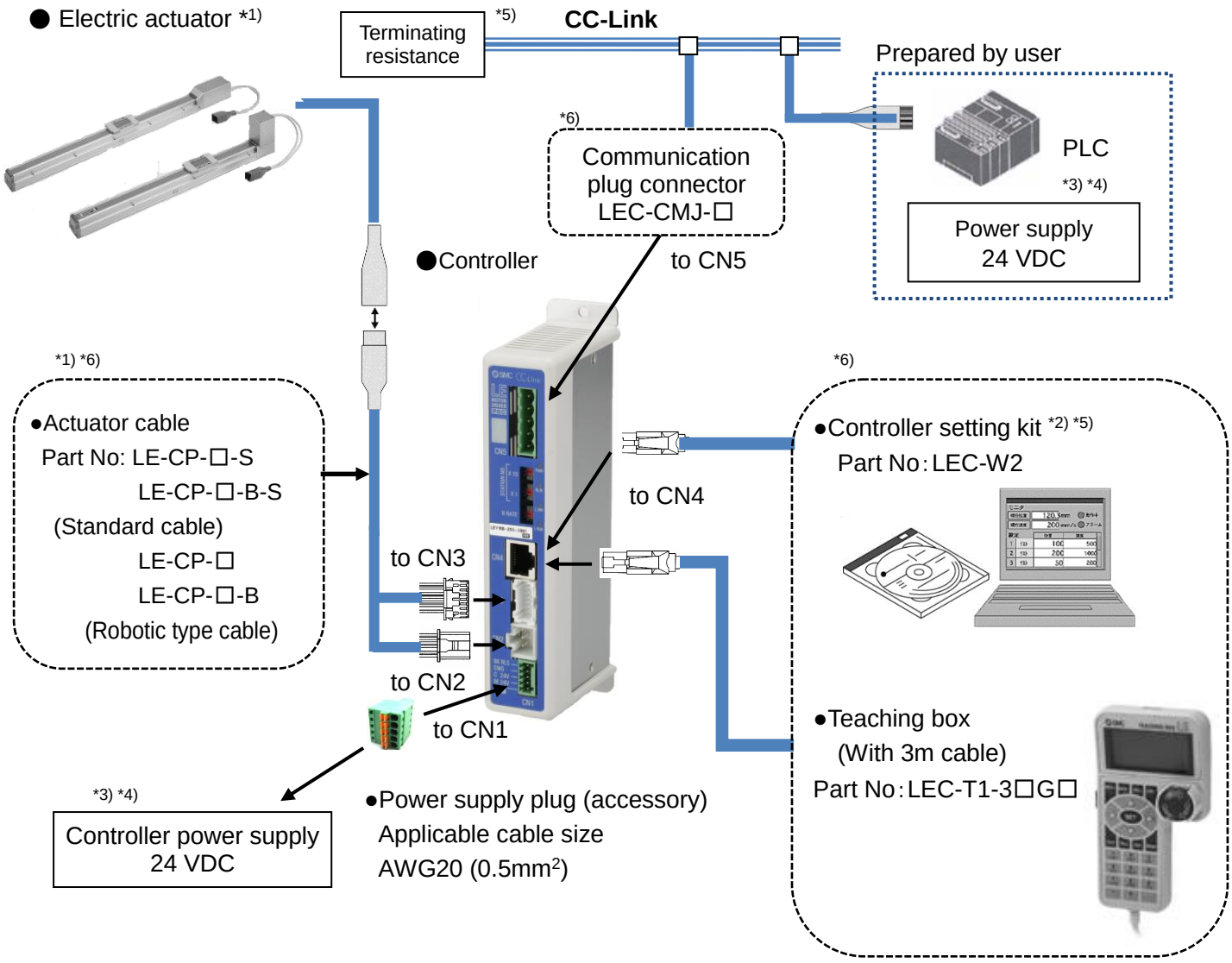
There are two available modes for the controller setting kit and the teaching box. In Easy mode, you can start the operation by only setting the speed, position, etc. In Normal mode, further detailed setup can be performed.

⚠ Caution

Please keep this manual safe for future use. It will be necessary to refer to this manual along with the operation manuals for other electric actuators, teaching box, and controller setting kit at installation and faultfinding.
Keep this operation manual accessible for reference.

2.2 Product configuration

The product configuration of this controller is as follows.



*1) These items are included when ordered using the part number for the electric actuator set.

*2) The controller setting software must use the latest version.
For version information and upgrade, please refer to the SMC website. http://www.smcworld.com/

*3) When conformity to UL is required, the electric actuator and controller should be used with a UL1310 Class 2 power supply.

*4) 24 VDC power supply for controller input and 24 VDC power supply for I/O signal should be separated

*5) Be sure to prepare a terminating resistor and a PC.

*6) Optional.

⚠ Warming

Refer to section **"5. External Connection for wiring"**

Refer to **"17. Precautions for wiring and cables"** when handling the wiring and cables.

Do not connect the teaching box, LAN equipment, or LAN cable directly to a PC.
Otherwise, the controller, PC or equipment may be damaged.

2.3 How to Order

The product configuration of this controller is as follows.

L E C P M J □ □ – □

Controller

Compatible

P	Step motor (Servo / 24 VDC)

Kind of controller

MJ	CC-Link direct input type

Communication plug connector

Nil	None
S	Straight type
T	T-Branch type

Option

Nil	Screw mounting
D	DIN rail mounting

Electric actuator model

Stroke example: For LEFS25B-100B-S3MJT,
Specify LEFS25B-100
Rotating angle: For LER10K-2L-RMJT,
Specify LER10K-2
(Enter from the electric actuator part number "LE" to "stroke/ rotating angle")

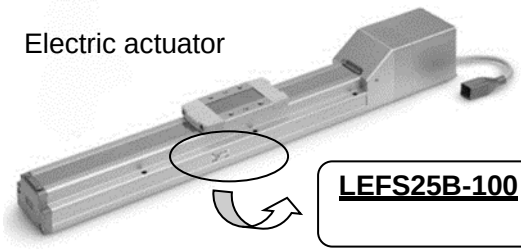
BC	Blank controller *1)

Note 1) Specified software (LEC-BCW) is required.

⚠ Caution

The controller and the electric actuator are factory set Confirm the combination of the controller and the electric actuator is correct.

Electric actuator



LEFS25B-100

Controller

LEFS25B-100

2.4 Option

(1)Actuator cable (5m or less)

LE-CP-□-□

Cable length (L)

1	1.5m
3	3m
5	5m

Actuator cable type

Nil	Robotic type cable
S	Standard cable

①

signal	Terminal no.
A	B-1
$\overline{A}$	A-1
B	B-2
$\overline{B}$	A-2
COM-A/COM	B-3
COM-B/ -	A-3
Vcc	B-4
GND	A-4
$\overline{A}$	B-5
A	A-5
$\overline{B}$	B-6
B	A-6

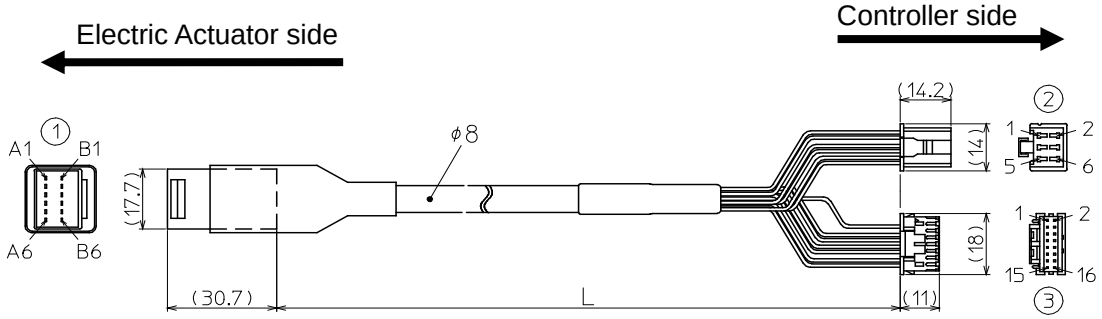
Shield

②

Cable color	Terminal no.
Brown	2
Red	1
Orange	6
Yellow	5
Green	3
Blue	4

③

Cable color	Terminal no.
Brown	12
Black	13
Red	7
Black	6
Orange	9
Black	8
-	3



(2) Actuator cable (8-20m)

LE-CP-□

Cable length (L)

8	8m *1)
A	10m *1)
B	15m *1)
C	20m *1)

*1) produced upon receipt of order.
Only Robotic type cable can be selected.

①

signal	Terminal no.
A	B-1
$\overline{A}$	A-1
B	B-2
$\overline{B}$	A-2
COM-A/COM	B-3
COM-B/ -	A-3
Vcc	B-4
GND	A-4
$\overline{A}$	B-5
A	A-5
$\overline{B}$	B-6
B	A-6

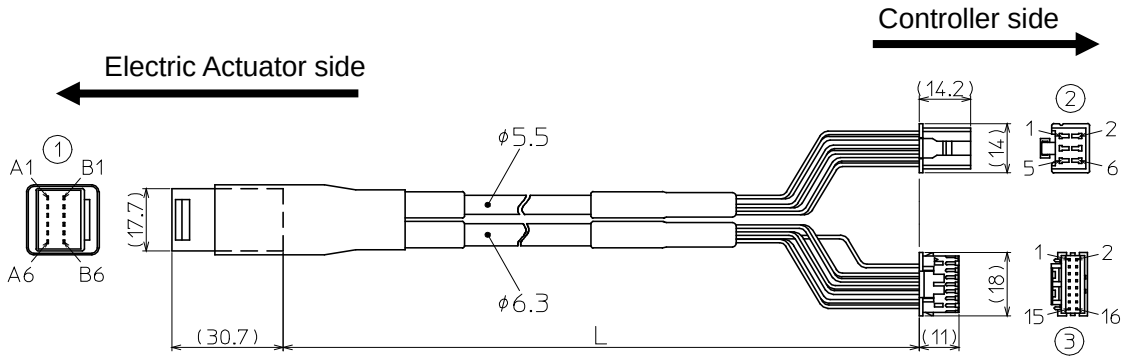
Shield

②

Cable color	Terminal no.
Brown	2
Red	1
Orange	6
Yellow	5
Green	3
Blue	4

③

Cable color	Terminal no.
Brown	12
Black	13
Red	7
Black	6
Orange	9
Black	8
-	3



(3) Actuator cable for with lock and sensor (5m or less)

LE-CP-□-B-□

Cable length (L)

1	1.5m
3	3m
5	5m

Actuator cable type

Nil	Robotic type cable
S	Standard cable

①

signal	Terminal no.
A	B-1
$\overline{A}$	A-1
B	B-2
$\overline{B}$	A-2
COM-A/COM	B-3
COM-B/ -	A-3
Vcc	B-4
GND	A-4
$\overline{A}$	B-5
A	A-5
$\overline{B}$	B-6
B	A-6

②

Cable color	Terminal no.
Brown	2
Red	1
Orange	6
Yellow	5
Green	3
Blue	4

Shield

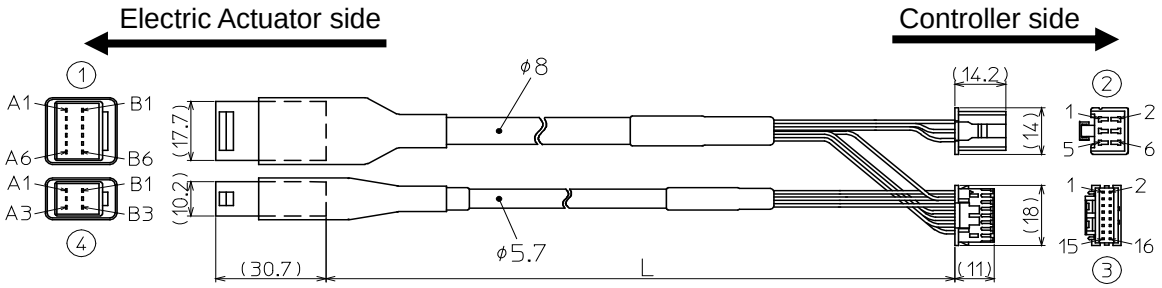
③

Cable color	Terminal no.
Brown	12
Black	13
Red	7
Black	6
Orange	9
Black	8
-	3

④

signal	Terminal no.
Lock (+)	B-1
Lock (−)	A-1
Sensor (+)	B-3
Sensor (−)	A-3

Cable color	Terminal no.
Red	4
Black	5
Brown	1
Blue	2



(4) Actuator cable for with lock and sensor (8-20m)

LE-CP-□-B

Cable length (L)

8	8m *1)
A	10m *1)
B	15m *1)
C	20m *1)

*1) produced upon receipt of order
Only "Robotic type cable" can be selected.

①

signal	Terminal no.
A	B-1
$\overline{A}$	A-1
B	B-2
$\overline{B}$	A-2
COM-A/COM	B-3
COM-B/ -	A-3
Vcc	B-4
GND	A-4
$\overline{A}$	B-5
A	A-5
$\overline{B}$	B-6
B	A-6

②

Cable color	Terminal no.
Brown	2
Red	1
Orange	6
Yellow	5
Green	3
Blue	4

Shield

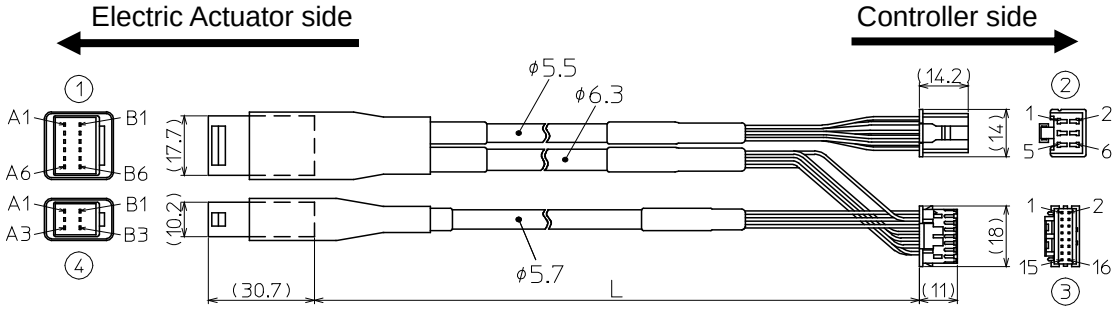
③

Cable color	Terminal no.
Brown	12
Black	13
Red	7
Black	6
Orange	9
Black	8
-	3

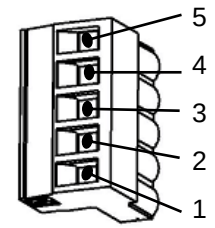
④

signal	Terminal no.
Lock (+)	B-1
Lock (−)	A-1
Sensor (+)	B-3
Sensor (−)	A-3

Cable color	Terminal no.
Red	4
Black	5
Brown	1
Blue	2



(5) Communication plug connector



Straight type

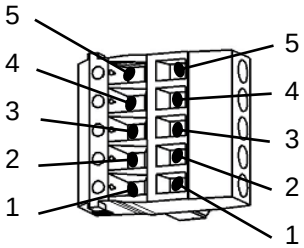
LEC-CMJ-□

Correspondence network

MJ	CC-Link

Type

S	Straight type
T	T-Branched

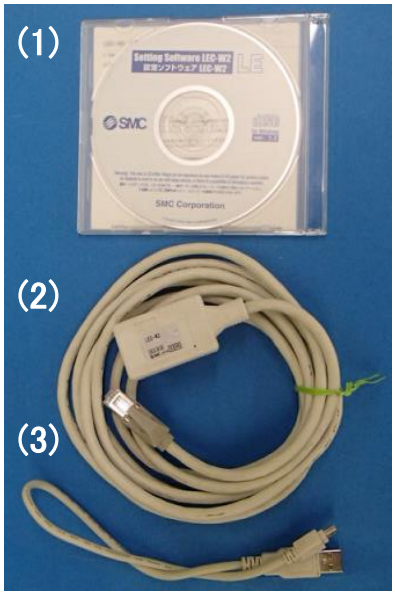


T-Branched type

No.	Name	Function
1	DA	CC-Link communication line A
2	DB	CC-Link communication line B
3	DG	CC-Link ground line
4	SLD	CC-Link shield
5	FG	Frame ground

(6) Controller setting kit

LEC-W2



Contents

Description	Product No. *1)	Quantity
(1) Controller setting software (CD-ROM)	LEC-W2-S	1
(2) Communication cable (3m)	LEC-W2-C	1
(3) USB cable (0.3m)	LEC-W2-U	1

*1) Can be ordered separately.

Hardware requirements

PC/AT compatible machine installed with Windows®XP and Windows®7 Windows®8.1 and equipped with USB1.1 or USB2.0 ports.

Windows® and Windows®XP, Windows®7, Windows®8.1 are registered trademarks of Microsoft Corporation.

⚠ Caution

The controller setting software must use the latest version.
Upgrade software be able to download on SMC website. http://www.smcworld.com/

(7) Teaching box

LEC－T1－3JG□

Teaching box

Cable length

3	3m

Initial language

E	English
J	Japanese

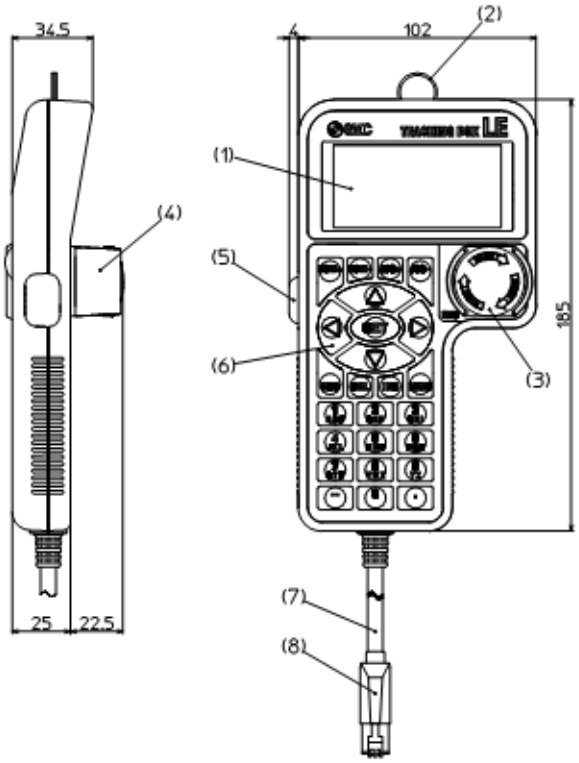
Enable switch

Nil	No enable switch
S	Equipped with enableswitchchluded.

Stop switch

G	Equipped with stop switch

Dimensions



No.	Name	Function
(1)	LCD	A screen ofliquid crystal display (with backlight)
(2)	Ring	A ring for hanging the teaching box.
(3)	Stop switch	When swich is pushed in, the swich locks and stops. The lock is released when it is turned to the right.
(4)	Stop switch guard	A guard for the stop guard
(5)	Enable switch (Option)	Prevent unintentional operation (unexpected operation) of the Jog test function. Other functions such as data change are not covered.
(6)	Key switch	Switch for each input
(7)	Cable	Length: 3 meaters
(8)	Connector	A connector connected to CN4 of the controller

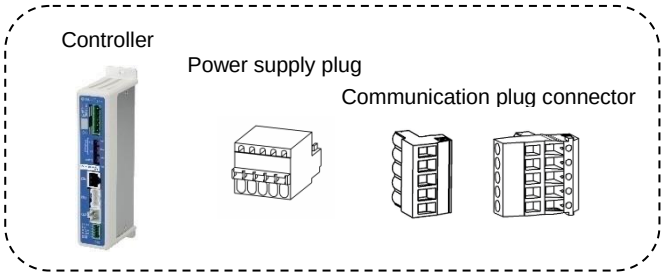
2.5 Startup Procedures

Be sure to check the procedure below before use.

(1) Confirmation of the package content

After unpacking everything, check the description on the label to identify the controller and the number of accessories. If any parts are missing or damaged, please contact your distributor.

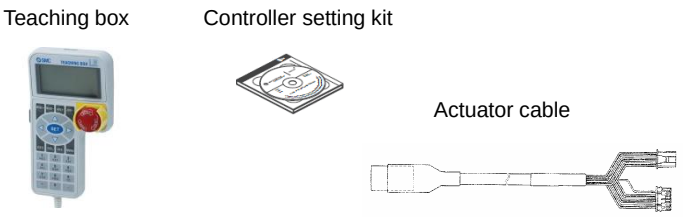
Item	Quantity
Controller (LECPMJ□□-□)	1 unit
Power supply plug (LEC-D1-1)	1 piece
Communication plug connector (LEC-CMJ-□) *1)	1 piece



*1) This item is included if you ordered by the part number for a set of communication plug connector.

【Option】

- ●Teaching box
- ●Controller setting kit
- ● Actuator cable
- ●Communication plug connector



(2) Installation

Please refer to the **"3.4 How to install"**

(3) Controller setting

It is necessary to set the address and the communication speed by the rotary switch of controller.

Please refer to the **"4.1 Switch (STAION NO., B RATE)"**

(4) PLC Setting

It is necessary to set a parameter of PLC which becoming the master station.

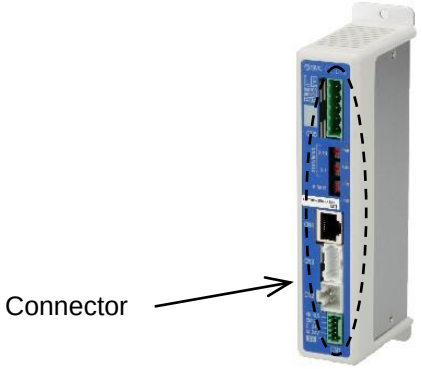
Please refer to the **"4.3 PLC setting"**.

(5) Wiring and connection

Prepare the electric actuator and the cable.

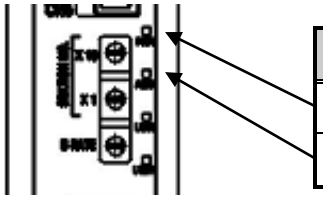
Connect cables, etc. to the connector (CN1 to CN5) of the controller.

Please refer to the **"5 External Wiring Diagram"** for the wiring of the connectors.



(6) Power ON alarm (error)

Ensure the stop is not activated and then supply 24 VDC power.



controller

Function	LED color	Status
PWR	Green	Normal
ALM	Off	No alarm

Please refer to **"8. LED Display"** for the explanation of each LED lamp
If the LED [PWR] lights in green, the controller is in the normal condition.
However, if the LED [ALM] lights in red, the controller is in the alarm (error) condition.

⚠ Caution

In case of alarm (error) condition:
Refer to the corresponding memory on CC-Link or connect a PC or the teaching box to the CN4 serial I/O connector and check the details of the alarm. Then, remove the cause of the error referring to the **"15. Alarm Detection of Motor Control"**.
Please refer to the manuals of the controller setting software or the teaching box for details of the alarms.

(7) Parameter setting

It is necessary to set a parameter of the controller. Please refer to the **"4.2 Parameter Setting"**
When setting of the PLC and the parameter are completed definitely, and CC-Link communication is established, LED of the controller front turns on like a list shown below.

Functions	LED condition	Condition
PWR	Green On	Supply of power
ALM	Off	No alarm
L ERR	Off	CC-Link status normal
L RUN	Green On	CC-Link communicating

Please refer to **"8. LED Display"** for the explanation of each LED lamp.
When LED [L RUN] is off or LED [L ERR] is red on/ red flashing, the communication of PLC and the controller is not established.

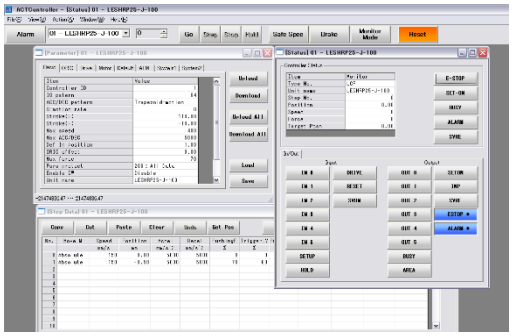
⚠ Caution

If communication between the PLC and the controller is not established, refer to **"16.Alarm Detection in CC-Link Communication"** and remove the cause.
And, with reference to **"4.2 Parameter Setting"** and **"4.3 PLC Setting"**, please confirm whether the communication speed of PLC and the controller, station information are set correctly.

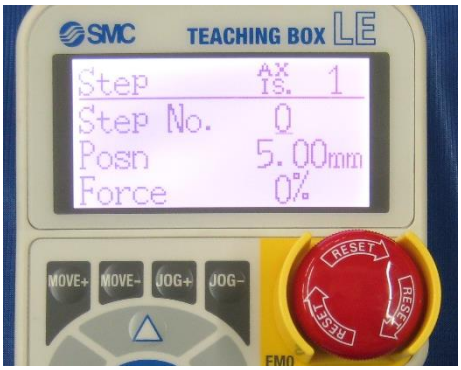
(8) Operation pattern setting

Set up the step data and parameters using the controller set up kit or the teaching box.

●Controller set up kit



●Teaching box



Please refer to the manuals of the controller setting software or the teaching box for how to setup the operation pattern.

(9) Trial run

Please refer to the manuals of the controller setting kit or the teaching box manual for how to perform a trial run.

3. Product Specifications

3.1 Specifications

(1) Basic specifications

Item		Specifications			
Compatible motor		Step Motor (Servo / 24 VDC)			
Power supply *1) *2)		Power voltage: 24 VDC +/-10% Max. current consumption: 3A (Peak 5A) *3) (for both of motor drive power control power, stop, lock brake release)			
Compatible encoder		Incremental A/B phase (800 pulse / rotation)			
Serial communication		Conforming to RS485. (Modbus protocol compliant)			
Memory		EEPROM			
LED indicator	LED name	PWR	ALM	L ERR	L RUN
	Contents	Power supply status	Alarm status	CC-Link Error status	CC-Link Communication status
Lock control		Forced-lock release terminal (Applicable to non -magnetizing lock.)			
Cable length		Actuator cable: 20m or less			
Cooling system		Natural air cooling			
Operating environment		Do not use in the environment of explosive gas, corrosive gas, oil mist, or powder dust.			
Operating temperature range		0 to 40ºC (No freezing)			
Operating humidity range		90%RH or less (No condensation)			
Storage temperature range		-10 to 60ºC (No freezing)			
Storage humidity range		90%RH or less (No condensation)			
Vibration		$4.9m/s^2$			
Enclosure		IP20			
Insulation resistance		Between external terminals and case 50MΩ (500VDC)			
Mass		170g (screw mount type) 190g (DIN rail mount type)			

*1) The controller power supply do not use the power supply of “inrush current restraining type”.

*2) When conformity to UL is required, the electric actuator and controller should be used with a UL1310 Class 2 power supply.

*3) The power consumption changes depending on the electric actuator model.
Please refer to the specifications of the electric actuator for more details.

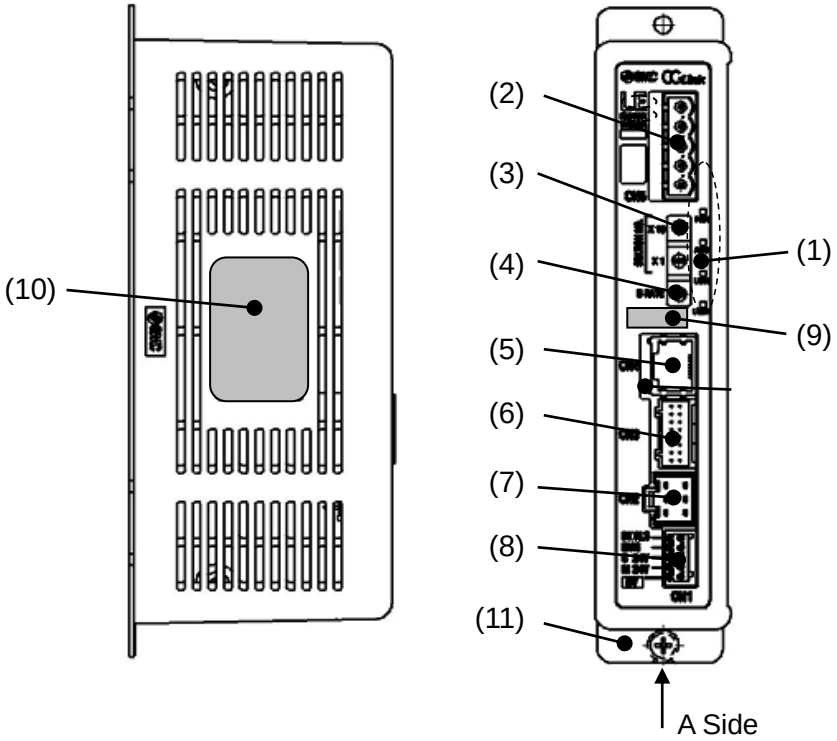
(2)CC-Link type

Item		Specifications				
Field bus		CC-Link Version 1.10				
Station type		Remote device station				
Occupied number of stations	Number of stations	1 stations	2 stations	4 stations		
	Number of input points/ number of output points	32 points / 32 points 4 words / 4 words	64 points / 64 points 8 words / 8 words	128 points /128 points 16 words / 16 words		
Communication speed		156k / 625k / 2.5M / 5M / 10Mbps				
Communication method		Broadcast Polling System				
Synchronization system		Frame synchronous communication				
Encoding method		NRZI				
Transmission system		Bus system (EIA RS485 compliant)				
Communication format		HDLC compliant				
Error control system		CRC ($X^{16}+X^{12}+X^5+1$)				
Applicable communication cable		CC-Link Ver.1.10-compatible cable (Three-core twisted-pair cable with shield)				
Cable length	Communication speed (bps)	156k	625k	2.5M	5M	10M
	Total cable length (m)	1200	900	400	160	100

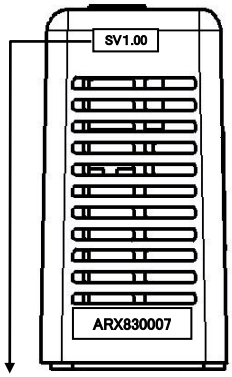
For a system with a CC-Link Ver.1.00-compatible cable coexisting, the maximum length and station-to-station length of the communication cable should follow the specifications for Ver.1.00.

3.2 Parts description

The detailed descriptions of each part are as follows:



A Side
(Controller version)



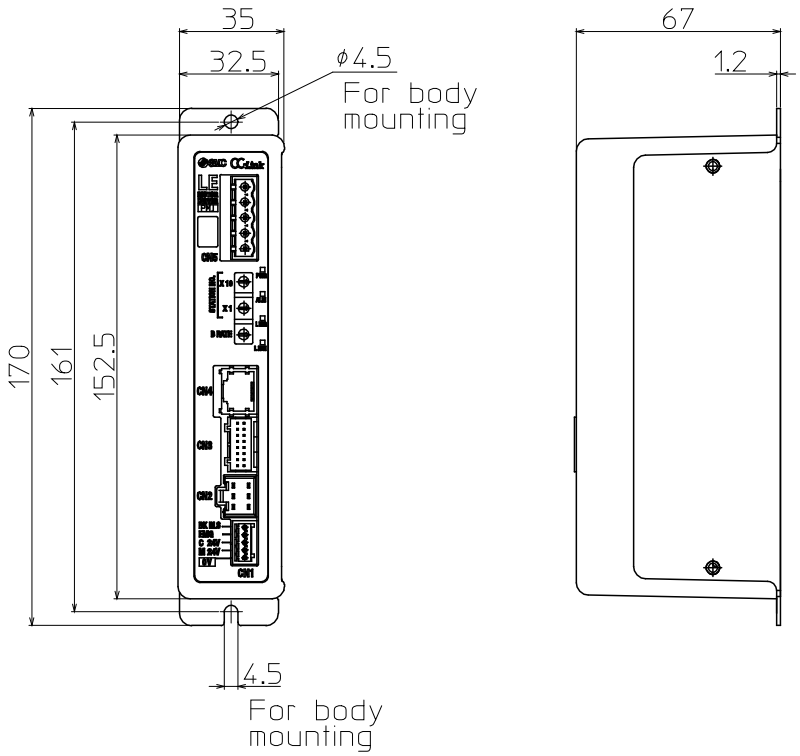
Label of Controller version
Example) SV2.07-1.00

No.	Label	Name	Description
(1)	-	LED	LED to indicate the condition of the controller. Please refer to the **"8. LED Display"**
(2)	CN5	Communication plug connector	Used to connect the CC-Link line.
(3)	STATION NO.	STATION NO. switch	Switch for setting address (01 to 64) X1 and X10
(4)	B RATE	Communication speed change switch	Used to set the communication speed of CC-Link.
(5)	CN4	Serial I/O Connector (8 pin)	Used to connect the teaching box (LEC-T1), Controller setting kit (LEC-W2), etc.
(6)	CN3	Encoder connector (16 pin)	Used to connect the actuator cable.
(7)	CN2	Motor power connector (6 pin)	
(8)	CN1	Power connector (5 pin)	Used to connect the controller power supply (24 VDC) with the power supply plug. Common power(-),Motor power (+),Control power(+),Stop signal(+),Lock release(+)
(9)	-	Applicable electric actuator model number label	The label indicating the applicable electric actuator model.
(10)	-	Controller label	The label indicating the part number of the controller.
(11)	-	FG	Functional ground (When the controller is mounted, tighten screws and connect the grounding cable.)

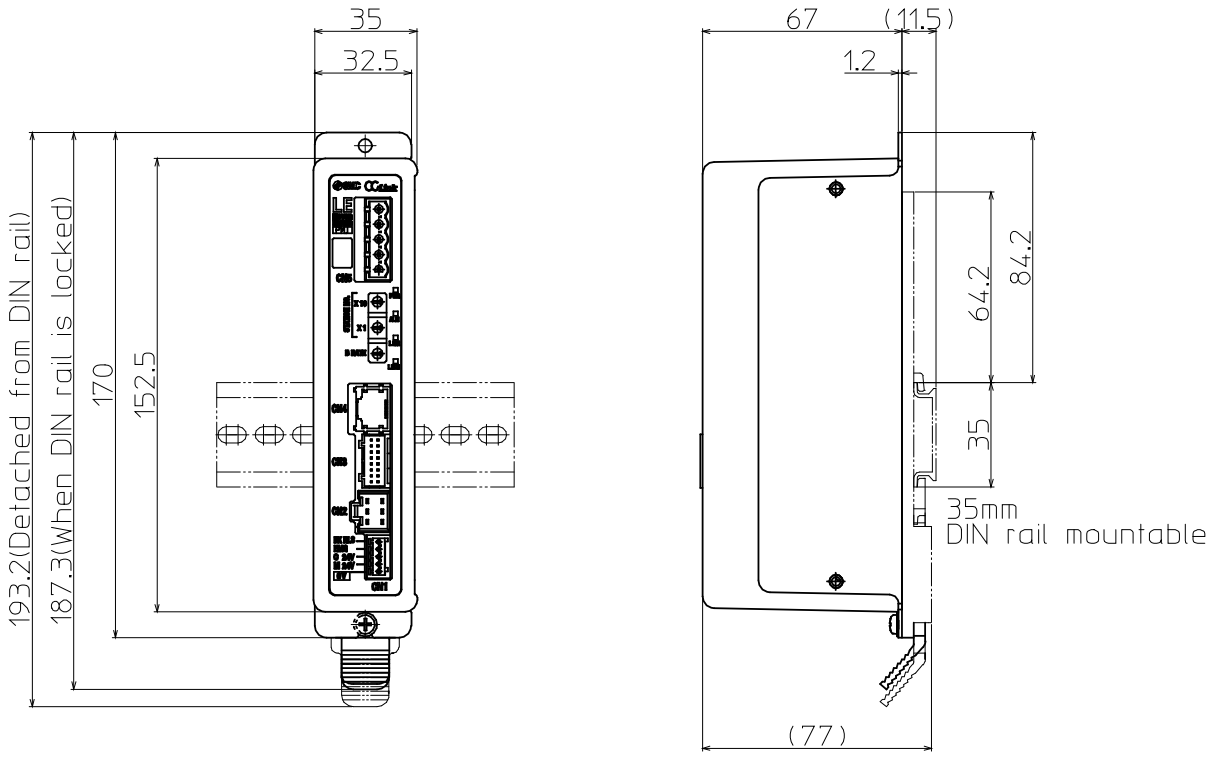
3.3 Outside dimension diagram

The outside view of this product is as shown in the diagram below:

(1) Screw mount type（LECPMJ□-□）



(2) DIN rail mount type (LECPMJ□D-□）



3.4 How to install

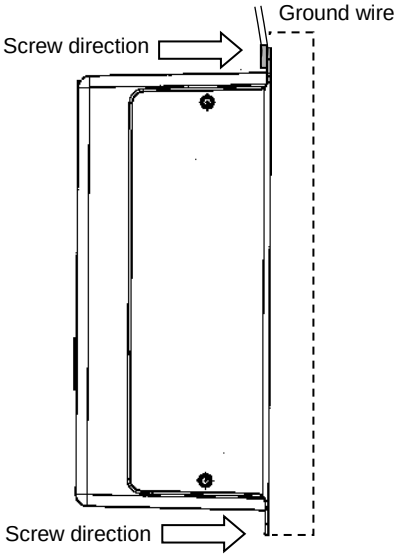
(1) How to install

The controller can be direct mounted using screws or mounted on a DIN rail.

The followings are the descriptions on how to install each type:

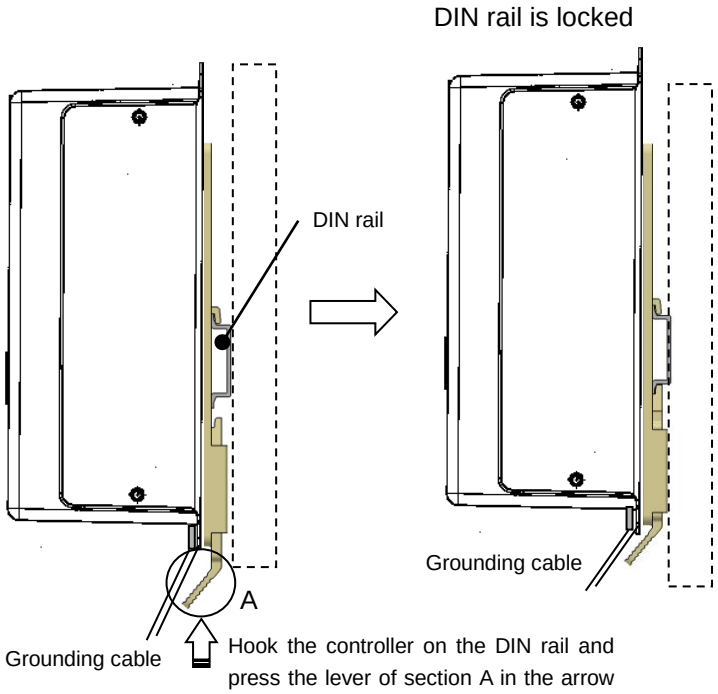
1) Screw mount type (LECPMJ□-□)

(Installation with two M4 screws)



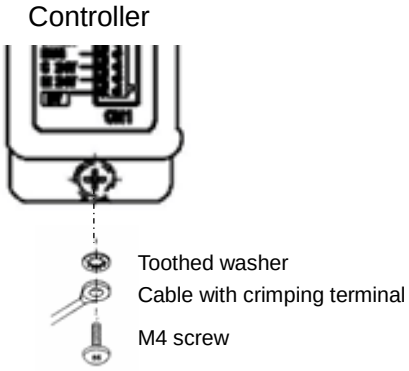
2) DIN rail mount type (LECPMJ□D-□)

(Installation with the DIN rail)



(2) Ground wire connection

Place the grounding cable with crimping terminal and toothed washer as shown below and tighten the screw.



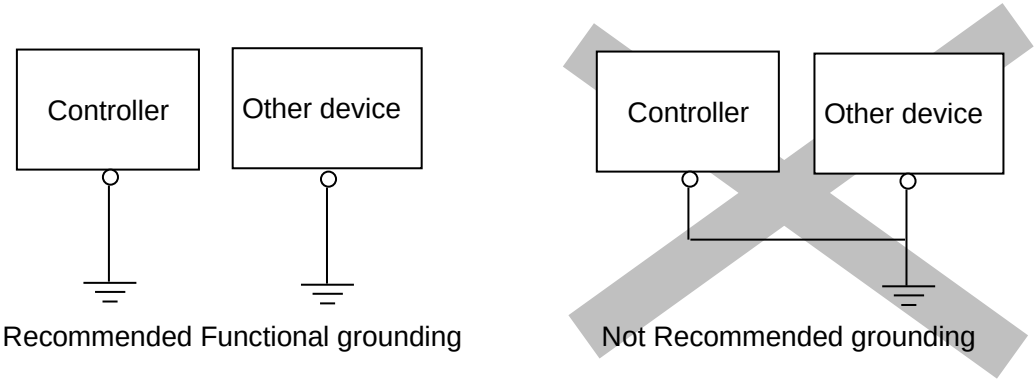
⚠ Caution

The M4 screw, cable with crimping terminal, and toothed washer should be obtained separately.
Ground the controller to shield it from electric noise.
If higher noise resistance is required, ground the 0V (signal ground).
When grounding the 0V, avoid flowing noise from the ground to the 0V

⚠ Caution

The earthling should be the dedicated grounding point. It should be a functional ground with less than 100 Ω resistance.

The cross section of the grounding wire should be greater than 2mm^2.
The ground point should be near this controller to make the wire length shorter.



(3) Installation location

Select the size and the installation style so that the surrounding temperature of the controller is 40 °C or less.

Mount the controller vertically on the wall with the space allowed as shown in Fig. 1.

As shown in Fig. 2, establish the construction so that the connectors can be connected and disconnected.

Enough space must be allowed around the controller so that the operating temperature of the controller stays within the specification range.

Avoid mounting the controller near a vibration source, such as a large electromagnetic contactor or circuit fuse breaker on the same panel.

Fig.1

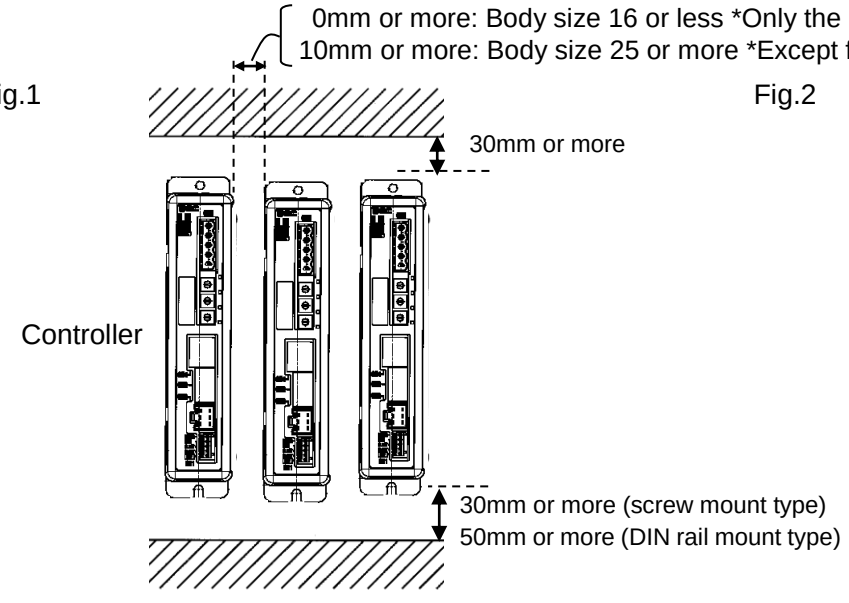
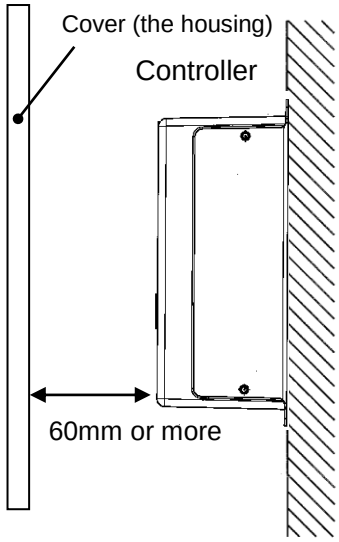


Fig.2



⚠ Caution

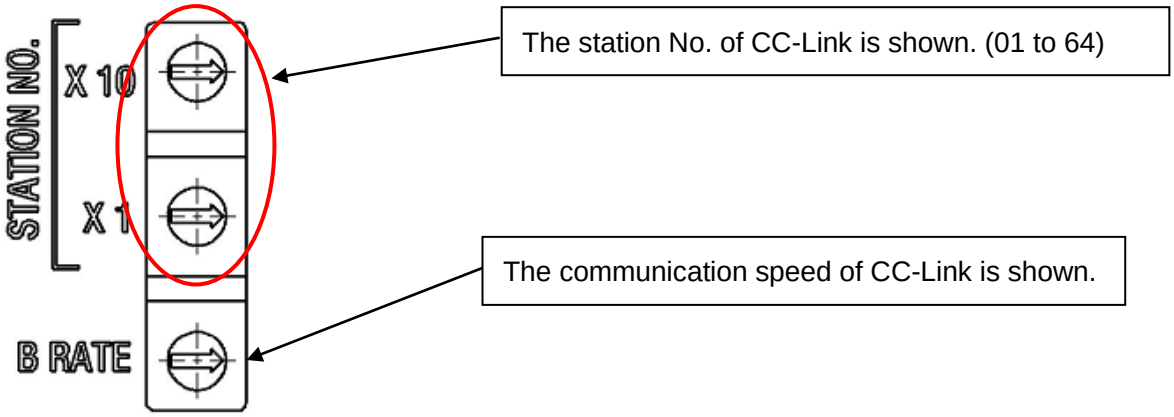
If the mounting surface of the controller is distorted or not flat, excessive force may be applied to the housing, etc. causing malfunction.

Mount this product on a plane flat surface.

4. Initial Setting

4.1 Switch (STATION NO., B RATE)

Set the CC-Link address and the CC-Link communication speed by the rotary switch. The table below shows functions of switches.



●STATION NO

Switch name	Set range	Description
STATION NO.(X10)	01 to 64	Set upper bits of the station.
STATION NO.(X1)		Set lower bits of the station.

The CC-Link address setting at the time of the factory shipment is set in “01".

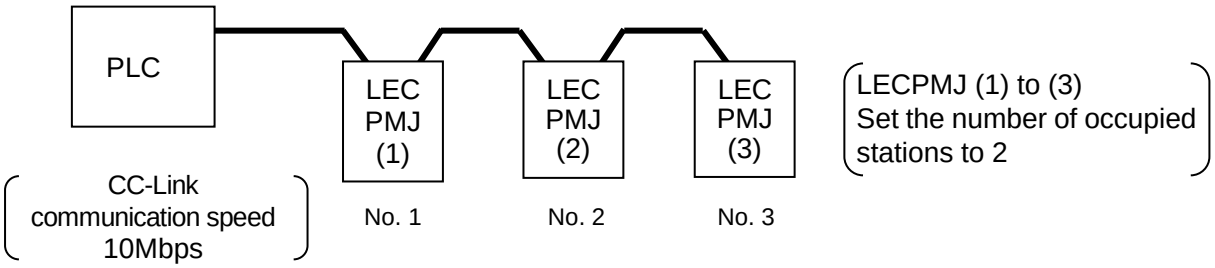
●B RATE switch

B RATE	CC-Link communication speed
9	Reset of Occupied number of stations *1)
8 : 5	No used
4	10Mbps
3	5Mbps
2	2.5Mbps
1	625kbps
0	156kbps

*1) In case of set point = 1 of Occupied number of stations:
The set point of Occupied number of stations is returns to “2” as delivered by applying the power at the state of B RATE = 9.

The communication speed of CC-Link setting at the time of the factory shipment is set in “0" (156kbps).

Example) When 3 controllers tie as follows by 2 stations occupation (The communication speed of CC-Link is 10Mbps)



(1) Since the CC-Link communication speed of the PLC is 10 Mbps, set the B RATE switch for all controllers to 4 (10 Mbps).

(2) Set the controller's STATION NO. (for the PLC, set the CC-Link station No. address to 0.)

Controller 1: For LECPMJ (1), set the CC-Link station No. address = 1.
(STATION NO. (X10)＝0、STATION NO. (X1＝1)

Controller 2: For LECPMJ (2), set the CC-Link station No. address = 3, which is calculated by adding 2 to the CC-Link station No. address of LECPMJ (1) (= 1).
(STATION NO. (X10)＝0、STATION NO. (X1)＝3)

Controller 3: For LECPMJ (3), set the CC-Link station No. address = 5, which is calculated by adding 2 to the CC-Link station No. address (= 3) of LECPMJ(2).
(STATION NO. (X10)＝0、STATION NO. (X1)＝5)

4.2 Parameter Setting

Set the parameter of occupied number of stations and operation setting at the time of the communication error of LECPMJ. The set item is shown below.

●Occupied number of stations setting

Set Occupied number of stations in "Optional setting 1" of basic parameter item.

Optional setting 1	Mode	Occupied number of stations
1	Single numerical data instructions	1 stations
2 (initial value)	Half numerical data instructions	2 stations
4	Full numerical data instructions	4 stations

Please refer to **"9. Mode"** for details of each mode

●Operation setting of CC-Link at the time of the communication error

Set the operation of CC-Link at the time of the communication error in "Undefined parameter No.11" of basic parameter item.

Undefined parameter No.11	Output the data to control unit
0 (initial value)	HOLD
10	Alarm Stop

Please refer to **"11.2 Basic parameter"** for details of each parameter.

4.3 PLC Setting

Set PLC that become the master station.
Use a PLC that supports CC-Link Ver. 1.10 or Ver. 2.00.

Show a case with CC-Link system master local unit (Q Series) of Mitsubishi for the example about setting.
PC series: QCPU (Q mode), PC type： Q00UJ

● Initial addresses of Remote I/O (Rx, Ry) and Remote register (RWr, RWw), etc.

The PLC memory address shown in **"10. Memory assignment"** becomes the address when doing the setting as the following list. Please set it according to the operating environment.

Example of setting the initial address

	Initial addresses
Remote input (Rx)	X1000
Remote output (Ry)	Y1000
Remote register (RWr)	W0
Remote register (RWw)	W1000
Special relay (SB)	SB0
Special register (SW)	SW0

● Station information setting

Set Occupied number of stations of LECPMJ which connected to the PLC.
Please set the value same as Occupied number of stations of "Optional setting 1" of Basic parameter.
Occupied number of stations of LECPMJ is set in "2" for shipment.

Example of setting the station information

Station classification	Occupied number of stations
Remote device station	2 stations occupation

●Mode setting

Set the Ver.1 mode.

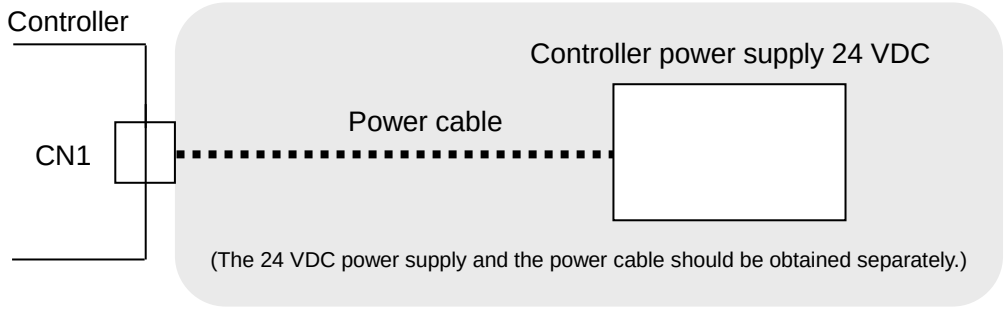
●Communication speed

Set the same value of communication speed as the value of **"4.1 Switch (STATION NO., B RATE)"**
Please refer to the manual of PLC which is using for details of the setting.

5. External Wiring Diagram

Examples of standard wiring are shown for each connector (CN1 to CN5) of the controller.

5.1 CN1: Power connector



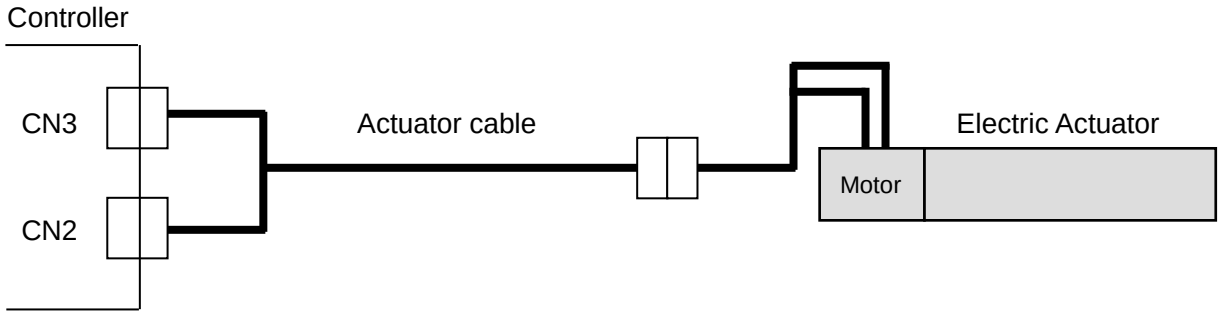
Please refer to **"6. CN1: Power supply plug"** for how to wire the CN1 connector.

⚠ Caution

The controller power supply (24 VDC) do not use the power supply of "inrush current restraining type".

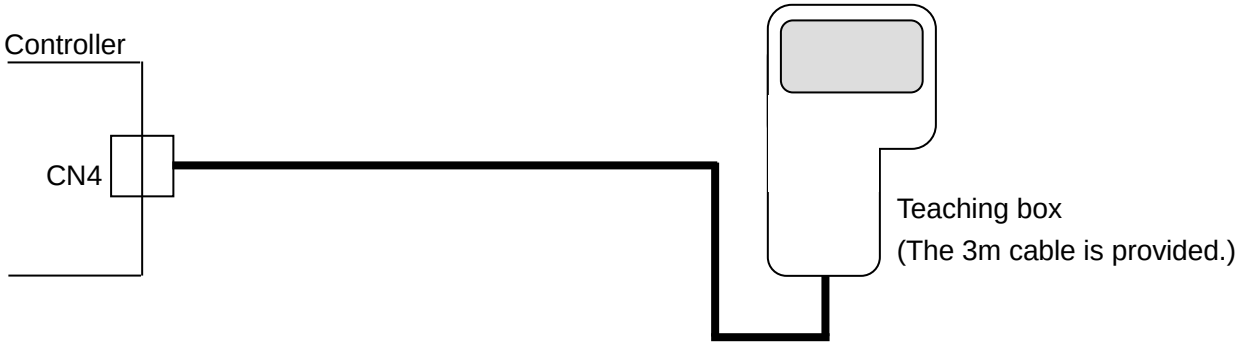
5.2 CN2: Motor power connector and CN3: Encoder connector

Connect the controller and the electric actuator with the actuator cable (LE-CP-☐-☐).

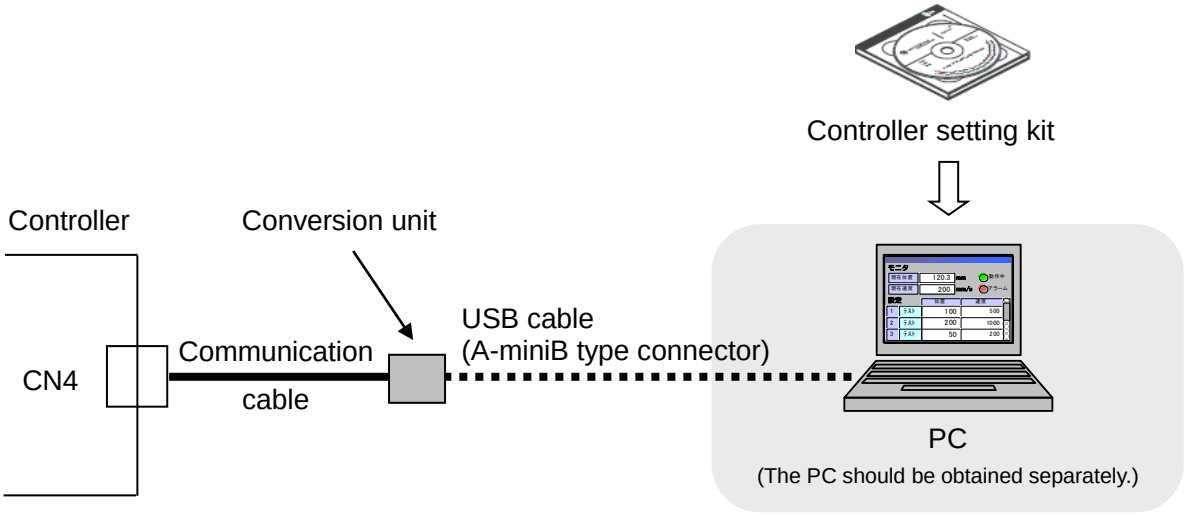


5.3 CN4: Serial I/O connector

(1) Connection with the teaching box



(2) Connection with a PC



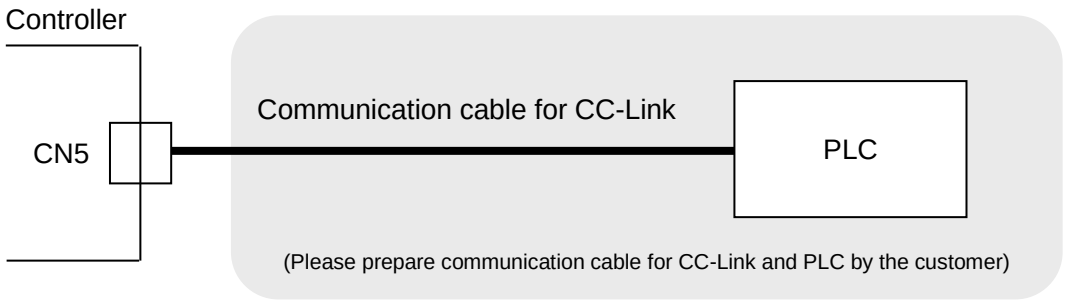
⚠ Caution

(1) Do not connect to equipment other than specified (LEC-W1, LEC-W2, LEC-T1, LEC-G). When connected to equipment, which is not specified, the product will be damaged by incorrect signal wiring.

(2) When connecting the cable, make sure that no electrically conductive materials are present in the connector insertion port.

(3) In the LEC-W1, the 0V of the driver and PC is not insulated. If the 0V and the PC ground are common and the PC ground makes contact with another voltage, an excessive voltage might be applied to the driver, causing damage to the driver.

5.4 CN5: Communication plug connector

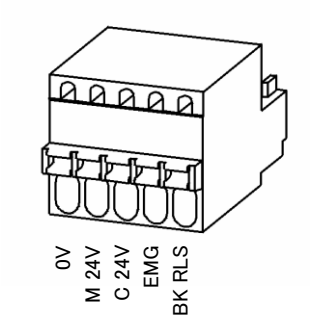


For the wiring method, refer to **"7. CN5: Communication Plug Connector"**.

6. CN1: Power supply connector details

6.1 Power supply plug specifications

Power supply plug

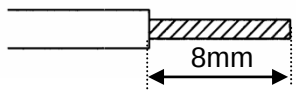


Terminal	Function	Descriptions
0V	Common power (-)	The negative common power for M 24V, C 24V, EMG and BK RLS.
M 24V	Motor power (+)	The positive power for the electric actuator motor to be supplied via the controller.
C 24V	Control power (+)	The positive control power.
EMG	Stop signal (+)	The positive power for Stop signal. (Motor is can operate to connect the 24V.)
BK RLS	Lock release (+)	The positive power for lock release.

【Power supply connector】

LEC-D-1-1 (FK-MC0.5/5-ST-2.5：Manufactured by Phoenix Contact)

6.2 Electric wire specifications

Item	Specifications
Applicable wire size (Single line, stranded wire, stranded wire with bar terminal (without insulation sleeve))	AWG20 (0.5mm^2) Cable sheath O.D. ø2.0mm or less The rated temperature for the insulation coating: 60^{o}C or more
Stripped section length	

Please insert only the peel line part when insert the electric wire in the power plug.

⚠ Caution

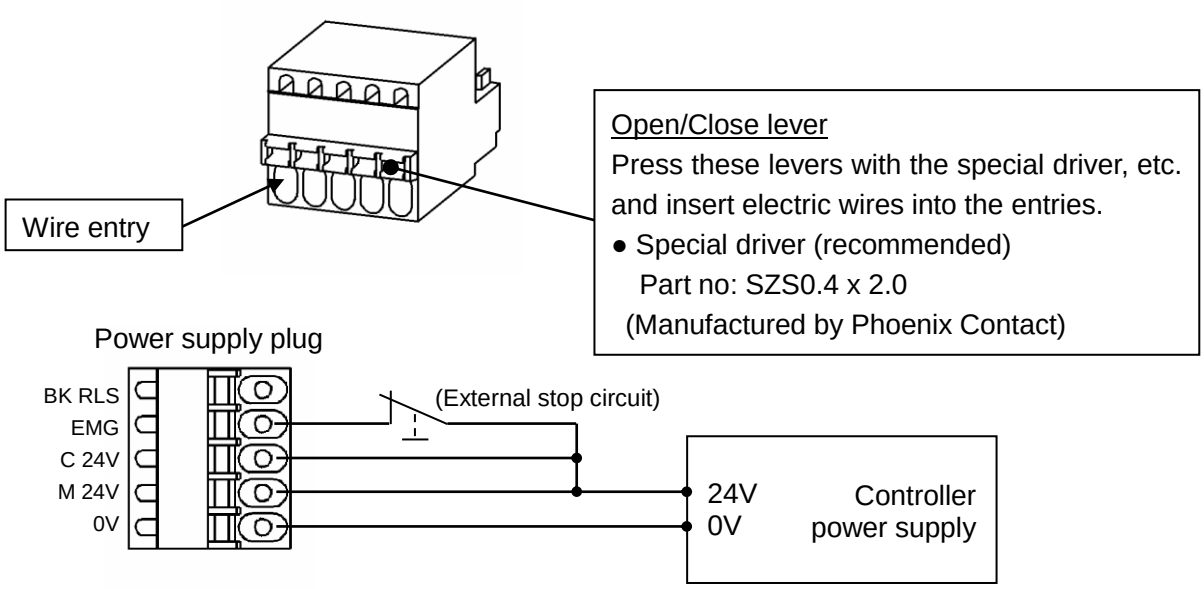
Multiple electric wires should not be connected to one terminal.
Arrange wiring so that conductors of each terminal do not contact other lines.

6.3 Wiring of power supply plug

Connect the power supply plug to the 24 VDC controller power supply according to instructions (1) (2) and (3) and then, insert it into the CN1 connector of the controller.

(1) Wiring of the power supply

Connect the positive of the 24 VDC controller power supply of the controller to the C 24V, M 24V and EMG terminal of the power supply connector, and connect the negative of that power supply to the 0V terminal.



⚠ Caution

For controller input power supply (24 VDC), use a power supply with a capacity not less than the "momentary maximum power" of the electric actuator specification. Do not use "inrush current restraining type" power supply.

(2) Wiring of the stop switch

By connecting 24V to EMG, motor becomes operable. Without connect the 24V to EMG, motor does not move. Stop switch must be installed by the user to stop the electric actuator in abnormal situations.

Please refer to **"6.4 Stop circuits"** for examples of how to wire stop switches.

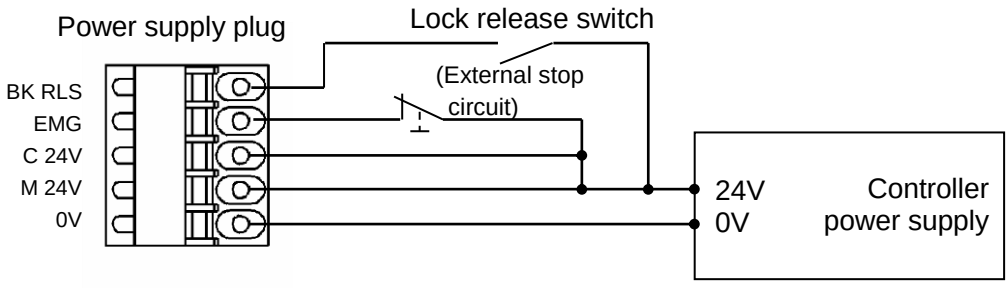
⚠ Caution

The Servo is not ON unless a voltage of 24 VDC is applied to the EMG terminal.

(3) Wiring of the lock release

Install an unlocking switch for adjustment or recovery during an emergency of the electric actuator with lock. The switch (24 VDC, Contact capacity: 0.5A or more) should be obtained separately.

One terminal of the lock release switch should be connected to the 24 VDC power supply and the other should be connected to the BK RLS terminal. When this is switched on, the lock will be released forcibly.



⚠ Caution

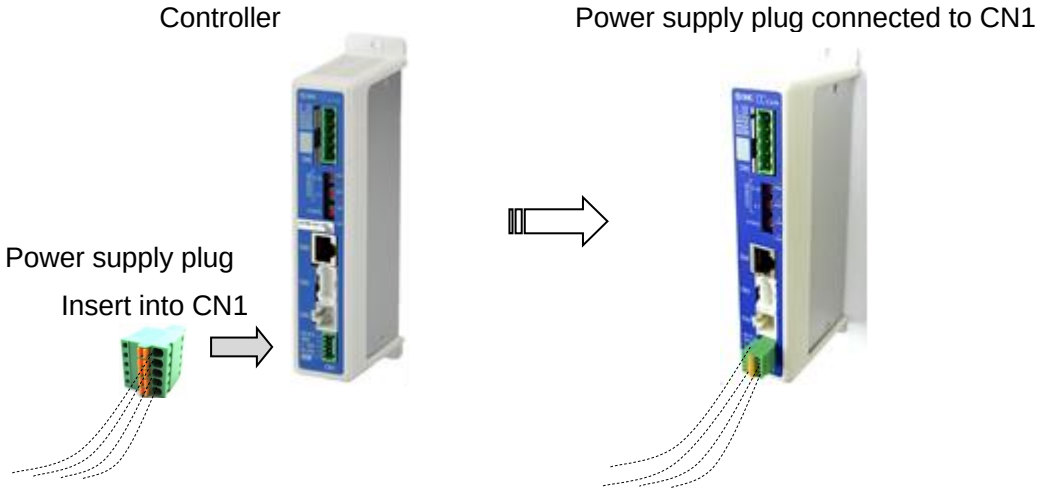
(1) If the electric actuator is a non-lock type, it is not necessary to wire the BK RLS terminal.

(2) Do not supply power to the BK RLS (lock release) during normal operation.

The 24 VDC supply to the BK RLS (lock release) is only required for the adjustment and the recovery in the emergency.

After the wiring of the power supply plug is completed, connect it to the CN1 connector of the controller.

Please refer to **"6.3 Wiring of power supply plug"** for how to wire the power supply plug.

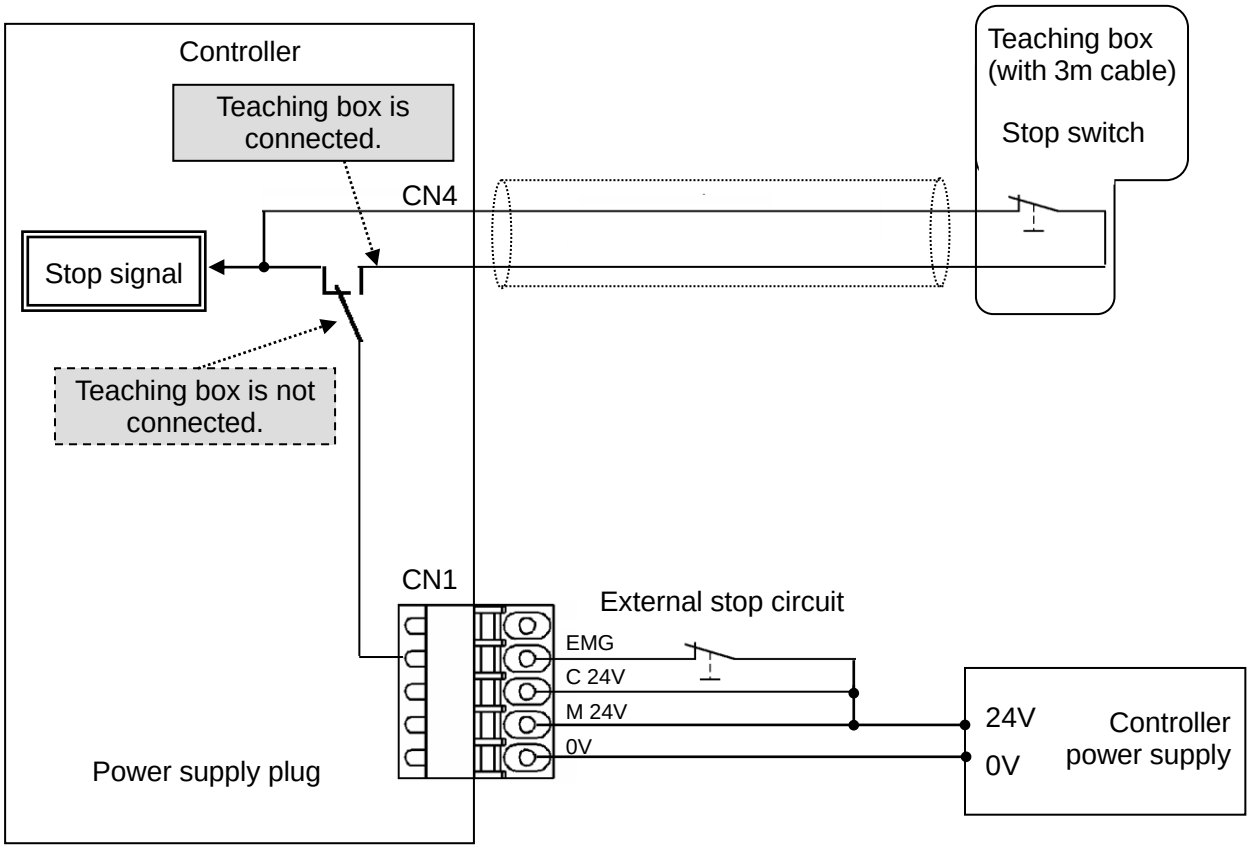


6.4 Stop circuits

When the external switch to stop or the stop switch of the teaching box is enabled on this controller, the electric actuator will stop.

(1) Example circuit 1- Single controller with teaching Box

When the teaching box is connected to the controller, the teaching box's stop switch will become effective.

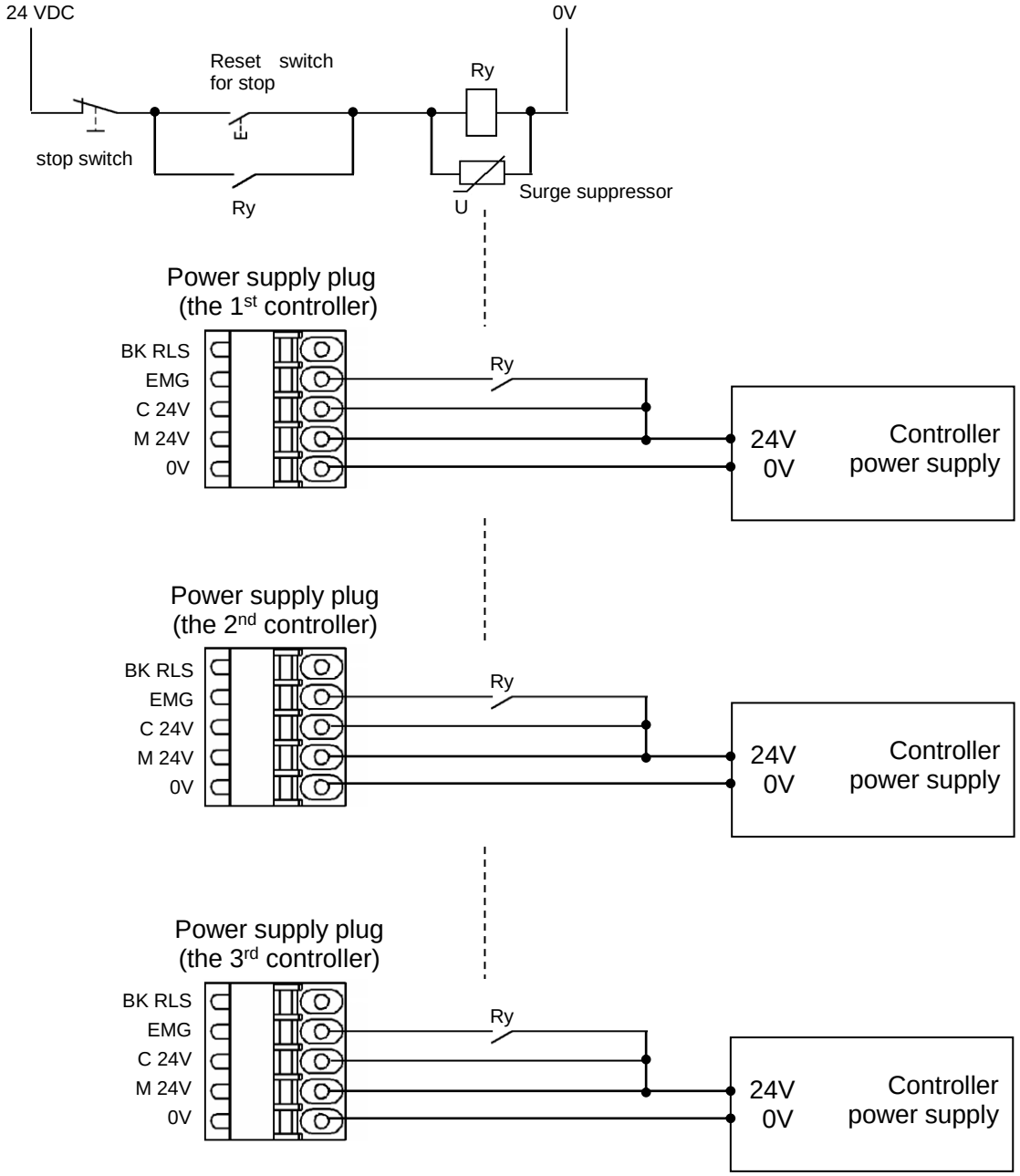


⚠ Warning
The teaching box's stop switch is effective only to the controller that is connected with it.

(2) Example circuit 2 - multiple controllers

If the system where this controller is installed has a stop circuit for whole system, or if the system has multiple controllers with individual power supply, relay contacts should be made between the 24 VDC controller power supply and the EMG terminal of the power supply plug.

(Circuit example: The figure below shows the stopped state.)

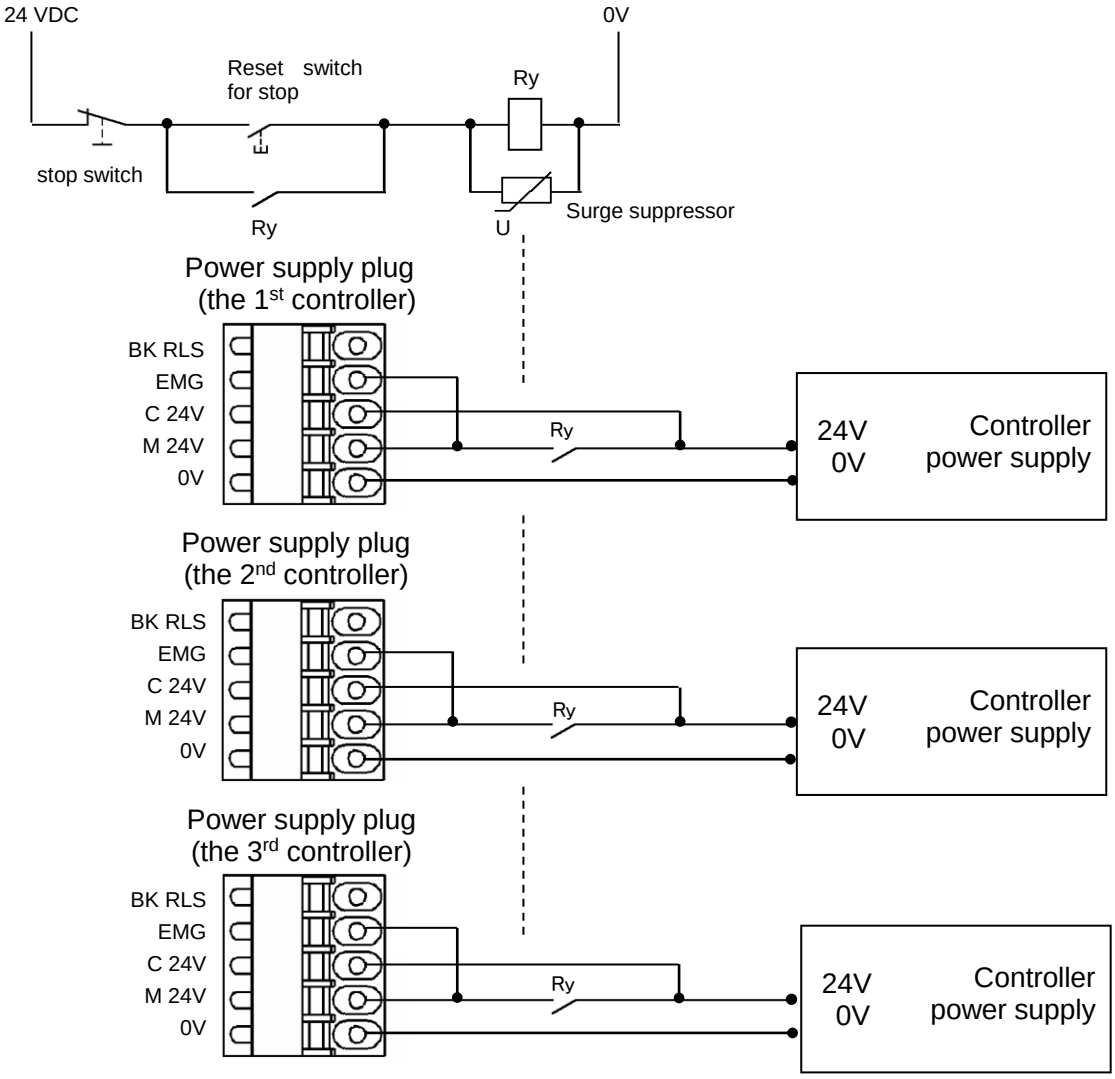


⚠ Caution
When shutdown is input, the controller stops with maximum deceleration, then the motor is turned off.

(3) Example circuit 3 - Motor power shutdown

If there is a necessity to have circuit to shut down the motor power externally, relay contacts should be made between the 24 VDC controller power supply and the M 24V and EMG terminal of the power supply plug.

(Circuit example: The figure below shows the stopped state.)



⚠ Warning

(1) Relay contacts should be made between the 24 VDC controller power supply and the M 24V and EMG terminal of the power supply plug. The electric actuator may make unexpected movement.

(2) When at the same time to OFF EMG and the power, For the inertia of the load, you might have to take time until the motor stops.

(3) Do not perform return to origin (SETUP input ON) when motor drive power (M 24V) is disconnected. The controller cannot recognize the correct origin point if a return to origin instruction is made with the motor drive power (M 24V) disconnected.

(4) If the electric actuator with lock is used vertically, delay in response of the brake may occur when shutting off the motor power supply (M 24V), and the moving part of the electric actuator may drop due to the weight of the electric actuator itself.

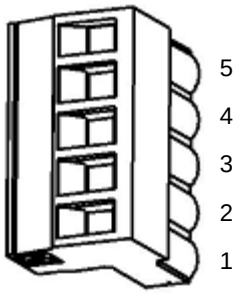
(5) Do not energize to the BK R LS terminal when there is a necessity to shut down the motor drive power (M 24V) externally.
Because the BK RLS terminal is connected with M 24V in the controller, the electric actuator may do unexpected operation. Please turn off the EMG terminal when energizing to the BK RLS terminal at motor drive power is OFF.

7. CN5: Communication Plug Connector

7.1 Wiring

The communication plug connector specification of the optional product is shown below.

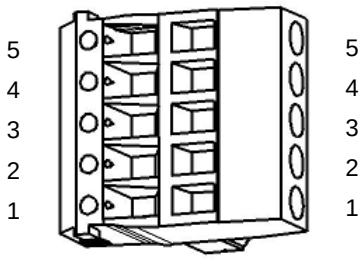
Straight type



LEC-CMJ-S

Manufactured by Phoenix Contact
Part no : MSTB2,5/5-ST-5,08 AU

T-Branched type



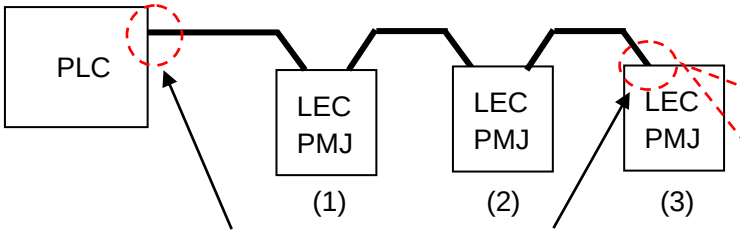
LEC-CMJ-T

Manufactured by Phoenix Contact
Part no : TMSTBP2,5/5-ST-5,08 AU

No	Designation	Description
1	DA	CC-Link communication line A
2	DB	CC-Link communication line B
3	DG	CC-Link ground line
4	SLD	CC-Link shield
5	FG	Frame ground

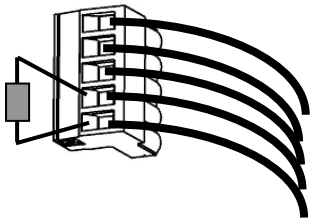
CC-Link system has different terminal resistance to connect depending on used cables.

Type of cable	Resistance
Communication cable for CC-Link	110Ω 1/2W
CC-Link dedicated high-performance cable	120Ω 1/2W



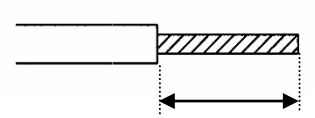
Connect the terminal resistance to both ends of the CC-Link main line.

Prepare a terminating resistor to suit your application.



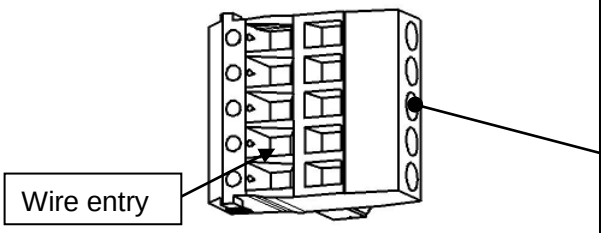
Please set the terminating resistor between 1 pin and 2 pin.

7.2 Electric wire specification

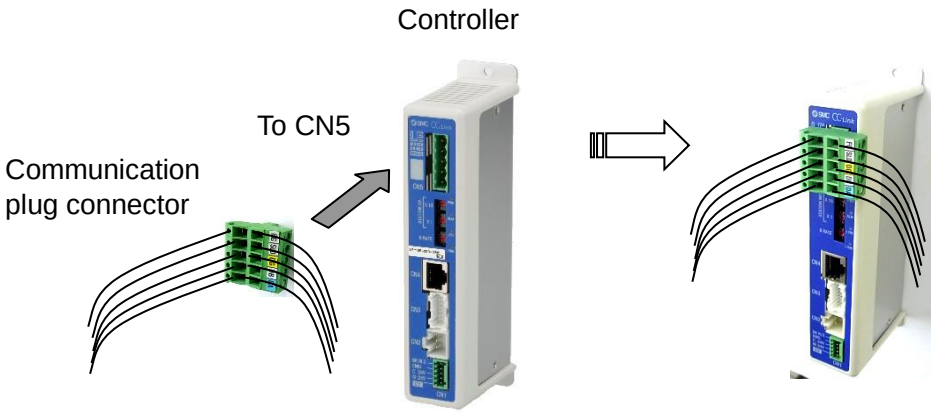
Item	Specifications
Applicable wire size (Single line, stranded wire)	AWG 24 to 12 (0.2 to 2.5mm^2) The rated temperature for the insulation coating: 60^{o}C or more
Stripped section length	 LEC-CMJ-S：7mm LEC-CMJ-T：10mm

7.3 Wiring of communication plug connector

Please wire the CC-Link communication cable to the communication plug connector, and then insert it into CN5 connector of controller.



● Screw for connection
Turn the screw with special driver, etc. and insert electric wires into the entries.
・Special driver (recommended)
Part no: SZS0.6×3.5
(Manufactured by Phoenix Contact)
・Screw： M2.5
・Tightening force： 0.5 to 0.6Nm



The figure of communication connector insert in CN5.

8. LED Display

8.1 LED display

Details of the LED display are shown as follows.

LED name	Content		
PWR	Power supply and EEPROM writing status	Off	Power is not supplied
		Green On	Power is supplied
		Green flashing	EEPROM writing
ALM	Alarm status.	Off	Normal status
		Red On	Alarm is generated
L ERR	Error status (CC-Link)	Off	Normal status
		Red On	Error is generated
		Red flashing	
L RUN	Communication status (CC-Link)	Off	Communication disconnected
		Green On	Communicating
		Green flashing	Error is generated

8.2 Controller status and LED display

Controller state and LED display is shown below.

Controller state		LED name and display			
		PWR	ALM	L ERR	L RUN
Supply of power		—	—	Off	Off
CPU ROM・RAM check error for CC-Link communication		—	—	Red On	Green On
Normal communication of CC-Link		—	—	Off	Green On
The setting of Rotary switch is changed when supplying of power		—	—	Red flashing	Off
CC-Link communication area	CC-Link communication stop	—	—	Off	Off
	CC-Link CRC error	—	—	Red On	Off
	STATION No. error	—	—	Red On	Green flashing
	Communication speed error (unused range)	—	—	Red flashing	Green On
	WDT time-out error	—	—	Red flashing	Green flashing
Motor control area	Alarm is generated	Off	Red On	—	—
	System error is generated	Green On	Red On	—	—
	EEPROM writing	Green flashing	—	—	—

—: The LED display is unrelated

⚠ Caution

Do not turn off the controller input power or remove the cable during EEPROM writing. (PWR (green) light flashing).
Data (step data, parameter) might not be written correctly

9. Mode

9.1 Outline

This controller has 3 types of operation mode (Single numerical data instructions, Half numerical data instructions, Full numerical data instructions). These modes can be changed by registering the occupied number of Stations with basic parameter "Option setting 1" of the controller.

The following describes the details for each mode.

Mode name	Content
Single numerical data instruction mode	When specifying the preset step data No. for operation, it is possible to numerically specify the step data "Movement MOD" and one other item directly from the PLC.
Half numerical data instruction mode	When specifying the preset step data No. for operation, it is possible to numerically specify up to six step data items ("Movement MOD", "Speed", "Position", "Acceleration", "Pushing speed", "Pushing force", "Deceleration", and "Trigger LV") directly from the PLC.
Full numerical data instruction mode	It is possible to numerically specify all step data items (up to 12 items) ("Movement MOD", "Speed", "Position", "Acceleration", "Pushing speed", "Pushing force", "Deceleration", "Trigger LV", "Moving force", Area 1", "Area 2", and "In position") directly from the PLC.

Function of each mode setting that which be executed is shown below

Mode	Referent	Single numerical data instructions	Half numerical data instructions	Full numerical data instructions
Option setting 1 *1)	11.2	1	2	4
Occupied number of stations	-	1	2	4
Step No. instructions operation function	9.2	○		
Monitor function of Position/Speed	9.3	○		
Numerical data instructions operation function	9.4	○		
The number of Numerical data modifiable items		1	6	12
Step data editing function	9.5	○ *2)		
Maximum product to be connected	-	42	32	16

*1) At the time of the factory shipment, "Option setting 1" of the controller is set in “2".
Please refer to **“9.4 Numerical data instructions operation function"** for the number of Numerical data modifiable items in each mode

*2) It is possible to edit it from Teaching box / Controller setting software for “Single numerical data instructions". It is possible to edit it from Teaching box / Controller setting software and PLC (CC-Link) for “Half numerical data instructions" and "Full numerical data instructions".

9.2 Step No. instructions operation function

It operates by the memory which corresponds to the Input / Output ports of DRIVE signal and INP signal, etc., and the operating state can be monitored by PLC (master).

The memory which corresponds to the Input / Output ports of DRIVE signal and INP signal, etc. can be operated by Rx, Ry of Remote IO.

When operate with the operating data which are registered beforehand, select Step data No. of operating data in Ry00 to 05：IN0 to IN5 of remote IO and start operating with DRIVE signal.

Please refer to **"14.1 Operating procedure of Step No. instructions operation function"** for details of the operating procedure.

9.3 Monitor function of Position/Speed

The current position and the current speed of the information of the controller can be read by turning on controller control flag "RWw0, bit0: Setting read numerical data "of the remote register.

9.4 Numerical data instructions operation function

The electric actuator operates according to the value that specifying the position and the speed, etc. for the controller. The value that can be instructed in each mode is shown below. The item except Numerical data instructions refers to the step data which are registered in the controller.

And please do the operation similar to Step No. instructions operation for the preparation (SVON and return to origin) of operation.

● Modifiable step data item in each mode

Mode	Item											
	Move	Speed	Position	Accel	Pushing Sp	Pushing F	Decel	Trigger LV	Moving F	Area1	Area2	In pos
Single numerical data instructions	○	○ *1)										
Half numerical data instructions	○	○	○	○ *2)		○	○ *2)		–	–	–	–
Full numerical data instructions	○	○	○	○	○	○	○	○	○	○	○	○

○: It is possible to change. −: It is not possible to change.

*1) Only one item can be changed from the corresponding item.

*2) Only one item can be changed from the corresponding item.

Please refer to **"14.2 Operating procedure of Numerical data instructions operation function"** for details of the operating procedure

9.5 Data editing function

A function to read and write the step data and number of occupied stations in the controller's built-in microcomputer as well as read the state data to/from CC-Link. Please refer to the instruction manual for the teaching box, or to the controller setting software for details of the function for editing the step data and other items.

Please refer to **"9.5 Data editing function"** for setting Sub Function (Iinstruction code), Address (reading / writing start address), and DATA (change data) when data is rewritten.

Please refer to **"14.3 The operating procedure of Data editing function"** for details of the operating procedure.

Data editing function

● Sub Function (instruction code)

The instruction code, the function, and the setting data which can be used in this controller are shown below.

Instruction code (Sub Function)	Function	Address	DATA (Sending)		DATA (Receiving)	
			DATA (H)	DATA (L)	DATA (H)	DATA (L)
(01)h	Data returning for 1word	Reading start number			Data (1 word)	
(02)h	Data returning for 2word	Reading start number			Data (2 word Upper side)	Data (2 word lower side)
(11)h	Data writing for 1word	Writing start number	Data (1 word)		Data (1 word)	
(12)h	Data writing for 2word	Writing start number	Data (2 word Upper side)	Data (2 word lower side)	Data (2 word Upper side)	Data (2 word lower side)

● Address (reading / writing start address)

This specifies the controller memory address map of the LECPMJ's built-in microcomputer, which can edit data.

The controller memory address shown in the following is a hexadecimal notation.

・CC-Link occupied number of Stations setting address

Controller memory address	Name	Word	Setting data range	Unit
(001d)h	occupied number of Stations setting	1	1,2,4	—

This parameter becomes effective by reset.

・State data address

Controller memory address	Name	Word	Unit
(9000)h	Current position	2	0.01mm
(9002)h	Current speed	1	1mm/s
(9003)h	Current Force	1	1%
(9004)h	Target position	2	0.01mm
(9006)h	Movement step data No.	1	—
(9008)h	Alarm 2 (high-level byte) / Alarm 1 (low-level byte)	1	—
(9009)h	Alarm 4 (high-level byte) / Alarm 3 (low-level byte)	1	—

・Basic parameter addresses

Controller memory address	Name	Words	Input range	Unit
(0000)h	Controller ID	Upper-level byte	1 to 32	—
	I/O pattern	Lower-level byte	Fixed value	—
(0001)h	Acceleration/deceleration pattern	Upper-level byte	Fixed value	—
	S-motion rate	Lower-level byte	*1)	—
(0002)h	Stroke (+)	2	*1)	0.01 mm
(0004)h	Stroke (-)	2	*1)	0.01 mm
(0006)h	Maximum speed	2	*1)	1 mm/s
(0007)h	Maximum acceleration speed	1	*1)	1 mm/s^2
(0008)h	Default positioning range	2	*1)	0.01 mm
(000a)h	Origin offset	2	*1)	0.01 mm
(000c)h	Maximum pushing force	Upper-level byte	*1)	1%
	Parameter protection	Lower-level byte	1,2	—
(000d)h	Enable SW	Upper-level byte	1,2,3	—
	-	Lower-level byte	Fixed value	—
(000e)h	Unit name	8	Fixed value	—
(0016)h	W area output end 1	2	*1)	0.01 mm
(0018)h	W area output end 2	2	*1)	0.01 mm
(001a)h	ORG Correct	1	Fixed value	—
(001c)h	Sensor type	1	Fixed value	—
(001d)h	Optional setting 1 (Number of occupied stations on the CC-Link)	1	1,2,4	—
(001e)h	Undefined parameter 11 (Operation setting when there is a CC-Link communication error)	1	0,10	—
(001f)h	Undefined parameter 12	1	Fixed value	—

This parameter becomes effective after restarting.

・Return-to-origin parameter addresses

Controller memory address	Name	Words	Input range	Unit
(0020)h	Return-to-origin direction [ORIG direction]	Upper-level byte	1,2	—
	Return-to-origin mode [ORIG mode]	Lower-level byte	1,2	—
(0021)h	Origin pushing-force limit [ORIG limit]	Upper-level byte	*1)	
	Return-to-origin time [ORIG time]	Lower-level byte	Fixed value	1 ms
(0022)h	Return-to-origin speed [ORIG speed]	1	*1)	1 mm/s
(0023)h	Return-to-origin acceleration and deceleration [ORIG ACC/DEC]	1	*1)	1 mm/s^2
(0024)h	Creep speed	1	Fixed value	1 mm/s
(0025)h	Origin sensor [ORIG sensor]	Upper-level byte	0 to 2	1 mm/s^2
	ORIG switch direction [ORIG SW DIR]	Lower-level byte	Fixed value	—
(0026)h	Undefined parameter 21	1	Fixed value	—

・JOG motion data addresses (motion parameter items)

Controller memory address	Name	Word	Setting data range	Unit
(0030)h	JOG speed	1	*1)	1mm/s
(0031)h	JOG acceleration	1	1 to “Max ACC/ DEC” of the basic parameter	1mm/s^2
(0032)h	JOG deceleration	1	1 to “Max ACC/ DEC” of the basic parameter	1mm/s^2
(0033)h	JOG thrust	1	*1)	1%
(0034)h	Fixed distance	2	“Stroke (-) ” to “Stroke (+) ” of the basic parameter	0.01mm

・Step data address

Controller memory address	Name	Word	Setting data range	Unit
(0400)h to (040F)h	Step data (No.0)	16	—	—
(0410)h to (041F)h	Step data (No.1)	16	—	—
(0420)h to (042F)h	Step data (No.2)	16	—	—
. . .	. . .	. . .	. . .	. . .
(07F0)h to (07FF)h	Step data (No.63)	16	—	—

Please refer to the example of the following in a detailed address of each step data.

Example) Address for step data No.0

Controller memory address	Name	Word	Setting data range	Unit
(0400)h	Movement MOD	1	0=Disable 1=ABS 2=INC	—
(0401)h	Speed	1	*1)	1mm/s
(0402)h	Position	2	“Stroke (-) ” to “Stroke (+) ” of the basic parameter	0.01mm
(0404)h	Acceleration	1	1 to “Max ACC / DEC” of the basic parameter	1mm/s^2
(0405)h	Deceleration	1	1 to “Max ACC / DEC” of the basic parameter	1mm/s^2
(0406)h	Pushing force	1	*1)	1%
(0407)h	Trigger LV	1	*1)	1%
(0408)h	Pushing speed	1	*1)	1mm/s
(0409)h	Moving force	1	*1)	1%
(040A)h	Area 1	2	“Stroke (-) ” to “Stroke (+) ” of the basic parameter	0.01mm
(040C)h	Area 2	2	“Stroke (-) ” to “Stroke (+) ” of the basic parameter	0.01mm
(040E)h	In position	2	*1)	0.01mm

*1) The input range which can be set differs depending on the electric actuator type.
Refer to the electric actuator’s instruction manual for details.

10. Memory map

10.1 Remote IO (Rx and Ry)

List and details of remote IO according to the mode are shown as follows

Address Rx00、Ry00 corresponds to initial address of Remote IO memory allocated in masters.

(1) Controller → Higher level device [IN] (Remote to Master)

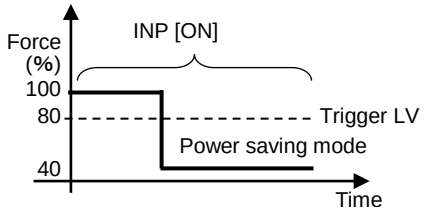
<table>
<tr><th>PLC memory address</th><th>Single numerical data instructions</th><th>Half numerical data instructions</th><th>Full numerical data instructions</th></tr>
<tr><td>Rx00 to Rx0F</td><td>Input port equivalency signal</td><td>Input port equivalency signal</td><td>Input port equivalency signal</td></tr>
<tr><td>Rx10 to Rx1F</td><td>CC-Link system area</td><td rowspan="2">(No used)</td><td rowspan="7">(No used)</td></tr>
<tr><td>Rx20 to Rx2F</td><td rowspan="7"></td></tr>
<tr><td>Rx30 to Rx3F</td><td>CC-Link system area</td></tr>
<tr><td>Rx40 to Rx4F</td><td rowspan="5"></td></tr>
<tr><td>Rx50 to Rx5F</td></tr>
<tr><td>Rx60 to Rx6F</td></tr>
<tr><td>Rx70 to Rx7F</td><td>CC-Link system area</td></tr>
</table>

(2) Higher level device → Controller [OUT] (Master to Remote)

<table>
<tr><th>PLC memory address</th><th>Single numerical data instructions</th><th>Half numerical data instructions</th><th>Full numerical data instructions</th></tr>
<tr><td>Ry00 to Ry0F</td><td>Output port equivalency signal</td><td>Output port equivalency signal</td><td>Output port equivalency signal</td></tr>
<tr><td>Ry10 to Ry1F</td><td>CC-Link system area</td><td rowspan="2">(No used)</td><td rowspan="7">(No used)</td></tr>
<tr><td>Ry20 to Ry2F</td><td rowspan="7"></td></tr>
<tr><td>Ry30 to Ry3F</td><td>CC-Link system area</td></tr>
<tr><td>Ry40 to Ry4F</td><td rowspan="5"></td></tr>
<tr><td>Ry50 to Ry5F</td></tr>
<tr><td>Ry60 to Ry6F</td></tr>
<tr><td>Ry70 to Ry7F</td><td>CC-Link system area</td></tr>
</table>

(3) Controller → Higher level device [IN] (Remote to Master)

<table>
<tr><th rowspan="2">PLC memory address</th><th colspan="3" rowspan="2">Signal name</th><th rowspan="3">Content</th></tr>
<tr></tr>
<tr><th>Rx</th><th>Single numerical data instructions</th><th>Half numerical data instructions</th><th>Full numerical data instructions</th></tr>
<tr><td>00</td><td colspan="3">OUT0</td><td rowspan="6">When the operation is started and DRIVE is turned OFF, a Bit no. corresponding to the number of the active step data will be output from these terminals. This output signal will be updated when DRIVE terminal is be turned ON.
Example) When output the step data No.3
<table><tr><td>OUT5</td><td>OUT 4</td><td>OUT 3</td><td>OUT 2</td><td>OUT 1</td><td>OUT 0</td></tr><tr><td>OFF</td><td>OFF</td><td>OFF</td><td>OFF</td><td>ON</td><td>ON</td></tr></table>⚠ Caution
1. When RESET is turned ON, these terminals are turned OFF.
2. During the alarm, these terminals output the alarm group.
3. During the pushing operation, if the electric actuator runs over the defined pushing width, these terminals will be turned OFF.</td></tr>
<tr><td>01</td><td colspan="3">OUT1</td></tr>
<tr><td>02</td><td colspan="3">OUT2</td></tr>
<tr><td>03</td><td colspan="3">OUT3</td></tr>
<tr><td>04</td><td colspan="3">OUT4</td></tr>
<tr><td>05</td><td colspan="3">OUT5</td></tr>
<tr><td>06</td><td colspan="3">–</td><td>–</td></tr>
<tr><td>07</td><td colspan="3">–</td><td>–</td></tr>
<tr><td>08</td><td colspan="3">BUSY</td><td>This terminal is ON during the movement of the electric actuator (during the positioning operation, etc.).
⚠ Caution
During the pushing operation without movement (no movement but the electric actuator generating the pushing force), BUSY is OFF. BUSY signal stays on for 50ms or longer after operation starts.</td></tr>
<tr><td>09</td><td colspan="3">SVRE</td><td>When the servo motor is OFF, SVRE is OFF.
When the servo motor is ON, SVRE is ON</td></tr>
<tr><td>0A</td><td colspan="3">SETON</td><td>When the electric actuator is in the SETON status (the position information is established), this terminal is turned ON.
When the position status is not established, this terminal is OFF.</td></tr>
</table>

<table>
<tr><td>0B</td><td colspan="3">INP</td><td>The condition when the INP output is ON depend on the electric actuator action.
● Return to origin
After stopping the electric actuator operation (turning OFF the BUSY output), the INP turns ON when the electric actuator is within the range defined in the origin +/- "Default positioning range" in the basic parameter.
● During positioning operation
The INP turns ON when the current position is within the step data "Position" +/- "In position".
● During pushing operation
The INP turns ON when the pushing force exceeds the value set in the step data "Trigger LV".
⚠ Caution
After the pushing operation is completed, even if it switches automatically to energy saving mode, the INP output signal stays ON.
When movement starts again from the pushing stopped state, the pushing operation is repeated with the normal pushing force.
(Example) Step data “force” is 100%
Step data” Trigger LV” is 80%
The energy saving setting of the electric actuator is 40% *1)
 

*1) The electric actuator model determines the energy settings. Please refer to the specifications of the electric actuator for more details.</td></tr>
<tr><td>0C</td><td colspan="3">AREA</td><td>When the electric actuator is within the range between Area 2 and Area1 in the step data, this terminal will be turned ON.
The range changes depending on the active step data.</td></tr>
<tr><td>0D</td><td colspan="3">WAREA</td><td>When the electric actuator is within the output range between "W-AREA1 and W-AREA2" of basic parameter, this terminal will be turned ON.</td></tr>
<tr><td>0E</td><td colspan="3">ESTOP</td><td>During activation of Teaching Box stop switch, this terminal is OFF. During the normal operation, this is ON.
This is synchronized to the input terminal for the EMG signal on the controller connector CN1</td></tr>
<tr><td>0F</td><td colspan="3">ALARM</td><td>An alarm is generated when an abnormality occurs with the electric actuator or its control.
When there are no alarms, this terminal is ON.
When there are alarms, this is OFF.</td></tr>
<tr><td>10 to 1A</td><td>CC-Link system area</td><td rowspan="2">(No used)</td><td rowspan="2">(No used)</td><td>–</td></tr>
<tr><td>1B</td><td>Remote station READY</td><td>● Only at Single numerical data instructions
During the normal status, this terminal is OFF, during the abnormal status (The WDT time-out of CPU is generated) this is ON.</td></tr>
</table>

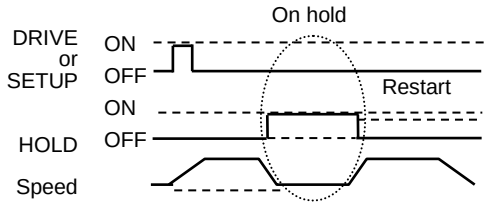
1C to 1F	CC-Link system area	(No used)	(No used)	–
20 to 2F				
30 to 3A		CC-Link system area		–
3B		Remote station READY		● Only at Half numerical data instructions The content of Remote station READY is as same as at Single numerical data instructions. Please refer to the content of Rx1B.
3C to 3F		CC-Link system area		–
40 to 6F				–
70 to 7A			CC-Link system area	–
7B			Remote station READY	●Only at Full numerical data instructions The content of Remote station READY is as same as at Single numerical data instructions. Please refer to the content of Rx1B.
7C to 7F			CC-Link system area	–

The table below shows the changes in the output signal with respect to controllers state.

Output signal / State	BUSY	INP	SVRE	Lock	SETON	OUT0 to 5
Controller powered down [SVOFF] with no motion	OFF	OFF	OFF	Lock	OFF	OFF
Controller powered down [SVON] with no motion	OFF	OFF	ON	Release	OFF	OFF
During returning to origin [SETUP].	ON	OFF	ON	Release	OFF	OFF
The electric actuator is at the origin. On completion of [SETUP]	OFF	ON *1)	ON	Release	ON	OFF
During movement by positioning / pushing operation.	ON	OFF	ON	Release	ON	ON *2)
The electric actuator is paused by [HOLD]	OFF	OFF	ON	Release	ON	ON *2)
On completion of the positioning operation.	OFF	ON *4)	ON	Release	ON	ON *2)
Stopped due to pushing a work-load in pushing operation.	OFF	ON	ON	Release	ON	ON *2)
Stopped due to no detection of work-load during a pushing operation.	OFF	OFF	ON	Release	ON	OFF
On completion of return to origin and then with [SVON] turned off.	OFF	OFF *4)	OFF	Lock	ON	ON *3)
EMG signal stop from the CN1 connector after the electric actuator is at the origin.	OFF	OFF *4)	OFF	Lock	ON	OFF

*1) The output turns on when the electric actuator is within the range defined in the basic parameter setup.
*2) The output is updated on the transition of (ON→OFF) of the DRIVE input signal.
*3) Retains the previous state.
*4) The output turns on when the electric actuator is "In position" of the step data.

(4) Higher level device → Controller [OUT] (Master to Remote)

<table>
<tr><th>PLC Memory address</th><th colspan="3">Signal name</th><th rowspan="2">Content</th></tr>
<tr><th>Ry</th><th>Single numerical data instructions</th><th>Half numerical data instructions</th><th>Full numerical data instructions</th></tr>
<tr><td>00</td><td colspan="3">IN0</td><td rowspan="6">Bit no. to specify the step data
(Specify the number by combining On/Off of the terminals.)
Example: (Bit no. to specify the step data no.3.)<table><tr><th>IN5</th><th>IN4</th><th>IN3</th><th>IN2</th><th>IN1</th><th>IN0</th></tr><tr><td>OFF</td><td>OFF</td><td>OFF</td><td>OFF</td><td>ON</td><td>ON</td></tr></table></td></tr>
<tr><td>01</td><td colspan="3">IN1</td></tr>
<tr><td>02</td><td colspan="3">IN2</td></tr>
<tr><td>03</td><td colspan="3">IN3</td></tr>
<tr><td>04</td><td colspan="3">IN4</td></tr>
<tr><td>05</td><td colspan="3">IN5</td></tr>
<tr><td>06</td><td colspan="3">—</td><td>Please always turn OFF.</td></tr>
<tr><td>07</td><td colspan="3">—</td><td>Please always turn OFF.</td></tr>
<tr><td>08</td><td colspan="3">HOLD</td><td>If HOLD input is ON during operation, the speed decreases at maximum deceleration speed of the basic parameter until the electric actuator stops. The remaining stroke will be on hold as long as HOLD is ON and when HOLD is turned OFF, the electric actuator restart to travel the remaining stroke.
●When DRIVE or SETUP is ON
 
⚠ Caution
・As long as HOLD is ON, the DRIVE input will be disabled.
・The output signals are rendered invalid whilst hold is in operation.</td></tr>
<tr><td>09</td><td colspan="3">SVON</td><td>The SVON signal turns the servo motor ON.
When SVON is ON, the servo motor will be turned ON. When this is OFF, the servo motor will be turned OFF.</td></tr>
<tr><td>0A</td><td colspan="3">DRIVE</td><td>When DRIVE is turned ON, the system scans the input IN0 to IN5 and starts the operation of the electric actuator. Then, when this terminal is turned OFF, the number of the active step data will be output via the terminals OUT0 to OUT5.</td></tr>
<tr><td>0B</td><td colspan="3">RESET</td><td>The terminal to reset the alarm and the operation.
After RESET, the speed decreases at maximum deceleration speed of the basic parameter until the electric actuator stops.
INP and OUT0 to OUT5 will be turned OFF (however, if the electric actuator is stopped within the in-position range, the INP will be turned ON).</td></tr>
<tr><td>0C</td><td colspan="3">SETUP</td><td>When SVRE is ON, the SETUP operation (return to origin operation) will be performed.
During the SETUP operation, BUSY will be turned ON and after completion of the SETUP operation, SETON and INP will be turned ON.</td></tr>
</table>

<table>
<tr><td>0D</td><td colspan="3">JOG (-)</td><td>Jogging in the (-) direction.
The electric actuator moves when the signal is ON.
Stops when the signal is OFF.
When the "FLGTH" (signal for switching Jogging and Inching) is ON, the electric actuator inches toward the (-) side as the "JOG (-)" signal increases.
INP output, OUT0 to 5 are OFF after Jogging/ Inching start. INP output, OUT0 to 5 are not turned ON after Jogging/ Inching is completed.</td></tr>
<tr><td>0E</td><td colspan="3">JOG (+)</td><td>Operation is the same as "JOG (-)", with "-" changed to "+"</td></tr>
<tr><td>0F</td><td colspan="3">FLGTH</td><td>Switches the function (Jogging and Inching) of Jogging signal "JOG(-)" and "JOG (+)".
Inching starts when this signal is ON and when the Jogging signal is ON.
Jogging starts when this signal is OFF.
The Inching distance is the value in the operation parameter "Fixed distance".</td></tr>
<tr><td>10 to 1F</td><td rowspan="5">CC-Link system area</td><td rowspan="2">(No used)</td><td rowspan="3">(No used)</td><td rowspan="5">—</td></tr>
<tr><td>20 to 2F</td></tr>
<tr><td>30v3F</td><td rowspan="3">CC-Link system area</td></tr>
<tr><td>40 to 6F</td></tr>
<tr><td>70 to 7F</td><td>CC-Link system area</td></tr>
</table>

Valid conditions for input signals

Signal name / Conditions	SETON output	SVRE output	BUSY output
SETUP input [Return to origin]	—	ON	OFF *1)
DRIVE input [Operation start instruction]	ON	ON	—
JOG (-) , (+) [JOG operation command]	— *2)	ON *3)	OFF

("-" = Does not depend on the ON/OFF state of each output signal)

*1) The SETUP input will be disabled during the positioning and pushing operation.

*2) JOG (including Inching) is enabled even before the position is fixed. However, since the stroke limit is not enabled before fixing the position, take extra care not to let the JOG collide with the rotating end.

*3) When Jogging (including Inching) reaches the stroke limit, the "stroke limit" alarm (052) occurs.

⚠ Caution

・When power is applied, it may take approximately 10 seconds (max. 20 sec.) from SVON input to SVRE output depending on the electric actuator position.

・SETUP and DRIVE can only be accepted during the above conditions. An alarm will be generated at other times.

Make sure to have intervals of 15 ms or longer (30 ms is recommended) between inputting signals, and maintain the input state for the same period of time.

10.2 Remote register (RWr and RWw)

List of remote register according to the mode are shown as follows.

In Half numerical data instructions and Full numerical data instructions the memory assignment is different according to the function to use. The change of Numerical data instructions operation function and Step data editing function uses RWw0, bit1: Setting parameter rewriting.

Address RWr0, RWw0 corresponds to top address of remote register memory allocated in masters.

(1) Controller → Higher level device [IN] (Remote to Master)

<table>
<tr><th rowspan="2">PLC Memory address</th><th>Single numerical data instructions</th><th colspan="2">Half numerical data instructions</th><th colspan="2">Full numerical data instructions</th></tr>
<tr><th>Numerical data instructions operation function</th><th>Numerical data instructions operation function</th><th>Data editing function</th><th>Numerical data instructions operation function</th><th>Data editing function</th></tr>
<tr><td>RWr0</td><td>Controller information flag</td><td>Controller information flag</td><td>Controller information flag</td><td>Controller information flag</td><td>Controller information flag</td></tr>
<tr><td>RWr1</td><td rowspan="2">Current position</td><td rowspan="2">Current position</td><td rowspan="2">Current position</td><td rowspan="2">Current position</td><td rowspan="2">Current position</td></tr>
<tr><td>RWr2</td></tr>
<tr><td>RWr3</td><td>Current speed</td><td>Current speed</td><td rowspan="5">Return of Parameter rewriting</td><td>Current speed</td><td>Current speed</td></tr>
<tr><td>RWr4</td><td rowspan="12"></td><td>Current force</td><td>Current force</td><td>Current force</td></tr>
<tr><td>RWr5</td><td rowspan="3">Target position</td><td rowspan="3">Target position</td><td rowspan="3">Target position</td></tr>
<tr><td>RWr6</td></tr>
<tr><td>RWr7</td><td>Alarm</td></tr>
<tr><td>RWr8</td><td rowspan="7"></td><td>Alarm</td><td>Alarm</td></tr>
<tr><td>RWr9</td><td rowspan="3">Occupation area</td><td rowspan="5">Return of Parameter rewriting</td></tr>
<tr><td>RWr10</td></tr>
<tr><td>RWr11</td></tr>
<tr><td>RWr12</td><td rowspan="4">Occupation area</td></tr>
<tr><td>RWr13</td></tr>
<tr><td>RWr14</td><td rowspan="2">Occupation area</td></tr>
<tr><td>RWr15</td></tr>
</table>

(2) Higher level device → Controller [OUT] (Master to Remote)

<table>
<tr><th rowspan="2">PLC memory address</th><th>Single numerical data instructions</th><th colspan="2">Half numerical data instructions</th><th colspan="2">Full numerical data instructions</th></tr>
<tr><th>Numerical data instructions operation function</th><th>Numerical data instructions operation function</th><th>Data editing function</th><th>Numerical data instructions operation function</th><th>Data editing function</th></tr>
<tr><td>RWw0</td><td>Controller control / Numerical data flag</td><td>Controller control / Numerical data flag</td><td>Controller information flag</td><td>Controller control / Numerical data flag</td><td>Controller information flag</td></tr>
<tr><td>RWw1</td><td>Movement MOD / Start flag</td><td>Movement MOD / Start flag</td><td rowspan="4">Send of Parameter rewriting</td><td>Movement MOD / Start flag</td><td rowspan="4">Send of Parameter rewriting</td></tr>
<tr><td>RWw2</td><td rowspan="3">Numerical data instructions data</td><td>Speed</td><td>Speed</td></tr>
<tr><td>RWw3</td><td rowspan="2">Target position</td><td rowspan="2">Target position</td></tr>
<tr><td>RWw4</td></tr>
<tr><td>RWw5</td><td rowspan="11"></td><td>Acceleration / Pushing speed</td><td>Acceleration</td></tr>
<tr><td>RWw6</td><td>Deceleration / Trigger LV</td><td>Deceleration</td></tr>
<tr><td>RWw7</td><td>Pushing force</td><td>Occupation area</td><td>Pushing force</td><td>Occupation area</td></tr>
<tr><td>RWw8</td><td rowspan="8"></td><td>Trigger LV</td><td rowspan="3">Occupation area</td></tr>
<tr><td>RWw9</td><td>Pushing speed</td></tr>
<tr><td>RWw10</td><td>Moving force</td></tr>
<tr><td>RWw11</td><td rowspan="2">Area 1</td><td rowspan="4">Occupation area</td></tr>
<tr><td>RWw12</td></tr>
<tr><td>RWw13</td><td rowspan="2">Area 2</td></tr>
<tr><td>RWw14</td></tr>
<tr><td>RWw15</td><td>In position</td></tr>
</table>

“Occupation area” is an area that secured compulsorily by LECPMJ. LECPMJ does not exchange data with PLC in “Occupation area”

(3) Details: Numerical data instructions operation function

● Controller → Higher level device [IN] (Remote to Master)

[Single numerical data instructions]

<table>
<tr><th colspan="2">PLC memory address</th><th colspan="2">RWr Data name</th><th rowspan="3">Content</th></tr>
<tr><th rowspan="2">RWr</th><th rowspan="2">bit</th><th colspan="2" rowspan="2">Single numerical data instructions</th></tr>
<tr></tr>
<tr><td rowspan="14">0</td><td>0</td><td rowspan="14">Controller information flag</td><td>Return of Occupied number of stations (L)</td><td rowspan="2">Current occupied number of stations is shown.
<table><tr><th>H</th><th>L</th><th>Occupied number of stations</th></tr><tr><td>0</td><td>0</td><td>1 Stations occupied</td></tr><tr><td>0</td><td>1</td><td>2 Stations occupied</td></tr><tr><td>1</td><td>0</td><td>—</td></tr><tr><td>1</td><td>1</td><td>4 Stations occupied</td></tr></table></td></tr>
<tr><td>1</td><td>Return of Occupied number of stations (H)</td></tr>
<tr><td>2</td><td>Sending</td><td>After turning Start flag on at Numerical data instructions operation, this terminal will be ON during sending. And this terminal is OFF when the sending is completed or waiting for the sending instruction.</td></tr>
<tr><td>3</td><td>Sending completed</td><td>When the data sending is completed at Numerical data instructions operation, Sending flag will be OFF and this terminal will be ON. Then Start flag turns OFF and this terminal will be OFF.</td></tr>
<tr><td>4</td><td>READY</td><td>It is always ON if the controller has been started normally.</td></tr>
<tr><td>5</td><td>ALARM flag</td><td>An alarm is generated when problems occur with the LECPMJ's internal process or communication with the PLC. OFF during normal condition. ON when an alarm is generated.</td></tr>
<tr><td>6</td><td>Initial</td><td>It is OFF during initial processing. It stays ON once the initial processing is completed.</td></tr>
<tr><td>7</td><td>Return of the read numerical data</td><td>It is ON when reading numerical data. Otherwise it is OFF.</td></tr>
<tr><td>8 to C</td><td>(No used)</td><td>—</td></tr>
<tr><td>D</td><td>Data editing error receiving</td><td>When the error occurs in the data editing function, this terminal will be ON with RWr0, bit5: ALARM flag. When RWw0, bit2: Reset is turned on, it is cleared.</td></tr>
<tr><td>E</td><td>Parameter anomaly detection</td><td>When a parameter is invalid, this and the RWr0,bit5: ALARM flag are turned ON. It is turned OFF when the RWw0,bit2: Reset flag is turned ON.
Please refer to "16. Alarm Detection for CC-Link Communication" for details.</td></tr>
<tr><td>F</td><td>The abnormal station detection</td><td>When an abnormal station is detected, this and the RWr0, bit5: ALARM flag are turned ON. It is OFF when the RWw0,bit2: Reset flag is ON.
Please refer to "16. Alarm Detection for CC-Link Communication" for details.</td></tr>
<tr><td>1</td><td>F to 0</td><td>L</td><td colspan="2" rowspan="2">Current position</td><td rowspan="2">When the read numerical data is effective, this terminal will output the current position of the electric actuator by 0.01[mm] unit
Example) When 800.00[mm] (80000d=13880h) is output
RWr1=3880h
RWr2=0001h</td></tr>
<tr><td>2</td><td>F to 0</td><td>H</td></tr>
<tr><td rowspan="2">3</td><td>7 to 0</td><td>L</td><td colspan="2" rowspan="2">Current speed</td><td rowspan="2">When the read numerical data is effective, this terminal will output the current speed of the electric actuator by 1[mm/s] unit
Example) When 300[mm/s] (300d=012Ch) is output
RWr3=012Ch</td></tr>
<tr><td>F to 8</td><td>H</td></tr>
</table>

H=Most Significant Byte or upper word
L=Least Significant Byte or lower word

[Half numerical data instructions, Full numerical data instructions]

<table>
<tr><th colspan="3" rowspan="2">PLC memory address</th><th colspan="3">RWr data name</th><th rowspan="3">Content</th></tr>
<tr><th colspan="2">Half numerical data instructions</th><th>Full numerical data instructions</th></tr>
<tr><th>RWr</th><th colspan="2">bit</th><th colspan="3"></th></tr>
<tr><td rowspan="13">0</td><td colspan="2">0</td><td rowspan="13">Controller information flag</td><td colspan="2">Return of Occupied number of stations (L)</td><td rowspan="8">As same as Single numerical data instructions.
Please refer to "10.2 Remote register (RWr and RWw)" for details.</td></tr>
<tr><td colspan="2">1</td><td colspan="2">Return of Occupied number of stations (H)</td></tr>
<tr><td colspan="2">2</td><td colspan="2">Sending</td></tr>
<tr><td colspan="2">3</td><td colspan="2">Sending completed</td></tr>
<tr><td colspan="2">4</td><td colspan="2">READY</td></tr>
<tr><td colspan="2">5</td><td colspan="2">ALARM flag</td></tr>
<tr><td colspan="2">6</td><td colspan="2">Initial</td></tr>
<tr><td colspan="2">7</td><td colspan="2">Return of the read numerical data</td></tr>
<tr><td colspan="2">8</td><td colspan="2">Return of parameter rewriting</td><td>It is ON when the parameter rewrite flag is enabled. otherwise it is OFF.</td></tr>
<tr><td colspan="2">9 to C</td><td colspan="2">(No used)</td><td>–</td></tr>
<tr><td colspan="2">D</td><td colspan="2">Data editing error</td><td rowspan="4">As same as Single numerical data instructions.
Please refer to "10.2 Remote register (RWr and RWw)" for details.</td></tr>
<tr><td colspan="2">E</td><td colspan="2">Parameter anomaly detection</td></tr>
<tr><td colspan="2">F</td><td colspan="2">The abnormal station detection</td></tr>
<tr><td>1</td><td>F to 0</td><td>L</td><td colspan="3" rowspan="2">Current position</td></tr>
<tr><td>2</td><td>F to 0</td><td>H</td></tr>
<tr><td rowspan="2">3</td><td>7 to 0</td><td>L</td><td colspan="3" rowspan="2">Current speed</td></tr>
<tr><td>F to 8</td><td>H</td></tr>
<tr><td rowspan="2">4</td><td>7 to 0</td><td>L</td><td colspan="3" rowspan="2">Current Force</td><td rowspan="2">When the read numerical data is effective, this terminal will output the current force of the electric actuator by 1[%] unit.</td></tr>
<tr><td>F to 8</td><td>H</td></tr>
<tr><td>5</td><td>F to 0</td><td>L</td><td colspan="3" rowspan="2">Target position</td><td rowspan="2">When the read numerical data is effective, this terminal will output the target position of the electric actuator by 0.01[mm] unit</td></tr>
<tr><td>6</td><td>F to 0</td><td>H</td></tr>
<tr><td rowspan="2">7</td><td colspan="2">7 to 0</td><td colspan="2">Alarm 1</td><td>Alarm 1</td><td rowspan="4">When the read numerical data is effective and alarm is generated, alarm code (3 decimal digits) will be output. It is possible to output up to 2 alarms at 2 Stations occupied and output up to 4 alarms at 4 Stations occupied.
As for the alarm, generated latest alarm code is output to alarm 1. It is updated every time when the alarm is generated, and alarm code which occurred in the past shifts in order of alarm 1→2→3→4.
When the number of generated alarms exceeds the maximum alarm output of each mode, it is deleted from the history in order of the alarm code generated in the past
Ex) When the alarm is generated in order of (1)→(5)
<table><tr><td>Alarm 1 (latest)</td><td>(1)</td><td rowspan="4">→</td><td>(2)</td><td rowspan="4">→</td><td>(3)</td><td rowspan="4">→</td><td>(4)</td><td rowspan="4">→</td><td>(5)</td></tr><tr><td>Alarm 2</td><td>0</td><td>(1)</td><td>(2)</td><td>(3)</td><td>(4)</td></tr><tr><td>Alarm 3</td><td>0</td><td>0</td><td>(1)</td><td>(2)</td><td>(3)</td></tr><tr><td>Alarm 4</td><td>0</td><td>0</td><td>0</td><td>(1)</td><td>(2)</td></tr></table>(1) to (5) in the list shows generated alarm code
Please refer to "15.2 Alarm details" for details of the content of the alarm.</td></tr>
<tr><td colspan="2">F to 8</td><td colspan="2">Alarm 2</td><td>Alarm 2</td></tr>
<tr><td rowspan="2">8</td><td colspan="2">7 to 0</td><td colspan="2" rowspan="3"></td><td>Alarm 3</td></tr>
<tr><td colspan="2">F to 8</td><td>Alarm 4</td></tr>
<tr><td>9 to 15</td><td colspan="2">F to 0</td><td>Occupation area</td><td>–</td></tr>
</table>

H=Most Significant Byte or upper word
L=Least Significant Byte or lower word

● Higher level device → Controller [OUT] (Master to Remote)
[Single numerical data instructions]

PLC memory address		RWw Data name		Content
RWw	bit	Single numerical data instructions		
0	0	Controller control flag	Setting read numerical data	Turn ON to enable reading the numerical data such as the current position or current speed. Turn OFF to disable reading.
	1		(No used)	—
	2		Reset flag	Clear “RWr0, bit5: ALARM flag” by turning this terminal ON from OFF.
	3		Restart flag	Controller’s reset is executed again when OFF is changed to ON.
	4	Numerical data input flag	Movement MOD	In the case of Numerical data instructions operation, when each set point is turned on, Numerical data instructions are possible. In the case of Single numerical data instructions, it is impossible to input following 11 items (except Movement MOD) at the same time. When repeat RWw0, bit5 to F: Setting numerical data A, the alarm (parameter anomaly detection) occurs. Please refer to **"16. Alarm Detection for CC-Link Communication"** for details.
	5		Speed *2)	
	6		Position *1)	
	7		Acceleration *2)	
	8		Deceleration *2)	
	9		Pushing force *2)	
	A		Trigger LV *2)	
	B		Pushing speed *2)	
	C		Moving force *2)	
	D		Area 1 *1)	
	E		Area 2 *1)	
	F		In position *1)	
1	0	Start flag		It is a data sending flag at Numerical data instructions operation. When waiting for the sending, this terminal is OFF. And this terminal is ON during sending numerical data to controller.
	1 to 7	(No used)		-
	8 to F	Movement MOD		1 : ABS (Absolute) 2 : INC (incremental)

*1) RWw0, bit4 to F: Setting numerical data in the case of "Position" or "Area 1" or "Area 2"

2	F to 0	L	Numerical data instructions data (2 word data)	Input the numerical value of the item which appoint in Setting numerical data. Please refer to **“11.1 Step data"** for the input range and the unit of each item. Example) Turn on RWw0,bit6:Position and direct 655.37 [mm] (65537d=10001h) RWw2=0001h RWw3=0001h
3	F to 0	H		

*2) RWw0,bit4 to F: Setting numerical data in the case of "Speed", " Acceleration", " Deceleration ", " Pushing force", " Trigger LV ", " Pushing speed ", " Moving force ", or " In position "

2	7 to 0	L	Numerical data instructions data (1 word data)	Input the numerical value of the item which appoint in Setting numerical data. Please refer to **“11.1 Step data"** for the input range and the unit of each item. Example) Turn on RWw0,bit5:Speed and direct 300[mm/s] (300d＝012Ch) RWw2＝012Ch
	F to 8	H		
3	F to 0		(No used)	-

H=Most Significant Byte or upper word
L=Least Significant Byte or lower word

[Half numerical data instructions, Full numerical data instructions]

<table>
<tr><th colspan="2" rowspan="2">PLC memory address</th><th colspan="3">RWw data name</th><th rowspan="2" colspan="3">Content</th></tr>
<tr><th colspan="2">Half numerical data instructions</th><th>Full numerical data instructions</th></tr>
<tr><th>RWw</th><th>bit</th><th colspan="3"></th><th>Setting data range</th><th>Unit</th></tr>
<tr><td rowspan="13">0</td><td>0</td><td rowspan="4">Controller information flag</td><td colspan="2">Read numerical data flag</td><td colspan="3">Turn ON to enable reading the numerical data such as current position or current speed. Turn OFF to disable reading.</td></tr>
<tr><td>1</td><td colspan="2">Parameter rewrite flag</td><td colspan="3">The data edit function is enabled when this flag is ON. When OFF, operation by numerical instruction is enabled. Before using the numerical instruction operation, be sure to turn this flag OFF.</td></tr>
<tr><td>2</td><td colspan="2">Reset flag</td><td colspan="3">Turning it OFF then ON will clear the RWr0,bit5: ALARM flag.</td></tr>
<tr><td>3</td><td colspan="2">Restart flag</td><td colspan="3">Turn it OFF then ON to re-initialize the controller.</td></tr>
<tr><td>4</td><td rowspan="9">Numerical data input flag</td><td colspan="2">Movement MOD</td><td colspan="3" rowspan="9">It is possible to change the value when each terminal is ON in Numerical data instructions operation function. When the Setting parameter rewriting flag is ON, it becomes invalid.
*1) In the half numerical data instruction mode, "Acceleration" and "Pushing force" cannot be input at the same time.
*2) In the half numerical data instruction mode, "Deceleration" and "Trigger LV" cannot be input at the same time.
When the above-mentioned numerical data input flags (*1), *2)) are duplicated, an alarm (Parameter error detected) is generated.
Please refer to “16. Alarm Detection for CC-Link Communication" for details. for details.</td></tr>
<tr><td>5</td><td colspan="2">Speed</td></tr>
<tr><td>6</td><td colspan="2">Position</td></tr>
<tr><td>7</td><td colspan="2">Acceleration *1)</td></tr>
<tr><td>8</td><td colspan="2">Deceleration *2)</td></tr>
<tr><td>9</td><td colspan="2">Pushing force *1)</td></tr>
<tr><td>A</td><td colspan="2">Trigger LV *2)</td></tr>
<tr><td>B</td><td colspan="2">Pushing speed</td></tr>
<tr><td>C</td><td rowspan="4">(No used)</td><td>Moving force</td></tr>
<tr><td>D</td><td>Area 1</td></tr>
<tr><td>E</td><td>Area 2</td></tr>
<tr><td>F</td><td>In position</td></tr>
</table>

<table>
<tr><td rowspan="3">1</td><td colspan="2">0</td><td colspan="3">Start flag</td><td colspan="3">It is a data sending flag at Numerical data instructions operation function. When waiting for the sending, this terminal is OFF. And this terminal is ON during sending numerical data to controller.</td></tr>
<tr><td colspan="2">1 to 7</td><td colspan="3">(No used)</td><td colspan="3">—</td></tr>
<tr><td colspan="2">8 to F</td><td rowspan="15">Numerical data instructions operation</td><td colspan="2">Movement MOD</td><td rowspan="15">Input the specified value to the controller.
And it is possible to input plural data (speed and target position, etc.) at the same time.

Please refer to “11.1 Step data" for 9details of each data.

Example)
R When turn on the “RWw0,bit6:Position”, instruct 655.37 [mm] (65537d=10001h)
RWw3＝0001h
RWw4＝0001h</td><td>1：ABS　2：INC</td><td>—</td></tr>
<tr><td rowspan="2">2</td><td>7 to 0</td><td>L</td><td colspan="2" rowspan="2">Speed</td><td rowspan="2">1 to “Max speed” of the basic parameter</td><td rowspan="2">1mm/s</td></tr>
<tr><td>F to 8</td><td>H</td></tr>
<tr><td>3</td><td>F to 0</td><td>L</td><td colspan="2" rowspan="2">Target position</td><td rowspan="2">“Stroke (-)” to “Stroke (+)” of the basic parameter</td><td rowspan="2">0.01mm</td></tr>
<tr><td>4</td><td>F to 0</td><td>H</td></tr>
<tr><td rowspan="2">5</td><td>7 to 0</td><td>L</td><td rowspan="2">Acceleration (Pushing force)</td><td rowspan="2">Acceleration</td><td rowspan="2">1 to “Max ACC/DEC” of the basic parameter *3)</td><td rowspan="2">1mm/s^2 (1%)</td></tr>
<tr><td>F to 8</td><td>H</td></tr>
<tr><td rowspan="2">6</td><td>7 to 0</td><td>L</td><td rowspan="2">Deceleration (Trigger LV)</td><td rowspan="2">Deceleration</td><td rowspan="2">1 to “Max ACC / DEC” of the basic parameter *3)</td><td rowspan="2">1mm/s^2 (1%)</td></tr>
<tr><td>F to 8</td><td>H</td></tr>
<tr><td rowspan="2">7</td><td>7 to 0</td><td>L</td><td rowspan="2">Pushing speed</td><td rowspan="2">Pushing force</td><td rowspan="2">*3)</td><td rowspan="2">1mm/s 1%</td></tr>
<tr><td>F to 8</td><td>H</td></tr>
<tr><td rowspan="2">8</td><td>7 to 0</td><td>L</td><td rowspan="14"></td><td rowspan="2">Trigger LV</td><td rowspan="2">*3)</td><td rowspan="2">1%</td></tr>
<tr><td>F to 8</td><td>H</td></tr>
<tr><td rowspan="2">9</td><td>7 to 0</td><td>L</td><td rowspan="2">Pushing speed</td><td rowspan="2">*3)</td><td rowspan="2">1mm/s</td></tr>
<tr><td>F to 8</td><td>H</td></tr>
<tr><td rowspan="2">10</td><td>7 to 0</td><td>L</td><td rowspan="2">Moving force</td><td rowspan="2">*3)</td><td rowspan="2">1%</td></tr>
<tr><td>F to 8</td><td>H</td></tr>
<tr><td>11</td><td>F to 0</td><td>L</td><td rowspan="2">Area 1</td><td rowspan="2">“Stroke (-)” to “Stroke (+)” of the basic parameter</td><td rowspan="2">0.01 mm</td></tr>
<tr><td>12</td><td>F to 0</td><td>H</td></tr>
<tr><td>13</td><td>F to 0</td><td>L</td><td rowspan="2">Area 2</td><td rowspan="2">“Stroke (-)” to “Stroke (+)” of the basic parameter</td><td rowspan="2">0.01 mm</td></tr>
<tr><td>14</td><td>F to 0</td><td>H</td></tr>
<tr><td rowspan="2">15</td><td>7 to 0</td><td>L</td><td rowspan="2">In position</td><td rowspan="2">*3)</td><td rowspan="2">0.01 mm</td></tr>
<tr><td>F to 8</td><td>H</td></tr>
</table>

H=Most Significant Byte or upper word
L=Least Significant Byte or lower word

*3) The limit of possible input values depends on the type of electric actuator.
Please refer to the electric actuator’s instruction manual for details.

*4) For the RWw15: In position, input the lower-level word of the two-word In position data.

(4) Data editing function

●Controller → Higher level device [IN] (Remote to Master)

<table>
<tr><th colspan="2" rowspan="2">PLC memory address</th><th colspan="2" rowspan="2">RWr data name</th><th rowspan="2">Contents</th></tr>
<tr><th>Half numerical data instructions</th><th>Full numerical data instructions</th></tr>
<tr><th>RWr</th><th>bit</th><th colspan="3"></th></tr>
<tr><td rowspan="15">0</td><td>0</td><td rowspan="15">Controller information flag</td><td colspan="2">Return of Occupied number of stations (L)</td><td>Current occupied number of stations is shown.
<table><tr><th>H</th><th>L</th><th>Occupied number of stations</th></tr><tr><td>0</td><td>0</td><td>1 Stations occupied</td></tr><tr><td>0</td><td>1</td><td>2 Stations occupied</td></tr><tr><td>1</td><td>0</td><td>–</td></tr><tr><td>1</td><td>1</td><td>4 Stations occupied</td></tr></table></td></tr>
<tr><td>1</td><td colspan="2">Return of Occupied number of stations (H)</td><td></td></tr>
<tr><td>2</td><td colspan="2">Sending</td><td>After turning Start flag on at Step data editing function, this terminal will be ON during sending. And this terminal is OFF when the sending is completed or waiting for the sending instruction.</td></tr>
<tr><td>3</td><td colspan="2">Sending completed</td><td>When the data sending is completed at Step data editing function, Sending flag will be OFF and this terminal will be ON. Then Start flag turns OFF and this terminal will be OFF.</td></tr>
<tr><td>4</td><td colspan="2">READY</td><td>It is always ON if the controller has been started normally.</td></tr>
<tr><td>5</td><td colspan="2">ALARM flag</td><td>An alarm is generated when problems occur with the LECPMJ's internal process or communication with the PLC.
OFF during normal condition. ON when an alarm is generated.</td></tr>
<tr><td>6</td><td colspan="2">Initial</td><td>It is OFF during initial processing. It stays ON once the initial processing is completed.</td></tr>
<tr><td>7</td><td colspan="2">Numerical data reading enable/disable flag</td><td>It is ON when reading numerical data. Otherwise it is OFF.</td></tr>
<tr><td>8</td><td colspan="2">Parameter rewriting enable / disable flag</td><td>It is ON when the parameter rewrite flag is enabled. When it is disabled, it is OFF.</td></tr>
<tr><td>9 to C</td><td colspan="2">(No used)</td><td>–</td></tr>
<tr><td>D</td><td colspan="2">Data editing error receiving</td><td>When the error occurs in the data editing function, this terminal will be ON with RWr0, bit5: ALARM flag. When RWw0, bit2: Reset is turned on, it is cleared.</td></tr>
<tr><td>E</td><td colspan="2">Parameter anomaly detection</td><td>When a parameter is invalid, this and the RWr0, bit5: ALARM flag are turned ON. It is turned OFF when the RWw0,bit2: Reset flag is turned ON.
Please refer to "16. Alarm Detection for CC-Link Communication" for details.</td></tr>
<tr><td>F</td><td colspan="2">The abnormal station detection</td><td>When an abnormal station is detected, this and the RWr0, bit5: ALARM flag are turned ON. It is turned OFF when the RWw0,bit2: Reset flag is ON.
Please refer to "16. Alarm Detection for CC-Link Communication" for details.</td></tr>
</table>

<table>
<tr><td>1</td><td>F to 0</td><td>L</td><td colspan="3">Current position</td><td>The current position of the electric actuator is shown in multiples of 0.01 mm when numerical data reading is enabled.
Example)
800.00mm (80000d＝13880h) is output:
RWr1＝3880h
RWr2＝0001h</td></tr>
<tr><td>2</td><td>F to 0</td><td>H</td></tr>
<tr><td rowspan="2">3</td><td>7 to 0</td><td>L</td><td rowspan="6">Return of Data editing</td><td rowspan="2">Sub Function</td><td rowspan="2">Current speed</td><td rowspan="2">● Half numerical data instructions
The executed instruction code is output. Please refer to “9.5 Data editing function" for details of the instruction code. The value of 80h that is the OR (logical add) is output to Sub Function which set in RWw1. *3)
● Full numerical data instructions
The current speed of the electric actuator is shown in multiples of 1 mm/s when numerical data reading is enabled
Example) 300 mm/s (300d=012Ch) is output
RWr3＝012Ch</td></tr>
<tr><td>F to 8</td><td>H</td></tr>
<tr><td rowspan="2">4</td><td>7 to 0</td><td>L</td><td rowspan="2">Address</td><td rowspan="2">Current Force</td><td rowspan="2">● Half numerical data instructions
The start address of the executed instruction code is output. Please refer to “9.5 Data editing function" for details of the instruction code
00h is output in abnormal conditions.*3)
● Full numerical data instructions
The current pushing force of the electric actuator is shown in multiples of 1% when numerical data reading is enabled.</td></tr>
<tr><td>F to 8</td><td>H</td></tr>
<tr><td>5</td><td>F to 0</td><td>L</td><td>Address (always 0)</td><td rowspan="2">Target position</td><td>● Half numerical data instructions
0 is always output.
● Full numerical data instructions
The target position of the electric actuator is shown in multiples of 0.01 mm when numerical data reading is enabled.</td></tr>
<tr><td>6</td><td>F to 0</td><td>H</td><td>DATA (H)</td><td>● Half numerical data instructions
Data that corresponds to the executed instruction code is output.
An error code is output when there is an abnormality.
● Full numerical data instructions
The target position of the electric actuator is shown in multiples of 0.01 mm when numerical data reading is enabled.</td></tr>
</table>

<table>
<tr><td rowspan="2">7</td><td>7 to 0</td><td rowspan="2"></td><td rowspan="2">DATA (L)</td><td>Alarm 1</td><td rowspan="2">● Half numerical data instructions
Data that corresponds to the executed instruction code is output.
00h is output when there is an abnormality. *3)
● Full numerical data instructions
Alarm code shown as a 3 digit decimal number when numerical data reading is enabled and an alarm is generated. In the half numerical data instruction mode, up to two alarms can be output. In the full numerical data instruction mode, up to four alarms can be output.

The latest alarm code generated will be output to alarm 1. Alarm is updated by another alarm. The code of the previous alarms generated will be shifted to alarm1→2→3→4.
When the number of alarms generated exceeds the maximum alarm output for each mode, the oldest alarm code is deleted from the record.
Example)
Alarms were generated in order of (1) → (5)
<table><tr><td>Alarm 1 (The latest)</td><td>(1)</td><td rowspan="4">→</td><td>(2)</td><td rowspan="4">→</td><td>(3)</td><td rowspan="4">→</td><td>(4)</td><td rowspan="4">→</td><td>(5)</td></tr><tr><td>Alarm 2</td><td>0</td><td>(1)</td><td>(2)</td><td>(3)</td><td>(4)</td></tr><tr><td>Alarm 3</td><td>0</td><td>0</td><td>(1)</td><td>(2)</td><td>(3)</td></tr><tr><td>Alarm 4</td><td>0</td><td>0</td><td>0</td><td>(1)</td><td>(2)</td></tr></table>(1) to (5) in the table indicate the codes for the generated alarms.
Please refer to "16.1 Alarm details" for the alarm details.</td></tr>
<tr><td>F to 8</td><td>Alarm 2</td></tr>
<tr><td rowspan="2">8</td><td>7 to 0</td><td rowspan="15"></td><td>Alarm 3</td></tr>
<tr><td>F to 8</td><td>Alarm 4</td></tr>
<tr><td>9</td><td>F to 0</td><td>Sub Function</td><td>The executed instruction code is output. Please refer to “9.5 Data editing function" for details of the instruction code.
The value of 80h that is the OR (logical add) is output to Sub Function which set in RWw1. *3)</td></tr>
<tr><td>10</td><td>F to 0</td><td>Address</td><td>The start address of the executed instruction code is output. Please refer to “9.5 Data editing function" for details of the instruction code.
00h is output in abnormal conditions. *3)</td></tr>
<tr><td>11</td><td>F to 0</td><td>Address (always 0)</td><td>0 is always output</td></tr>
<tr><td>12</td><td>F to 0</td><td>DATA (H)</td><td>The data of the executed instruction code is output.
Error code is output in abnormal conditions. *3)</td></tr>
<tr><td>13</td><td>F to 0</td><td>DATA (L)</td><td>The data of the executed instruction code is output. 00h is output in abnormal conditions. *3)</td></tr>
<tr><td>14</td><td>F to 0</td><td rowspan="2">Occupation area</td><td rowspan="2">–</td></tr>
<tr><td>15</td><td>F to 0</td></tr>
</table>

H=Most Significant Byte or upper word

L=Least Significant Byte or lower word

*3) When the error occurred in the data edit function by the specified address which is out of the range etc., the value of 80h that is the OR (logical add) is output to Sub Function which set in RWw1 is returned to Sub Function RWr3 (RWr9 at Full numerical data instructions), and the received error code is returned to DATA (H) [RWr6] (RWrC at Full numerical data instructions). And RWr4:Address and RWr7: DATA (L) (RWrA and RWrD at Full numerical data instructions) will be 00h. Error code is shown below.

Error code	Name	Content
2	Out of address range	1) The setting of the reading/writing start number is out of address range 2) Writing in a number (address) which is not permitted
3	Out of access point number range	The setting of the reading/writing final number is out of the range

●Higher level device → Controller [OUT] (Master to Remote)

PLC memory address		RWw data name			Content
		Half numerical data instructions		Full numerical data instructions	
RWw	bit				
0	0	Controller control flag	Setting read numerical data		Turn ON to enable reading the numerical data such as current position or current speed. Turn OFF to disable reading.
	1		Setting parameter rewriting		When this flag is ON, the data edit function is enabled. When OFF, operation by numerical instruction is enabled. Before using the numerical instruction operation, be sure to turn this flag OFF.
	2		Reset flag		Turning it OFF then ON will clear the RWr0, bit5: ALARM flag.
	3		Restart flag		Turn it OFF then ON to re-initialize the controller.
	4		Start flag		Data transmission flag during data edit operations. It is OFF while waiting to transmit. Turn it ON when transmitting parameters to the controller.
	5 to F		(No used)		—
1	F to 0	Send of Data editing	Sub Function		Input the instruction code to be executed. Please refer to **"9.5 Data edit function"** for details.
2	F to 0		Address		Input the start address of the instruction code to be executed. Please refer to **"9.5 Data edit function"** for details.
3	F to 0		Address (always 0)		0 is always output.
4	F to 0		DATA (H)		Input data for some instruction codes. Please refer to **"9.5 Data edit function"** for details.
5	F to 0		DATA (L)		
6	F to 0	Occupation area			—
7	F to 0				
8 to 15	F to 0			Occupation area	—

H=Most Significant Byte or upper word

L=Least Significant Byte or lower word

11. Setting Data Entry

In order to move the electric actuator to a specific position, it is necessary to setup the patterns of operations with the controller setting kit or the teaching box. This setup data input by the controller setting kit or teaching box will be recorded in the memory of the controller.

For the controller setting kit and the teaching box, there are two available modes. The appropriate mode can be selected depending on the purpose.

- Easy mode

  In Easy mode, the electric actuator can be started by entering only a limited number of settings with the controller setting kit and the teaching box.

  The combination of settings you need to set up will change depending on the type of the electric actuator. (Combination of data can be selected.)

- Normal mode

  In Normal mode, a more detailed setup can be made (conditions for the electric actuator and controller, etc.) than in Easy mode.

  You can change three kinds of setting data, “Step data,” “Basic parameter” and “Return to origin parameter” in this mode.

11.1 Step data

Step data is the actual data relating to the operation of the electric actuator.

There are 64 patterns of step data. Each of them has 1 item to be set.

Each step data will become effective as soon as it is written to the controller.

Example) Step data of the controller setting kit [Normal mode]

No.	Move	Speed mm/s	Position mm	Accel mm/s^2	Decel mm/s^2	PushingF %	TriggerLV %	PushingSp mm/s	Moving F %	Area1 mm	Area2 mm	In posn mm
0	ABS	100	20.00	1000	1000	0	0	0	100	18.00	22.50	0.5
1	ABS	50	10.00	1000	1000	70	60	5	100	6.0	12.0	1.5
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
63	ABS	20	5.00	500	500	0	0	0	100	3.0	8.0	1.2

⚠ Caution

Writing of the step data should be performed while the electric actuator is stopped

Details of step data

<table>
<tr><th>Setting name</th><th>Range</th><th>Description</th></tr>
<tr><td>No.</td><td>0 to 63</td><td>Number of the step data.</td></tr>
<tr><td>Movement MOD</td><td>3 options
(See the right descriptions.)</td><td>The setting to specify the coordinate system for the target position.
<table>
<tr><th>Software</th><th>TB</th><th>Description</th></tr>
<tr><td>Blank</td><td>Disable</td><td>The step data is ineffective.</td></tr>
<tr><td>Absolute</td><td>Absolute</td><td>The target position will be defined by the absolute coordination based on the zero point.</td></tr>
<tr><td>Relative</td><td>Relative</td><td>The target position will be defined by the relative coordination based on the current position.</td></tr>
</table></td></tr>
<tr><td>Speed</td><td>Minimum value to “Max speed” of the basic parameter *1)</td><td>The speed to move to the target position (Unit: mm/s)</td></tr>
<tr><td>Position</td><td>“Stroke (-) ” to “Stroke (+) ” of the basic parameter</td><td>The target position (Unit: mm)</td></tr>
<tr><td>Acceleration</td><td>1 to “Max ACC/ DEC” of the basic parameter</td><td>The acceleration to reach to the Speed (Unit: mm/s^2)</td></tr>
<tr><td>Deceleration</td><td>1 to “Max ACC/ DEC” of the basic parameter</td><td>The deceleration to reach to the Speed (Unit: mm/s^2)</td></tr>
<tr><td>Pushing force</td><td>0 or
Minimum value to “Max force” of the basic parameter *1)</td><td>The setting to define the pushing operation or the positioning operation.
For the positioning operation, the value specifies the force as the percentage against the maximum force (Unit: %).
The maximum force changes depending on the electric actuator. Please refer to the manual and the rated force of the electric actuator.
<table>
<tr><th>Value</th><th>Operation</th><th>Description</th></tr>
<tr><td>0</td><td>Positioning operation</td><td>The electric actuator moves to the position specified in the “Position.</td></tr>
<tr><td>1-100</td><td>Pushing operation</td><td>The electric actuator moves to the position specified in the “Position” and then, performs a pushing action with a force not more than the set force.</td></tr>
</table></td></tr>
<tr><td>Trigger LV</td><td>Minimum value to “Max force” of the basic parameter *1)</td><td>● Effective only for the pushing operation.
(when the value for the “Pushing force” is from 1 to 100).
This is the setting to define the conditions where the INP will be turned ON. When the electric actuator generates a force over this value, INP will be turned ON. (Unit: %)
● For the positioning operation, this value is ignored.</td></tr>
</table>

<table>
<tr><td>Pushing speed</td><td>Minimum value to “Max force” of the basic parameter *1)</td><td>● Effective only for the pushing operation.
(when the value for the “Pushing force” is from 1to 100).
This defines the movement speed during the pushing operation. If this Speed is too high, it may cause damage to the electric actuator or work piece due to impacts. Therefore, enter a value within the range appropriate for the electric actuator. (Unit: mm/s)
Please refer to the electric actuator manual for the appropriate range of the speed.
● For the positioning operation, this value is ignored.</td></tr>
<tr><td>Moving force</td><td>*1)</td><td>The setting to define the maximum torque during the positioning operation.
Enter a value within the range appropriate for the electric actuator. (Unit: %).
Please refer to the electric actuator manual for the appropriate range of the speed.</td></tr>
<tr><td>Area1</td><td>“Stroke (-)” to “Area2” of step data</td><td rowspan="2">The setting to define the conditions where the AREA output will be turned ON (Unit: mm).
If the current position is within the range between the “Area1” and “Area2”, the AREA output will be turned ON.
If “Area1” ≧“Area2”, the alarm “Step Data ALM1” will be activated.
(However, no alarm is generated if “Area1”= “Area2”= 0, the AREA output will be turned OFF).</td></tr>
<tr><td>Area2</td><td>“Area1” of step data to “Stroke (+)” of the basic parameter</td></tr>
<tr><td>In position</td><td>*1)</td><td>The functions of this will be different between the pushing operation and the positioning operation.
● Positioning operation: Positioning range (Unit: mm).
● Pushing operation: Pushing distance (Unit: mm)
<table>
<tr><th>Operation</th><th>Description</th></tr>
<tr><td>Positioning operation</td><td>This is the setting to define the conditions where the INP output will be turned ON.
When the electric actuator enters within this range from the target position, the INP will be turned ON.
(It is unnecessary to change this from the initial value.)
If it is required to get a signal before the electric actuator completes the positioning operation, this value should be larger.
The INP output will be turned on. Target position - in position ≦ the electric actuator position ≦ target position + in position</td></tr>
<tr><td>Pushing operation</td><td>This is the setting to define the distance pushed by the electric actuator during the pushing operation.
When the electric actuator pushed exceeding this distance, the pushing operation will end.
In case of such stop exceeding the pushing distance, the INP will not be turned ON.</td></tr>
</table></td></tr>
</table>

*1) The range varies depending on the electric actuator. Please refer to the manual of the electric actuator for more details.

11.2 Basic parameter

The “Basic parameter” is the data to define the operating conditions of the controller, conditions of the electric actuator, etc.

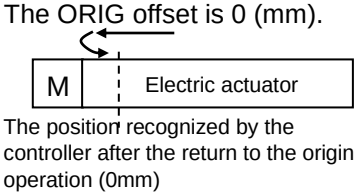
⚠ Caution

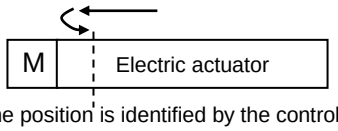
Writing of the parameter should be performed while the electric actuator is stopped.

Details of basic parameter

Activation: “XX” = Become effective just after recorded into the controller
“X” = Become effective after restarting the controller
“—”= The parameter cannot be changed (fixed value)

Parameter name	Range	Description	Activation
Controller ID	1 to 32	Identification number (axis) parameters of serial communications are set.	X
IO pattern	Fixed value	This is the fixed value for this controller. (It should not be changed). The value for this should be 64(Standard).	-
ACC/ DEC pattern	Fixed value	This is the fixed value for this controller. (It should not be changed) This defines the trapezoid acceleration/ deceleration parameter.	-
S-motion rate	Fixed value	This is the fixed value for this controller. (It should not be changed)	-
Stroke (+)	*1)	This defines the positive (+) side limit of the position. (Unit: mm) Any value greater than the [stroke (+)] value cannot be entered in the “Position” field data of step parameter setup.	XX
Stroke (-)	*1)	This defines the negative (-) side limit of the position. (Unit: mm) Any value less than the [stroke (-)] value cannot be entered in the “Position” field data of step parameter setup.	XX
Max speed	*1)	This defines the maximum limit of the speed (Unit: mm/s). Any value greater than the [Max speed] value cannot be entered in the “Speed” field data of step parameter setup. *2)	XX
Max ACC/DEC	*1)	This defines the maximum limit of the ACC/ DEC (Unit: mm/s^2). Any value greater than the [Max ACC/ DEC] value cannot be entered in the “Accel” field data of step parameter setup.	XX
Def In position	*1)	This defines the range to activate the INP output when the electric actuator is within it after the return to origin operation. (Unit: mm)	XX

<table>
<tr>
<td>ORIG offset</td>
<td>*1)</td>
<td>This defines the position of the electric actuator after the return to origin operation. (Unit: mm)
● The ORIG offset is 0 (mm).
 

The position recognized by the controller after the return to the origin operation (0mm)
● The ORIG offset is 100 (mm).
 

The position is identified by the controller after the return to the origin operation (100mm).
Between the left examples, the electric actuator positions are not different but the reference point that the controller recognizes will be changed after the return to origin operation
⚠ Caution
If the value for the “ORIG offset” is changed, the “Stroke (+)” and “Stroke (-)” of the basic parameters should be checked again.</td>
<td>XX</td>
</tr>
<tr>
<td>Max force</td>
<td>*1)</td>
<td>The maximum force for the pushing operation (Unit: %).</td>
<td>XX</td>
</tr>
<tr>
<td>Para protect</td>
<td>1 to 3</td>
<td>Sets the range in which parameter and step data can be changed.
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>1：Common + Step data</td><td>Basic parameter
+ Return to origin parameter
+ Step data</td></tr>
<tr><td>2：Common</td><td>Basic parameter
+ Return to origin parameter</td></tr>
<tr><td>3：Common + extend
+ Step data *3)</td><td>Basic parameter
+ Return to origin parameter
+ Operation parameter
+ Step data</td></tr>
</table></td>
<td>XX</td>
</tr>
<tr>
<td>Enable SW</td>
<td>1 to 2</td>
<td>This defines the status of the Enable switch of the teaching box.
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>1</td><td>Enable</td></tr>
<tr><td>2</td><td>Disable</td></tr>
</table></td>
<td>XX</td>
</tr>
<tr>
<td>Unit name</td>
<td>Fixed value</td>
<td>Indication of the electric actuator type compatible to the controller.
(It should not be changed)</td>
<td>-</td>
</tr>
<tr>
<td>W-AREA1</td>
<td rowspan="2">“Stroke (-)” to “Stroke (+)” of the basic parameter</td>
<td rowspan="2">The condition that the WAREA output turns ON.(unit mm):
When the current position is within W-AREA1 and W-AREA2, the WAREA output turns ON.

When “W-Area 1 < W-Area2”, the “Parameter ALM “of alarm occurs. But if both W-Area1 and W-Area2 is 0, the alarm will not be activated, and the WAREA output turns OFF</td>
<td>XX</td>
</tr>
<tr>
<td>W-AREA2</td>
<td>XX</td>
</tr>
<tr>
<td>ORG Correct
[Link Offset]</td>
<td rowspan="2">Fixed value</td>
<td rowspan="2">This is the fixed value for this controller.
(It should not be changed)</td>
<td rowspan="2">-</td>
</tr>
<tr>
<td>Sensor type</td>
</tr>
</table>

<table>
<tr>
<td>Option 1
(Occupied number of stations of CC-Link)</td>
<td>1,2,4</td>
<td>Set the operation mode for the controller (number of occupied stations).
<table>
<tr><th>Parameter</th><th>Operation mode
(number of occupied stations)</th></tr>
<tr><td>1</td><td>Single numerical data instruction mode
(1 stations is occupied)</td></tr>
<tr><td>2</td><td>Half numerical data instruction mode
(2 stations are occupied)</td></tr>
<tr><td>4</td><td>Full numerical data instruction mode
(4 stations are occupied)</td></tr>
</table>
</td>
<td>X</td>
</tr>
<tr>
<td>Undefined parameter No.11
(Operation setting at CC-Link communication error)</td>
<td>0,10</td>
<td>Set the operating method of CC-Link communication abnormality (time-out, malfunction, and CRC error).
<table>
<tr><th>Parameter</th><th>Output the data to control unit</th><th>Details</th></tr>
<tr><td>0</td><td>Hold
(Hold the operating state)</td><td>Even if communication abnormality occurs in CC-Link, the alarm does not occur. The control unit continues operation and executes it.</td></tr>
<tr><td>10</td><td>Alarm stop</td><td>When the communication abnormality occurs in CC-Link, the control unit will be stop state by the alarm and outputs “Communication alarm 150”.</td></tr>
</table>
</td>
<td>X</td>
</tr>
<tr>
<td>Undefined parameter No.12</td>
<td>Fixed value</td>
<td>This is the fixed value for this controller.
(It should not be changed)</td>
<td>–</td>
</tr>
</table>

*1) The range varies depending on the electric actuator. Please refer to the manual of the electric actuator for more details.

*2) It is recommended to set the “maximum speed” for the electric actuator operation. Control is restricted so that the set value is not exceeded. The response will be slower because of this.

*3) For the basic parameter "Parameter protection" to "3: Common + Extend + Step", set it according to the following procedures.

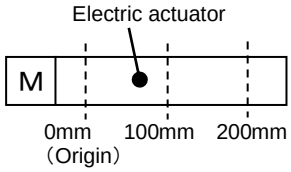
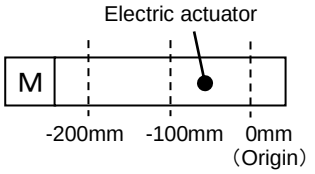
1. Start controller-setting software (LEC-W2) in the Normal mode.
2. Select "HELP" - "Password" from the menu and input "password" in the password input screen.
3. Change the basic parameter "Parameter protection" to "3: Common + Extend + Step" in the Parameter window.
4. Click "Download" to transmit the change. The text colour of the changed parameter will change from blue to black.
5. After completing the setting, turn the LECPMJ OFF then ON to make the change effective.

11.3 Return to origin parameter

The “Return to origin parameter” is the setting data for the return to origin operation.

Details of Return to origin parameter

Activation: “XX” = Become effective just after recorded into the controller,
“X” = Become effective after restarting the controller,
“-” = The parameter cannot be changed (fixed value).

<table>
<tr><th>Name</th><th>Range</th><th>Description</th><th>Activation</th></tr>
<tr><td>ORIG direction</td><td>1 to 2</td><td>Sets the direction of return to origin operation.<table><tr><th>Value</th><th>Description</th></tr><tr><td>1</td><td>CW</td></tr><tr><td>2</td><td>CCW *1)</td></tr></table>⚠Caution
Even if “ORIG direction” is changed, direction of + to - of step data is not changed.
●Default value
 
●Value changed from the default value
  </td><td>X</td></tr>
<tr><td>ORIG mode</td><td>*1)</td><td>The setting for the return to origin operation.<table><tr><th>Value</th><th>Description</th></tr><tr><td>1</td><td>pushing origin operation [Stop]</td></tr><tr><td>2</td><td>limit switch origin [Sensor]</td></tr></table></td><td>XX</td></tr>
<tr><td>ORIG limit</td><td>*1)</td><td>A pushing force level at which to set the origin.</td><td>XX</td></tr>
<tr><td>ORIG time</td><td>Fixed value</td><td>This is the fixed value for this controller
(It should not be changed)</td><td>-</td></tr>
<tr><td>ORIG speed</td><td>*1)</td><td>The allowable speed to move to origin.</td><td rowspan="2">XX</td></tr>
<tr><td>ORIG ACC/ DEC</td><td>*1)</td><td>The acceleration and deceleration during find origin.</td></tr>
<tr><td>Creep speed</td><td>Fixed value</td><td>This is the fixed value for this controller
(It should not be changed)</td><td>XX</td></tr>
<tr><td>ORIG sensor</td><td>*1)</td><td>The setting for ORIG sensor.<table><tr><th>Value</th><th>Description</th></tr><tr><td>0</td><td>The origin sensor is not effective. [Disable]</td></tr><tr><td>1</td><td>The origin sensor is N.O type. [N.O].</td></tr><tr><td>2</td><td>The origin sensor is N.C type. [N.C.]</td></tr></table></td><td>XX</td></tr>
<tr><td>ORIG SW DIR
Undefined parameter No.21</td><td>Fixed value</td><td>This is the fixed value for this controller.
(it should not be changed)</td><td>-</td></tr>
</table>

*1) The range varies depending on the electric actuator. Please refer to the manual of the electric actuator for more details.

11.4 Operation parameters

This is data to set the JOG operation of the controller.

To change operation parameters, set the basic parameter "Parameter protection" to "3: Common + Extend + Step".

Details of the operation parameters

Activation: “XX” = Become effective just after recorded into the controller,
“X” = Become effective after restarting the controller,
“-” = The parameter cannot be changed (fixed value).

Controller setting software	Range	Description	Acti-v ation
JOG speed	*1)	Defines the JOG operation speed. (Unit: 1 mm/s)	XX
JOG acceleration	1 to "Max ACC/DEC" of the basic parameter	Defines the JOG operation acceleration. (Unit: 1 mm/s^2)	XX
JOG deceleration	1 to "Max ACC/DEC" of the basic parameter	Defines the JOG operation deceleration. (Unit: 1 mm/s^2)	XX
JOG thrust	*1)	Defines the torque limit during JOG operation. (Unit: 1%)	XX
Fixed distance	0.01 to Full stroke *1)	Defines the Inching distance. (Unit: 0.01 mm)	XX

*1) This depends on the electric actuator. Set a value that is equal to or smaller than the catalogue recommended value for positioning operation or pushing operation, according to the operating manual for each electric actuator.

12. Return to origin

12.1 Return to origin

After inputting the set data, it is necessary to perform a return to origin (to establish the origin point) before starting the positioning or pushing operation. (To ensure the position of origin)

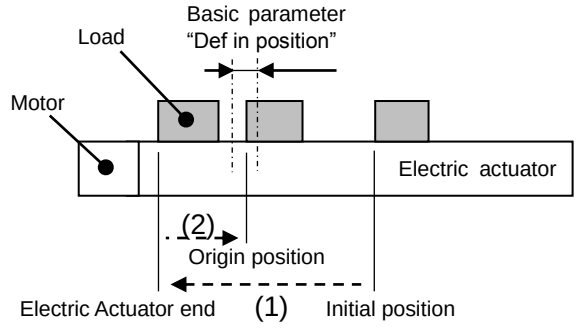
● Return to origin operation

The electric actuator moves in the return to origin direction (this direction is dependent on the electric actuator) from the initial position at the moment of power-on: (1)

When the electric actuator reaches the end of it pauses for a short time. The controller recognizes the position as the end of travel limit of the electric actuator. Then, the electric actuator moves at a low speed in the direction opposite to the return to origin direction: (2)

Return to origin signal
↓
Move in the return to origin direction
↓
Stop the movement
↓
Move in the opposite direction
↓
Origin position

(Example) Return to origin operation



⚠ Caution

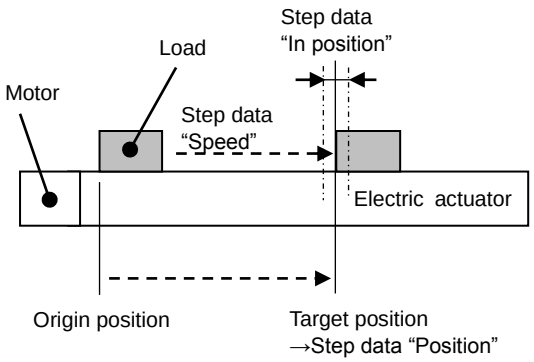
This direction is dependent on the electric actuator.

12.2 Positioning operation

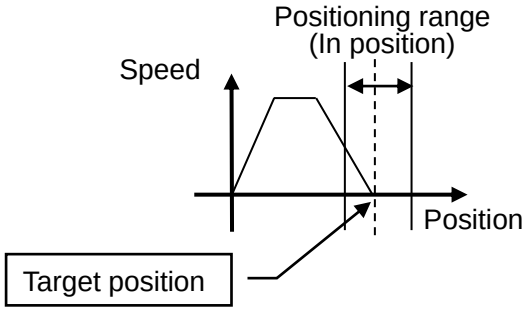
Step data "Pushing force" is 0.

The electric actuator moves to the target position specified by the step data "Position."

● Example) Positioning operation



●Example) Positioning operation [Speed/ Position]



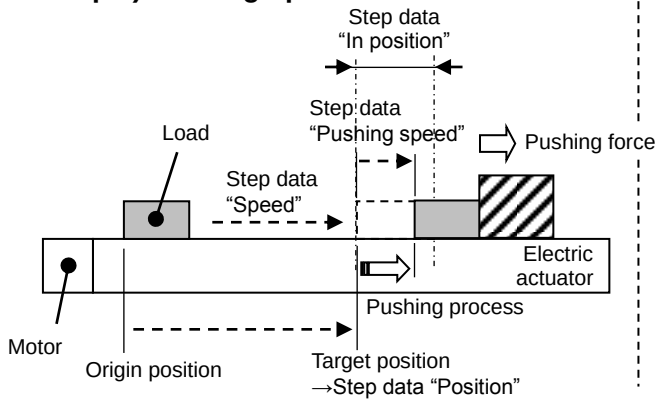
12.3 Pushing operation

The pushing operation is active when a Value greater than “1” is set in the Step data “pushing force”.
Similar to the positioning operation, the electric actuator moves according to the settings of “Position” and “Speed” in the step data and then, when it reaches to the target position, it starts the pushing process.
The electric actuator pushes the load with the force no more than the maximum force set in the “Pushing force” of the step data.

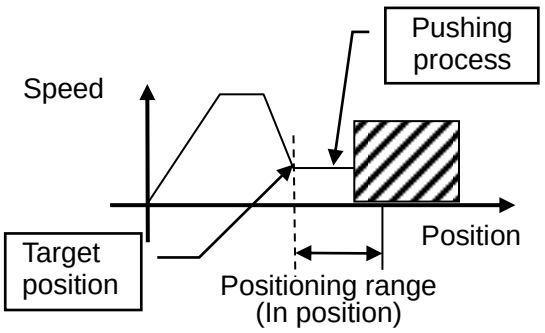
(1) Pushing operation is successfully performed

During the pushing operation, if the pushing force is kept higher than the value specified by “Trigger LV” of the step data for a certain time, the INP output will be turned ON. Even after this completion of pushing operation, the electric actuator keeps generating the force setup in the step data.

●Example) Pushing operation

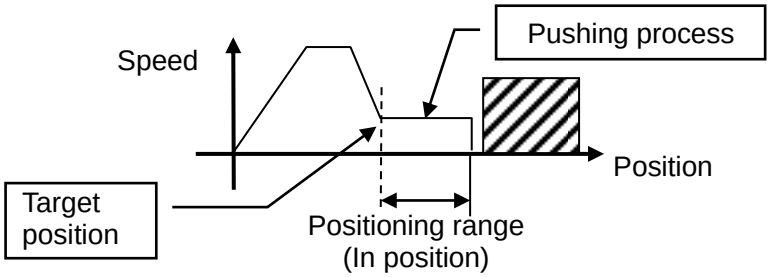


●Example) Pushing operation (Speed/Position)



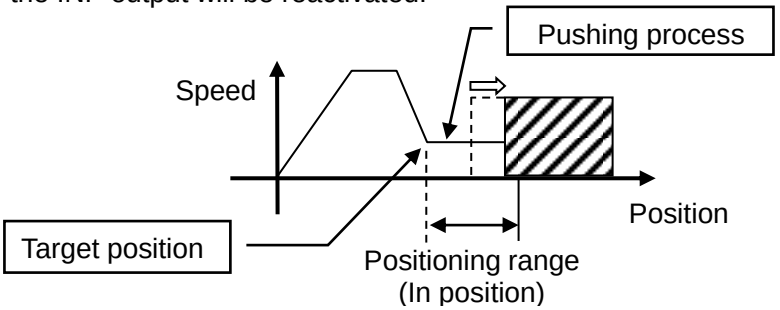
(2) Pushing operation is failed (pushing the air)

If the pushing process is not completed even after the electric actuator runs over the range specified in the step data from the target position (the starting point of the pushing process), the operation will be completed. In such case, the INP output will be turned OFF.



(3) Movement of the work piece after the completion of the pushing process

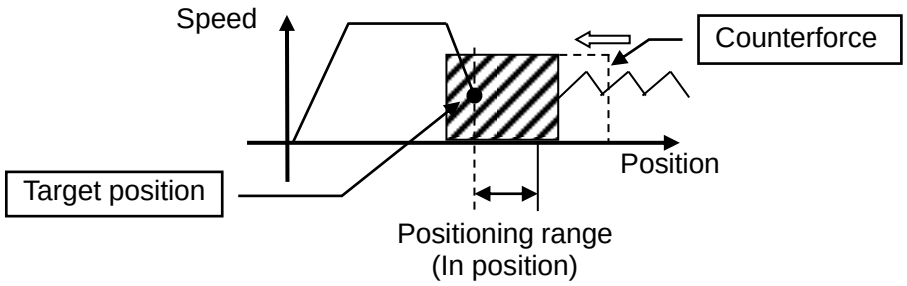
1) Movement of the work piece in the pushing direction.
After completion of the pushing operation, if the reaction force from the work piece becomes smaller, the electric actuator may move with a force smaller than that specified in the “TriggerLV” of the step data.In such case, the INP output will be turned OFF and the electric actuator moves within the positioning range according to the balance of the force.
If the pushing force is kept higher than the value specified by “Trigger LV” of the step data for a certain time again, the INP output will be reactivated.



2) Movement of the work piece in the direction opposite to the pushing direction

(The electric actuator is pushed back since the reaction force from the work piece is too large.)

After completion of the pushing operation, if the reaction force from the work piece becomes larger, the electric actuator may be pushed back. In such case, while the INP output is kept be ON, the electric actuator will be pushed back to the point where the reaction force and the electric actuator pushing force are balanced (pushed back toward the target position). If the electric actuator is pushed back over the target position, the alarm (ORIG ALM) will be activated.



12.4 Controller input signal response time

The factors that may cause the controller to delay's in responding to the input signal are as follows:

(1) The controller delayed in scanning the input signal.

(2) The analysis and computing of the input signal is delayed.

(3) The analysis and processing of the command is delayed.

Leave an interval of 15 ms (30 ms if possible) or more between input signals and maintain the state of the signal for 30ms or more, as PLC processing delays and controller scanning delays can occur.

12.5 Methods of interrupting operation

There are two methods of interrupting operation and stopping the electric actuator during positioning operation and pushing operation, as shown below. The state after stopping is different, so use the method appropriate to the application.

● Stopping by EMG signal

If the EMG signal is turned OFF during operation, after the electric actuator decelerates and stops, the servo will turn OFF so the stopped position is not held. (For the electric actuator with lock, it is held by the lock function.)

● Stopping by RESET signal

If the RESET signal is turned ON during operation, after the electric actuator decelerates and stops, the stopped position is held. (The servo does not turn OFF.)

● Stopping by HOLD signal

The electric actuator decelerates to stop when HOLD signal is ON during operation.

(The servo does not turn OFF.)

⚠ Caution

If instructed to stop by EMG signal and RESET signal, all OUT signals will turn OFF.
The RESET signal input during HOLD is valid.

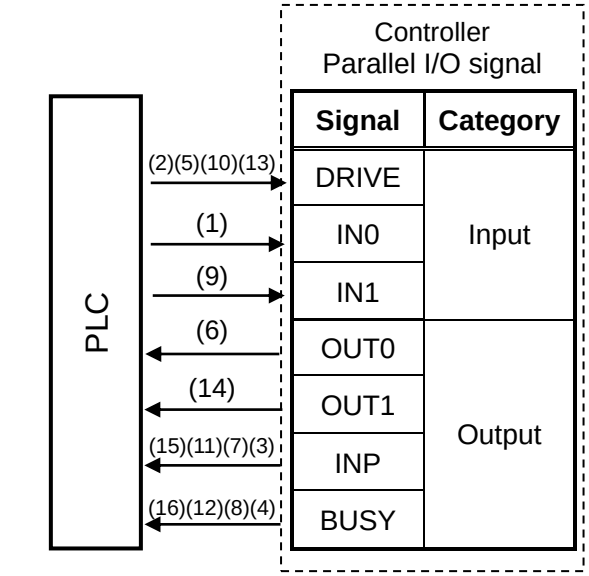
13. Operation (Example)

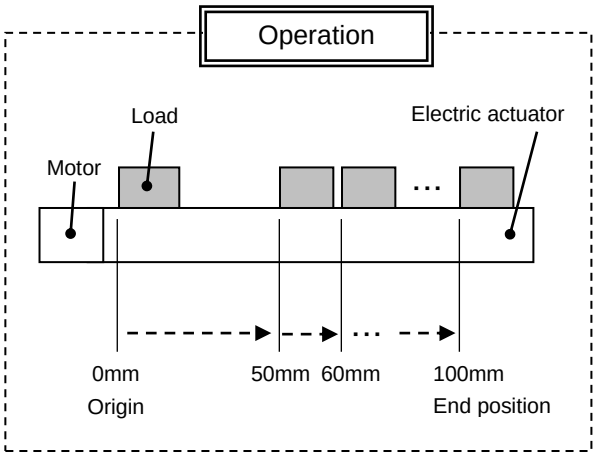
13.1 Positioning operation

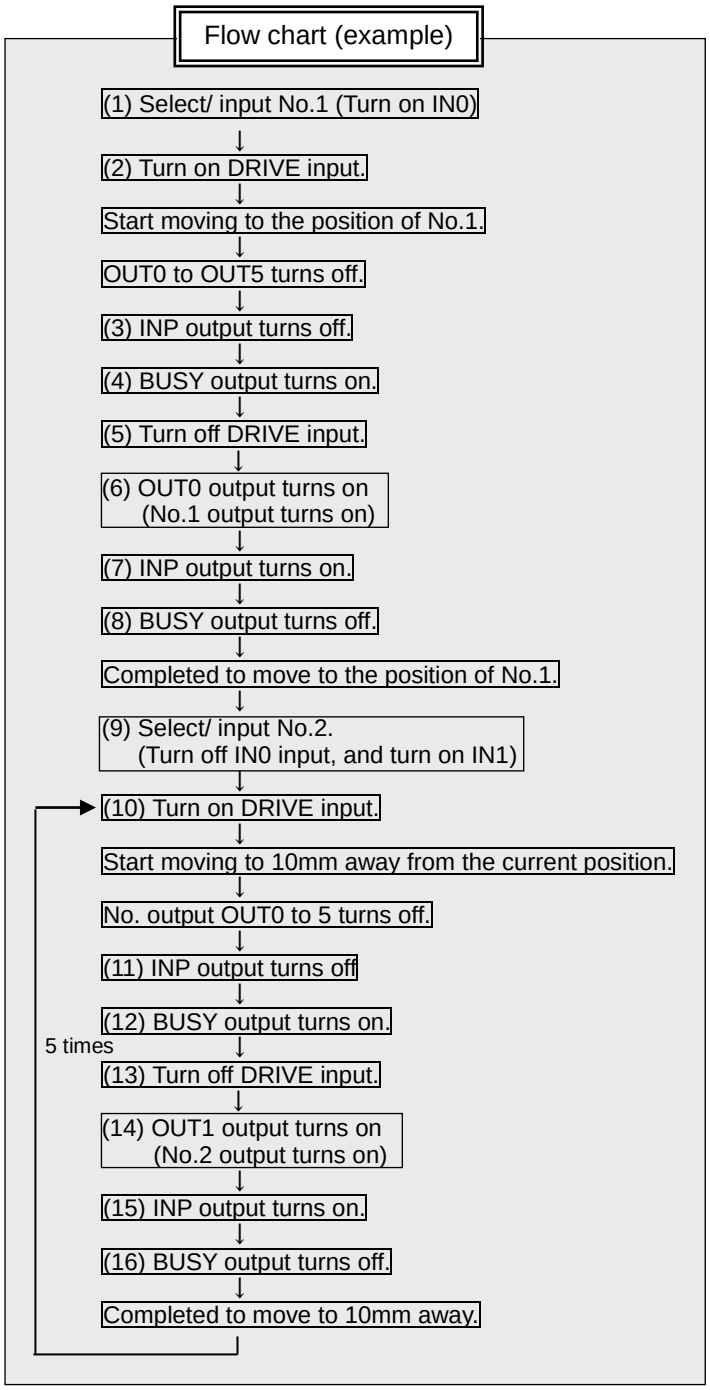
Example) Move the electric actuator from the origin to 50mm point with 100mm/s. (Using Step No.1)
Next, it shows setting example to move the electric actuator from the 50mm point to 100mm point by moving it 5 times continuously, 10mm at a time, with a speed of 50 mm/s. (Step No. 2)

● [Normal mode] Step data example

No.	Movement MOD	Speed mm/s	Position mm	Acceleration mm/s^2	Deceleration mm/s^2	Pushing force %	Trigger LV %	Pushing speed mm/s	Moving force %	Area1 mm	Area2 mm	Inposition mm
0	-	-	-	-	-	-	-	-	-	-	-	-
1	Absolute	100	50.00	1000	1000	0	0	0	100	0	0	0.1
2	Relative	50	10.00	1000	1000	0	0	0	100	0	0	0.1





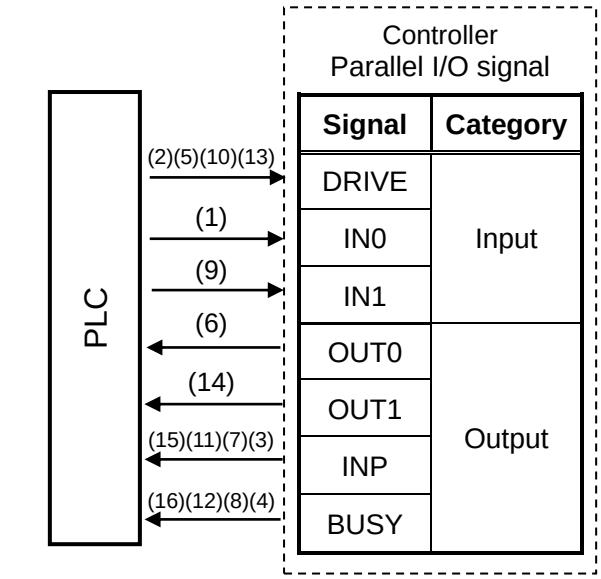


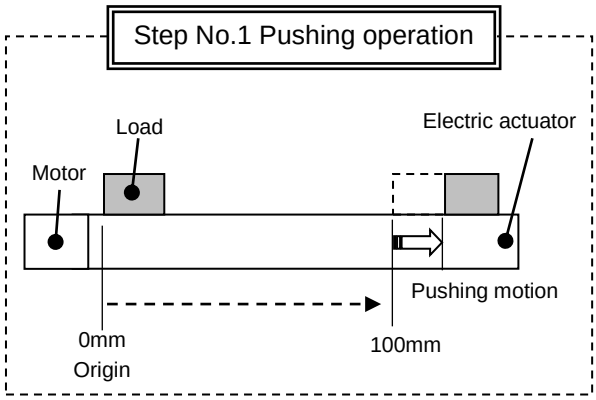
13.2 Pushing operation

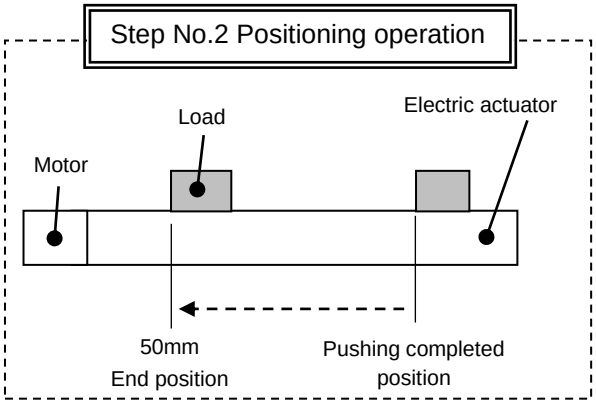
Example) Move the electric actuator from the origin to 100mm point with 100mm/s. (Using Step No.1)
From the 100mm point, the electric actuator starts the pushing operation of 10mm/s speed and 50% or less force (the pushing distance is up to 5mm). Then, the electric actuator moves from the position where the pushing operation was completed (where INP was turned on) to the 50mm point with 50mm/s. (Using Step No.2)

● [Normal mode] Step data example

No.	Movement MOD	Speed mm/s	Position mm	Acceleration mm/s²	Deceleration mm/s²	Pushing force %	Trigger LV %	Pushing speed mm/s	Moving force %	Area1 mm	Area2 mm	Inposition mm
0	-	-	-	-	-	-	-	-	-	-	-	-
1	Absolute	100	100.00	1000	1000	50	40	10	100	0	0	5
2	Absolute	50	50.00	1000	1000	0	0	0	100	0	0	0.1







Flow chart (example)

(1) Select/ input No.1 (Turn on IN0)
↓
(2) Turn on DRIVE input
↓
Start moving to the position of No.1.
↓
OUT0 to OUT5 turns off
↓
(3) INP output turns off.
↓
(4) BUSY output turns on.
↓
(5) Turn off DRIVE input.
↓
(6) OUT0 output turns on
(No.1 output turns on)
↓
Move at low speed after passing the “Position” of the No.1
↓
Push the work piece with the specified “Pushing force”
↓
(7) INP output turns on.
↓
(8) BUSY output turns off.
↓
Completed to move to the position of No.1.
↓
(9) Select/ input No.2.
(Turn off IN0 input, and turn on IN1)
↓
(10) Turn on DRIVE input.
↓
Start moving to 50mm away from the current position.
↓
No. output OUT0 to 5 turns off.
↓
(11) INP output turns off.
↓
(12) BUSY output turns on.
↓
(13) Turn off DRIVE input.
↓
(14) OUT1 output turns on
(No.2 output turns on)
↓
(15) INP output turns on.
↓
(16) BUSY output turns off.
↓
Completed to move to the “Position” of the No.2.

14. Operation instruction

The following describes how to instruct the operation by step data No. instruction, operation by numerical instruction, and operation of the data edit function.

14.1 Operating procedure for operation by step data No. instruction

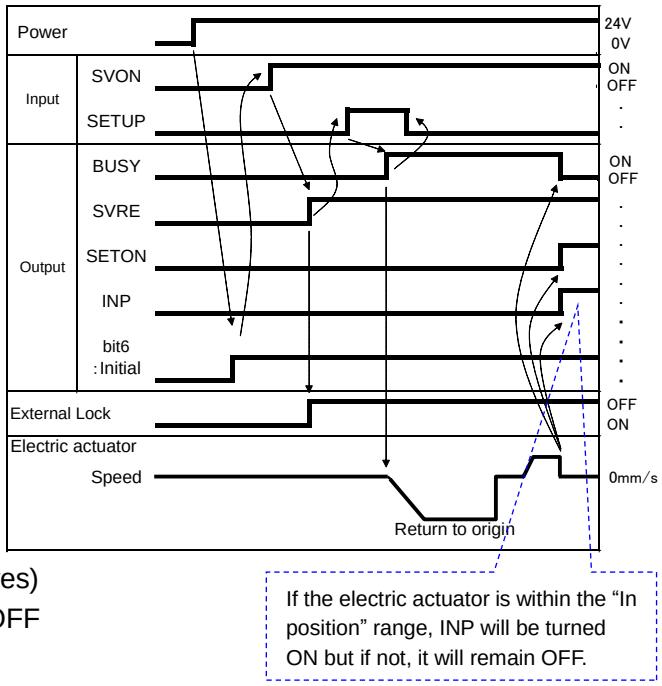
Check the following procedures and timing chart for each item.

(1) Power on → Return to origin

- Procedures-

1) Apply the power.
   When the initialization of the controller is over, RWr0, bit6 : Initial is turned on.
   ↓
2) SVON is turned ON.
   ↓
3) SVRE is turned ON
   The time taken for SVRE output to turn on depends on the electric actuator type and the operating conditions.
   The electric actuator with lock is unlocked.
   ↓
4) SETUP is turned ON.
   ↓
5) BUSY is turned ON. (The electric actuator moves)
   After BUSY was turned ON, SETUP is turned OFF
   ↓
6) SETON and INP are turned ON.
   When the BUSY output is turned OFF, the return to origin operation has been completed.

- Timing chart Power on → Return to origin -



(2) Positioning operation

- Procedures-

1) Input step data No. (IN0 to IN5)

↓

2) DRIVE is turned ON.
(OUT0 to OUT 5 is turned off)
→Scan the step data number (From IN0 to IN5). Then, if DRIVE is turned OFF, the step data number will be output (From the output OUT0 to OUT5)

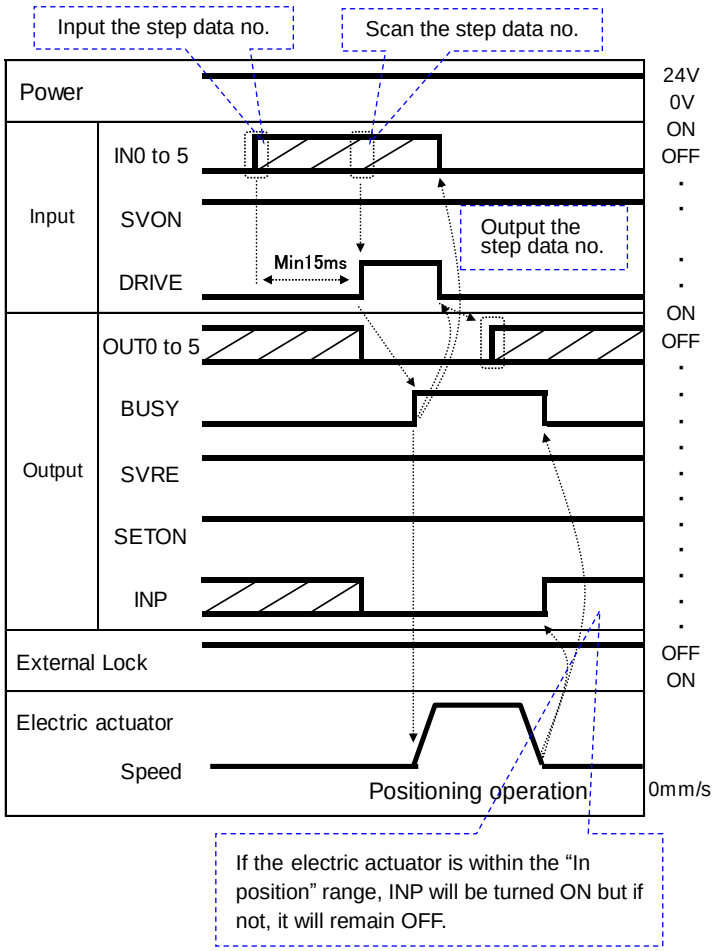
↓

3) BUSY is turned ON.
(The positioning operation starts.)

↓

4) When INP turns ON and BUSY turns OFF, the positioning operation will be completed.

-Timing chart Positioning operation-



(3) Pushing operation

- Procedures-

1) Input step data No. (IN0 to IN5)

↓

2) DRIVE is turned ON.
(OUT0 to OUT5 is turned off.)
→Scan the step data number (From IN0 to IN5). After this, if DRIVE is turned OFF, the step data number will be output (From the outputs OUT0 to OUT5)

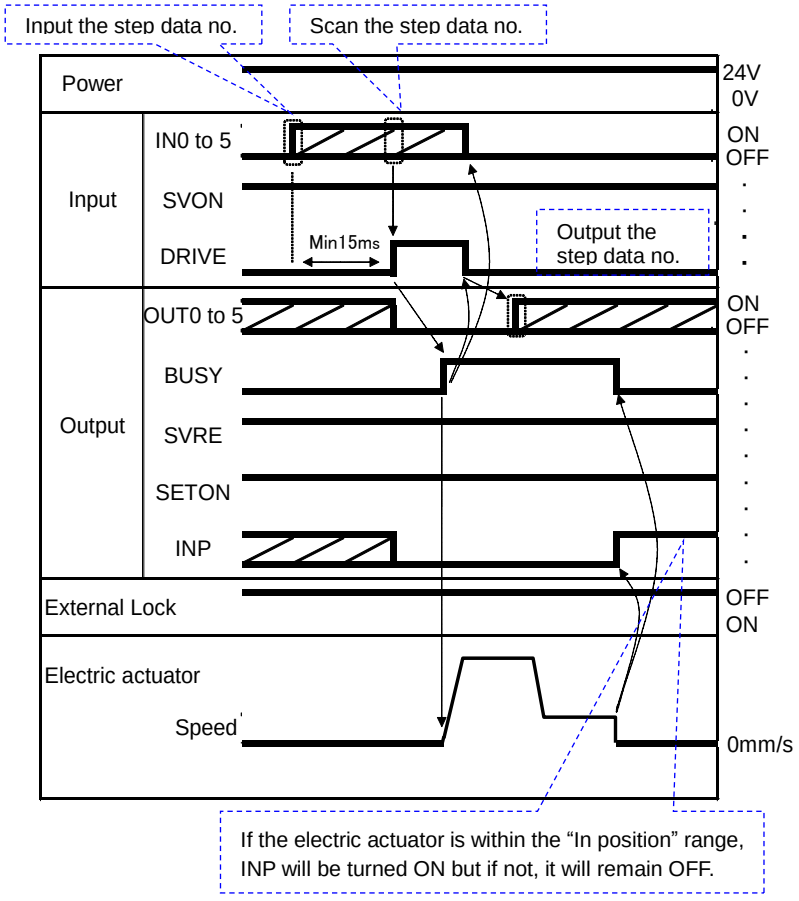
↓

3) BUSY is turned ON.
(The Pushing operation starts.)

↓

4) When INP output is turned ON and BUSY is turned OFF, the pushing operation will be completed.
(The electric actuator generates the force larger than that specified in “TriggerLV” of the step data).

- Timing chart Pushing operation -

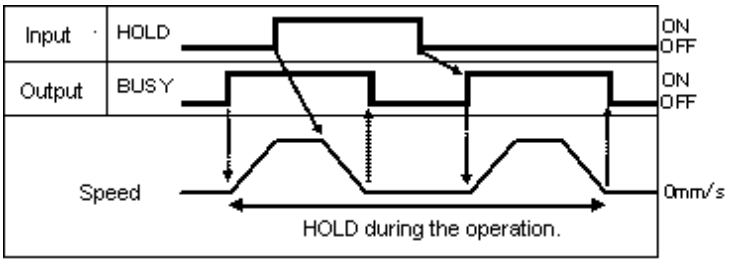


(4) HOLD

-Procedures-

1) HOLD is turned ON during the operation
(When HOLD is ON).
↓
2) BUSY is turned OFF (The electric actuator stops).
↓
3) HOLD is turned OFF.
↓
4) BUSY is turned ON (The electric actuator restarts).

-Timing chart HOLD -

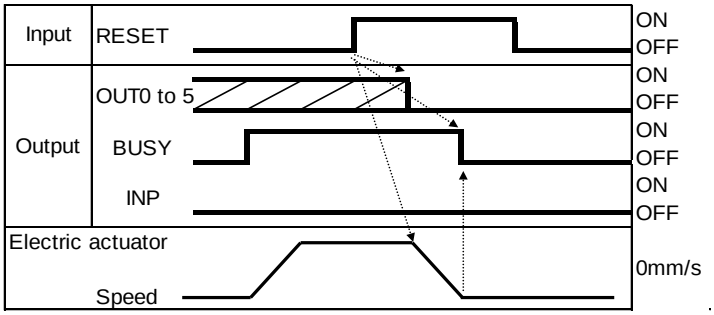


(5) Reset

-Procedures- [Driving reset]

1) RESET is turned ON during the operation
(BUSY output is ON).
↓
2) The OUT0 to OUT5 (OUT) are turned OFF
↓
3) The “BUSY” output turns OFF.
(The electric actuator stops.)

-Timing chart Driving reset -

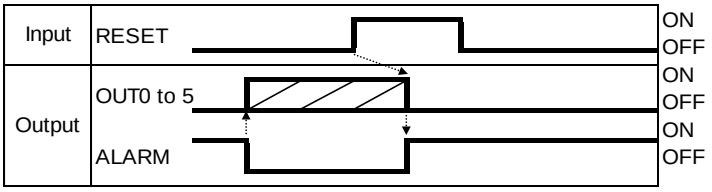


If the electric actuator is within the “In position” range, INP will be turned ON.

-Procedures- [Alarm reset]

1) An alarm is activated.
(ALARM is turned OFF and the output OUT0 to OUT3 is turned ON.)
↓
2) RESET is turned ON.
↓
3) ALARM is turned ON and the output OUT0 to OUT3 is turned OFF (The alarm is deactivated).

-Timing chart Alarm reset

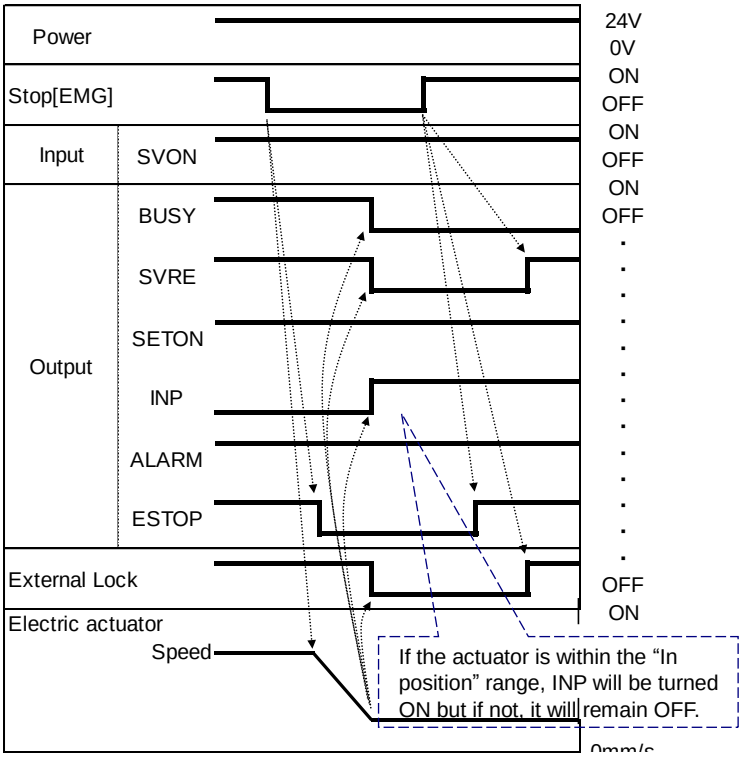


(6) Stop

-Procedures-

1) The stop [EMG] input is turned OFF during the operation
(When BUSY is ON). [Stop command]
↓
2) ESTOP is turned OFF.
↓
3) BUSY is turned OFF
(The electric actuator stops).
SVRE is turned OFF
(If the electric actuator has a lock).
↓
4) The stop [EMG] input is turned ON.
[The stop release command]
↓
5) ESTOP is turned ON.
SVRE is turned ON. (Lock release)
If the electric actuator has a lock.

- Timing chart stop -



When "Stop [EMG]" is OFF, the stop is activated.

(7) Area output

-Procedures-

● Operation of Step Data No.1

1) Input step data No. (IN0 to IN5)

↓

2) DRIVE is turned ON

→ Receive the step data no.1 (From the input IN0 to IN5).
Then, if the DRIVE is turned OFF, the step data will be output.
(From the output OUT0 to OUT5).

↓

3) BUSY is turned ON.
(The electric actuator starts the operation)
INP is turned OFF.

↓

4) AREA output is turned ON for the step data no.1
(At 150mm from the origin point).

↓

5) BUSY is turned OFF. (The electric actuator stops.)
INP is turned ON.

↓

● Operation of Step Data No.2

6) Input step data No. (IN0 to IN5).

↓

7) DRIVE is turned ON.

→ Receive the step data no.2 (From the input IN0 to IN5).
Then, if the DRIVE is turned OFF, the step data will be output (from the output OUT0 to OUT5).

↓

8) AREA is turned OFF.
BUSY is turned ON. (The electric actuator starts the operation.)

↓

9) AREA output is turned ON for the step data no.2 (At 170mm from the origin point).

↓

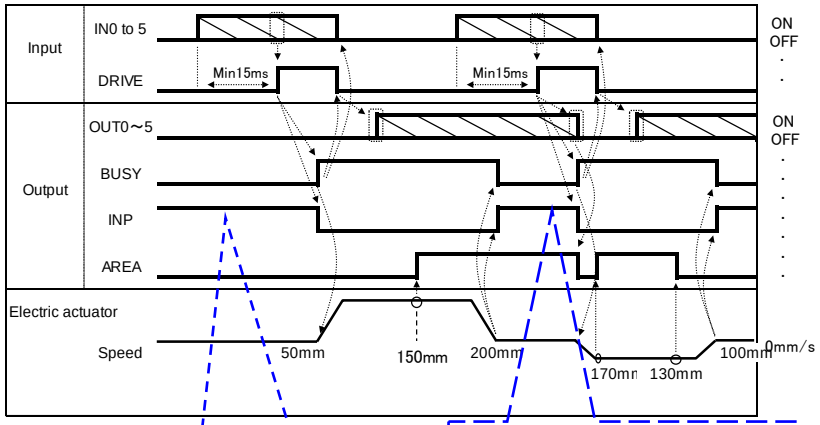
10) AREA output is turned OFF for the step data no.2 (At 130mm from the origin point).

↓

11) BUSY is turned OFF. (The electric actuator stops.)
INP is turned ON.

-Timing chart Area output -

Example:
The initial position: 50mm
↓
Operation of step data No.1: Position: 200mm, Area1-Area2: 150-250mm
↓
Operation of step data No.2: Position: 100mm, Area1-Area2: 130-170mm



If the now position is inside of step data positioning. The INP signal is ON. Otherwise, the signal is OFF.

If the now position is inside of 1 and 2 area scope for step data. The AREA signal is ON. Otherwise, the signal is OFF

14.2 Operating procedure for operation by numerical instruction

Operation by numerical instruction is possible in all modes. The following shows an example in the half numerical data instruction mode.

Enter half numerical data instruction mode and numerically instruct 50.00 mm directly for the position parameter of the specified step data No., and then operate the electric actuator. For parameters other than positions that are numerically specified (e.g. speed, acceleration/ deceleration), values set to the specified step data No. are used.

Regarding servo ON (Rx09: SVRE = ON) and fixing position information by return-to-origin (Rx0A: SETON = ON), complete these before starting operation by numerical instruction.

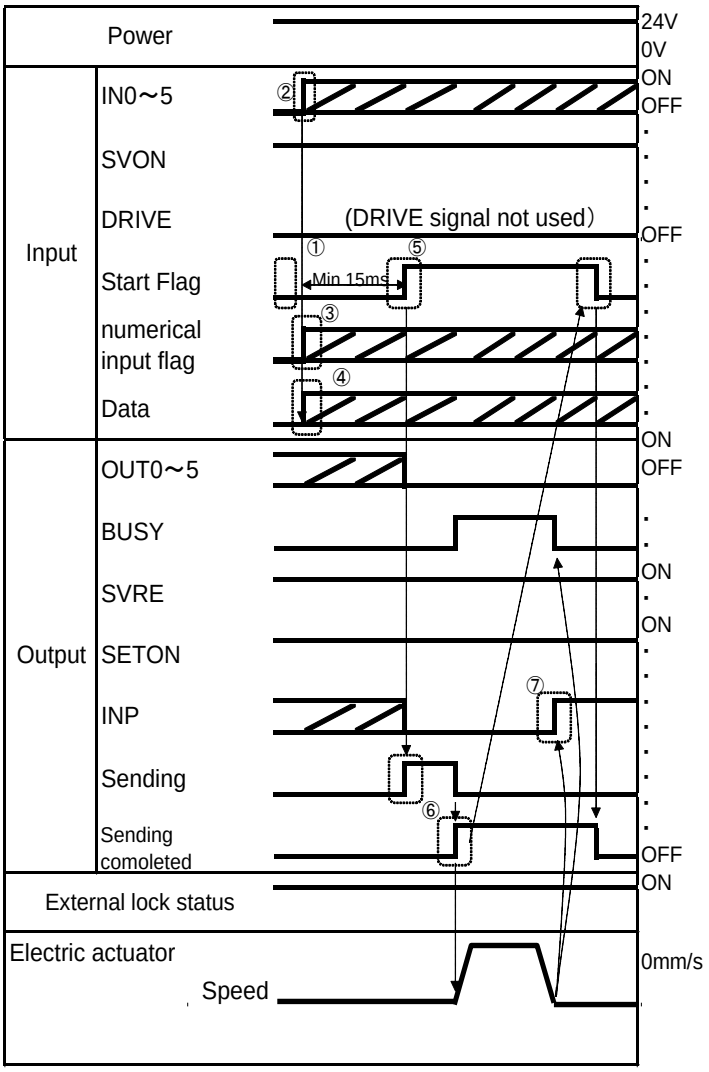
(1) Check that RWw1,bit0: Start flag = OFF. When RWw1,bit0: Start flag = ON, input "OFF".

(2) Input the step data No. to be specified in Ry00 to 05: IN0 to 5.
Example) To specify step data No.1 → Input Ry00: IN0 = ON and Ry01 to 05: IN1 to 5 = OFF

(3) RWw0,bit4 to F: With a numerical input flag, input ON to the parameter bit that is numerically instructed by specified step data No. Input OFF to the parameter bit that is not numerically instructed.
Example) Only [position] of the numerical data input flag is specified by number.
→ Input RWw0,bit6 = ON and RWw0,bit4, 5, 7 to B = OFF.

(4) Input RWw1,bit8 to F: Operation mode and the parameter data to be numerically specified for RWw2 to 15.
Example) Input "Position" 50.00 mm.
5000[0.01 mm] = (00001388)h
→ RWw3: Target position (L) = (1388)h
RWw4: Target position (H) = (0000)h

Timing chart/Numerical instruction operation



(5) Input the numerical data input flag bit and numerically specified parameter data, and then input RWw1,bit0: Start flag=ON.
When the Start flag is turned ON, transmission of the operation instruction data starts and Rx00 to 05: OUT0 to 5=OFF and Rx0B: INP=OFF are output. During data transmission, RWr0,bit2: Sending=ON is output.

(6) When data transmission to the electric actuator is completed, RWr0,bit2: Sending=OFF and RWr0,bit3: Sending completed=ON are output and the electric actuator starts operating.
When the electric actuator is operating, Rx08: BUSY=ON is output.
In addition, when RWw1,bit0: Start flag=OFF is input after RWr0,bit3: Sending completed=ON is output, RWr0,bit3: Sending completed=OFF is output.

(7) Once the electric actuator reaches the target position, Rx0B: INP=ON is output.
(Please refer to **"10.1 Memory Allocation"** for details on the conditions for turning ON the INP signal.)
When operation of the electric actuator is completed, Rx08: BUSY=OFF is output.
The instructed operation is judged to be completed when both Rx0B: INP=ON and Rx08: BUSY=OFF are output at the same time.

Please refer to **"10.1 Remote I/O (Rx and Ry)"** for details on the remote I/O (Rx and Ry) and **"10.2 Remote register (RWr and RWw)"** for details on the remote register (RWr and RWw).

14.3 Operating procedure for the data edit function

Data editing function is possible to be operated in Half numerical data instructions mode and Hull numerical data instructions mode.
The example using in Half numerical data instructions mode is described as follows.
Input 50.00[mm] into the position of Step No.1.However uses Half numerical data instructions.
Please details of remote IO (Rx and Ry) must refer to **"10.1.1 Remote I/O (Rx and Ry)"** and refer to **"10.1.2 Remote register (RWr and RWw)".**

(1) Check that the remote register RWw0,bit4: Start flag is OFF.
When the Start flag is ON, turn it OFF. Next, turn ON the remote register RWw0,bit1: Parameter rewrite flag.

(2) Set the data to be rewritten (Sub Function, Address, DATA) for the remote register RWw1 to 5: Data, edit and send. Please refer to **"9.5.1 Data edit function"** for details on data settings.
Since Position consists of two words, input the instruction code [2-word writing] (12)h in Sub Function (RWw1).
RWw1 : Sub Function ＝ (0012)h
Input the "Position" address D0412 of step data No.1 in RWw2 to 3: Address.
RWw2 : Address ＝ (0412)h
RWw3 : Address ＝ (0000)h
Input 50.00 [mm] in RWw4 to 5: DATA.
RWw4 : DATA (H) ＝ (0000)h
RWw5 : DATA (L) ＝ (1388)h

(3) When the remote register RWw0,bit4: Start flag is turned ON, the data described in (2) above is sent.
During data transmission, the remote register RWr0,bit2: Sending is ON.

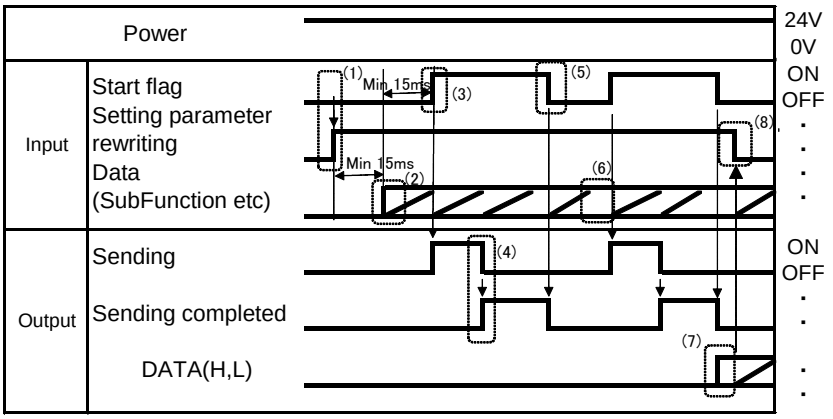
(4) When data transmission is completed, the remote register RWr0,bit2: Sending is turned OFF and RWr0,bit3: Sending completed is turned ON.

(5) When the remote register RWw0,bit4: Start flag is turned OFF, RWr0,bit3:Sending completed is turned OFF.
(Perform steps (6) and (7) only when you want to check the written contents.)

(6) Check that the step data has been edited correctly. Set data as described in (2).
To read step data, use the instruction code [2-word reading] (02)h to read the [Position] (address D0412) of step data No. 1.
RWw1 : Sub Function ＝ (0002)h
RWw2 : Address ＝ (0412)h
RWw3 : Address ＝ (0000)h

(7) Check that data is being transmitted and the transmission is completed by using the same procedures described in (3) and (4).
When data transmission is completed, [Position] of the step data No. 1 is output to the remote register RWr6 to 7: DATA.
RWr6 : DATA (H) ＝ (0000)h
RWr7 : DATA (L) ＝ (1388)h

(8) Check that step data has been edited correctly. To end the data editing function, turn OFF the remote registerRWw0,bit1: Parameter rewrite flag.



For the memory address used in the data editing function in the full numeric data instructions mode, please check **"10.2 Remote register (RWr and RWw)".**

15. Alarm Detection of Motor Control

The details of the alarm can be checked using the controller setting kit or the teaching box.
Please refer to the manuals of the controller setting kit or the teaching box for details of the alarms.
Please refer to section **"15.2 Alarm details"** of this manual on how to, deactivate the alarm.
Alarms are divided into two types. One can be cleared by inputting the remote I/O signal, RESET. The other cannot be cleared unless the control power supply (24 VDC) is turned off.

15.1 Output signal of Remote IO for the alarm group

In case of an alarm, this controller outputs a signal that informs the type of alarm.
Alarms are classified into 4 groups. When an alarm is generated, it is output in OUT0 to 3. OUT4 and OUT5 are OFF.

The status of output terminal for each alarm group is as follows:

Alarm group	Output signal of Remote IO				
	ALARM	OUT0	OUT1	OUT2	OUT3
Alarm group B	ON	OFF	ON	OFF	OFF
Alarm group C	ON	OFF	OFF	ON	OFF
Alarm group D	ON	OFF	OFF	OFF	ON
Alarm group E	ON	OFF	OFF	OFF	OFF

When multiple alarms go off and there are different alarm groups, multiple OUT signals will turn on.

When the alarm has activated, the status of output terminal will be as follows:

Alarm group	Output signal of Remote IO		Procedure of restart
	SVRE	SETON	
Alarm group B	There is no change	There is no change	RESET input
Alarm group C	There is no change	There is no change	RESET input
Alarm group D	OFF	There is no change	RESET,SVON input *1)
Alarm group E	OFF	OFF	Power off ⇒Turn on the power again

*1) Procedures for resuming operation when alarm group D is generated

1. Alarm group D is generated → "SVRE" changes to OFF (Servo is OFF)
2. Input RESET → (Alarm is reset) → Input SVON. After that, SVRE is turned ON (Servo is ON)

15.2 Alarm details

Alarm (code)	Group	How to deactivate	Alarm contents/ Countermeasure
Step data ALM1 (1-048)	B	RESET input	**<Contents>** The step data is in-correct for the following conditions (Assignable value range) (1) “Area1” < “Area2” (If both “Area1 and Area2” is 0, the alarm will not be activated.) (2) “Trigger LV” ≤ “Pushing force” (If Pushing force< “Trigger LV” at the time of “Pushing force” = 0, the alarm will not be activated.) (3) Minimum speed of electric actuator ≤ “Pushing speed” ≤ “Speed” (4) “Pushing speed” ≤ Maximum pushing speed of the electric actuator. (5) Pushing force ≥ Minimum pushing force of the electric actuator. (6) Basic parameters “Max force” ≥ Minimum pushing force of the electric actuator. (7) Basic parameters “Max force” ≥ “Trigger LV” **<Countermeasure>** Modify the step data and basic parameters setting. **⚠ Caution** Please confirm this pushing force and minimum speeds of Data maximum speed and 0 or more of the electric actuator with the electric actuator manual or the catalog
Parameter ALM (1-049)	B	RESET input	**<Contents>** The basic parameter is not correct for the following condition: (Assignable value range) (1) Stroke (-) < Stroke (+) (2) W-Area 1 < W-Area2 (If both W-Area1 and W-Area2 is 0, the alarm will not be activated.) (3) Maximum pushing force < Maximum pushing force of the electric actuator **<Countermeasure>** Modify the basic parameter setting **⚠ Caution** Please refer to the manual or the catalogue of the electric actuator for the max / min pushing force / speed for the electric actuator.
Small Dec (1-050)	B	RESET input	**<Contents>** Step data in which a deceleration speed exceeding the stroke limit is specified. **<Countermeasure>** Modify the Deceleration value to a value with a sufficient margin so that the electric actuator can stop within the stroke limit.

Step data ALM2 (1-051)	B	RESET input	**<Contents>** For an operation for a specific step data no., the requested number of the step data is not registered. (When operation is commanded through PLC, this alarm will be generated depending on the input signal interval and the holding time of signals) **<Countermeasure>** (1) Make sure that the “Movement MOD” of the step data is not “Blank (Disabled)”. (2) Process delay of PLC or scanning delay of the controller may occur. Keep the input signal combination for 15 ms (30 ms if possible) or longer. **“14.1 (2) Positioning operation”**
Stroke limit (1-052)	B	RESET input	**<Contents>** The electric actuator goes out the stroke limit specified by the basic parameters, “Stroke (+)” and “Stroke (-)” if it performs the requested operation. (Including JOG operation after return to origin) **<Countermeasure>** Make sure that the basic parameter**,** “Stroke (+)” and “Stroke (-)” are consistent with the distance of electric actuator movement specified in the step data. **⚠ Caution** If the operation method of step data is INC, take care with the position where operation starts and the travel distance.
Pushing ALM (1-096)	C	RESET input	**<Contents>** In the pushing operation, if push back is bigger than pushing operation, the push back is requested. **<Countermeasure>** Increase the distance from the pushing operation origin position to the object being pushed. Or, increase the pushing force.
ORIG ALM (1-097)	C	RESET input	**<Contents>** Return to origin is not completed within the set time. **<Countermeasure>** - If the ORIG mode of the return to origin parameter is 1, the models of the controller and electric actuator may not match. Check the product model. Also, the motor shaft may be loosened. Please refer to the operation manual for the electric actuator. - If the ORIG mode of the return to origin parameter is 2 or 3, check if the sensor mounting and the cable connection of the sensor are correct.
Servo off ALM (1-098)	C	RESET input	**<Contents>** While the servo is off (when EMG terminal is not energized), the return to origin operation, positioning operation, pushing operation or JOG operation is requested. When the “Maximum speed” of the basic parameter is set low, change the speed to the maximum speed of the electric actuator to check the operation. **<Countermeasure>** Command operation while the servo motor is on (SVRE output is on). Apply 24 VDC to the EMG terminal.

<table>
<tr><td>Drive ALM
(1-099)</td><td>C</td><td>RESET
input</td><td><Contents>
A positioning operation or pushing operation is requested.
Before execute the return to origin position.

<Countermeasure>
Modify the setting so that those operations will be requested after the return to origin position is completed.</td></tr>
<tr><td>ORIG Sens ALM
(1-103)</td><td>C</td><td>RESET
input</td><td><Contents>
The origin sensor does not respond correctly when return to origin operation is performed with the origin sensor. Alarm is generated depending on the set value of the return to origin parameter.
<table>
<tr><th colspan="2">Return to origin parameter setting</th><th rowspan="2">Alarm generating conditions</th></tr>
<tr><th>ORIG mode</th><th>ORIG sensor</th></tr>
<tr><td rowspan="3">1: Return to origin by pushing force</td><td>0. No sensor</td><td>No alarm will be generated</td></tr>
<tr><td>1. Sensor Contact A</td><td>The end position is detected when the sensor has been OFF since the return to origin operation started</td></tr>
<tr><td>2. Sensor Contact B</td><td>The end position is detected when the sensor has been ON since the return to origin operation started</td></tr>
<tr><td rowspan="3">2,3. Return to origin with sensor</td><td>0. No sensor</td><td>Right after inputting a command of return to origin.</td></tr>
<tr><td>1. Sensor Contact A</td><td>Right after inputting a command of return to origin, the end position is detected when the sensor has been OFF since the return to origin operation started. Or the end position is detected after the sensor ON is detected and before the return to origin operation is completed.</td></tr>
<tr><td>2. Sensor Contact B</td><td>The end position is detected when the sensor has been ON since the return to origin operation started or the end position is detected after the sensor OFF is detected and before the return to origin operation is completed.</td></tr>
</table>
<Countermeasure>
- When ORIG mode is 1:
Set the return to origin sensor at “0”.
- When ORIG mode is 2 or 3:
Set the return to origin sensor in accordance with the sensor specifications. Also, check if the sensor mounting and the cable connection of the sensor are correct.</td></tr>
<tr><td>AbEnc Comm ALM
(1-106)</td><td>C</td><td>RESET
SVON
input</td><td><Contents>
The alarm is generated when the communication between the controller circuit and the absolute circuit is not normal. (This controller has not absolute function.)

<Countermeasure>
Make sure that the sensor type of the basic parameter is 1. After the parameter is changed, it is necessary to reapply the power.</td></tr>
</table>

Over speed (1-144)	D	RESET SVON Input *1)	**<Contents>** The motor speed exceeds a specific level due to an external force, etc. **<Countermeasure>** Make improvements such that the motor speed will not exceed the maximum speed of the electric actuator. **⚠ Caution** Please refer to the manual or the catalogue of the electric actuator for the maximum speed of the electric actuator.
Over motor Vol (1-145)	D	RESET SVON Input *1)	**<Contents>** This alarm is generated when the motor power-supply voltage, which is detected by the controller, is outside the specified range. The controller checks the lower limit of the motor power supply voltage only when the servo [SVRE] is ON. **<Countermeasure>** Make sure that the voltage supplied to the motor power (M 24V) of the controller is within specification. **⚠ Caution** If the power supply is “inrush current control type”, a voltage drop may cause an alarm during acceleration/ deceleration. **<Contents>** The alarm may be increased by regenerative power depending on the method of operation of the electric actuator. **<Countermeasure>** Make sure that the operating conditions are within the specifications. **⚠ Caution** Please refer to the manual or the catalogue of the electric actuator for the method of operation of the electric actuator.
Over Temp. (1-146)	D	RESET SVON Input *1)	**<Contents>** The temperature around the power element of the controller is too high. **<Countermeasure>** Make improvements so that the temperature around the controller is kept appropriate.
Over Crtl Vol (1-147)	D	RESET SVON Input *1)	**<Contents>** The control power supply voltage within the controller is out of a range. **<Countermeasure>** Make sure that the voltage supplied to the control power (C 24V) of the controller is appropriate. **⚠ Caution** If one power supply is commonly used for the control power and the motor power, or the power supply is inrush current restraining type, a power voltage drop may be caused due to a voltage drop during the acceleration/ deceleration.

<table>
<tr><td></td><td></td><td></td><td><Contents>
The alarm may be increased by regenerative power depending on the method of operation of the electric actuator
<Countermeasure>
Make sure that the operating conditions are within the specifications.
⚠ Caution
Please refer to the manual or the catalogue of the electric actuator for the method of operation of the electric actuator.</td></tr>
<tr><td>Over load
(1-148)</td><td>D</td><td>RESET
SVON
Input *1)</td><td><Contents>
The output current accumulated value exceeds the specified value.
<Countermeasure>
Check whether the movement of the electric actuator is obstructed. Also confirm whether the electric actuator load, speed, acceleration and deceleration are within the specification range of the electric actuator.</td></tr>
<tr><td>Posn failed
(1-149)</td><td>D</td><td>RESET
SVON
Input *1)</td><td><Contents>
Failed to reach to the set position within the set time limit.
<Countermeasure> Eliminate any obstructions that interfere with the electric actuator movement.
Also, make sure that the load, speed, acceleration and deceleration are within the range of the electric actuators.</td></tr>
<tr><td>Ctrl Comm ALM
(1-150)</td><td>D</td><td>RESET
SVON
Input *1)</td><td><Contents>
This alarm is generated when connection fails while the electric actuator is operated from an upper-level device.
<Countermeasure>
Do not interrupt the connection between the PC and teaching box when the electric actuator is being operated by upper-level devices.
*2) Check the connection with the upper level devices, and then reset alarms according to the states of the following LED and flags.
In case of the communication failure of the PC or teaching box, resetting of alarm by PC or teaching box is possible after connecting again.
Communication failure with PLC only occurs when 10 is selected for "Undefined parameter 11" of the basic parameter. In this case, reset the alarms as described in the following table.
<table>
<tr><th>LED
(LRUN)</th><th>The abnormal station detection
RWr0,bit F</th><th>Cause of communication error
(Upper-level device)</th><th>Alarm clear method</th></tr>
<tr><td rowspan="2">ON</td><td>ON</td><td>PLC</td><td>Turn on RWw0, bit 2: Reset flag, and then turn ON Ry0B: RESET.</td></tr>
<tr><td>OFF</td><td>PC/TB</td><td>Turn ON Ry0B: RESET</td></tr>
<tr><td>OFF</td><td>-</td><td>PLC or PC/TB</td><td>Power off controlled source and PLC</td></tr>
</table>
PC : Computer, TB : Teaching box</td></tr>
<tr><td>Encoder ALM
(1-192)</td><td>E</td><td>Power off</td><td><Contents>
Abnormality in communication with the encoder.
<Countermeasure>
Check the connection of the actuator cable.</td></tr>
</table>

Phase Det ALM (1-193)	E	Power off	**<Contents>** Unable to find the motor phase within the set time. (When the servo motor is turned on (SVON is turned ON) first time after the power is applied, the electric actuator needs to move a little to find the motor phase. However, if this electric actuator movement is prevented, this alarm will be activated.) **<Countermeasure>** Make sure there are no obstructions that interfere with the electric actuator movement and then, turn on the servo motor (SVON is turned on).
Over current (1-194)	E	Power off	**<Contents>** The output current of the power circuit is extraordinarily high. **<Countermeasure>** Make sure that there are no short circuits of actuator cables, connectors, etc. In addition, make sure that the electric actuator conforms to the controller.
I sens ALM (1-195)	E	Power off	**<Contents>** An abnormality is detected by the current sensor that is checked when the controller is reset. **<Countermeasure>** Make sure that the electric actuator conforms to the controller. When a command to turn on servo is given, check if BK RLS is energized by installing the electric actuator vertically in order to check if the motor is driven by an external force. Even after this measure, if the alarm regenerates when the power is reapplied, please contact SMC.
Err overflow (1-196)	E	Power off	**<Contents>** An overflow of the position error counter inside of the controller is occurred. **<Countermeasure>** Make sure there are no obstructions that interfere with the electric actuator movement. Also, make sure that the load, speed, acceleration and deceleration are within the range of the electric actuators.
Memory ALM (1-197)	E	Power off	**<Contents>** An error of the EEPROM is occurred. **<Countermeasure>** Please contact SMC. (The write limit of the EEPROM is roughly 100,000 times)
CPU ALM (1-198)	E	Power off	**<Contents>** The CPU is not operating normally. (It is possible that the CPU or surrounding circuits is failed or a malfunction of the CPU is occurred due to an electric noise). **<Countermeasure>** If the alarm cannot be deactivated even after the power is reapplied, please contact SMC.
CC-Link Communication error (01-206)	E	control power supply off	**<Contents>** This alarm is generated when a CC-Link communication error has occurred and the WDT (Watch Dog Timer) in the controller has reached the time limit. **<Countermeasure>** Please contact SMC when this alarm is generated.

*1) When an alarm for the remote register (RWr) is generated, only the portion of "□□□" in the code "01-□□□" is output.
Please refer to **"10.1.2 Remote register (RWr and RWw)"** for details on the remote register.

16. Alarm Detection for CC-Link Communication

The contents of the alarms related to CC-Link communication can be checked by referring to the LED indicator on the controller or the corresponding memory in the CC-Link.
When an alarm is generated, refer to the following to take countermeasures or make corrections, and then reset the alarm.
Alarms are divided into two types. One can be cleared by inputting the RESET signal. The other cannot be cleared unless the control power supply (C 24V) is turned off.

16.1 Alarm details

● The following tables show alarm details that can be confirmed by Controller LED display.

<table>
<tr><th rowspan="2">Controller state</th><th colspan="4">LED name and display</th><th rowspan="2">Alarm clear method</th><th rowspan="2">Contents , Countermeasure</th></tr>
<tr><th>PWR</th><th>ALM</th><th>LRUN</th><th>LERR</th></tr>
<tr><td>CPU ROM・RAM check error</td><td>-</td><td>-</td><td>Green On</td><td>Red On</td><td>Power off</td><td><Contents>
Checksum error of built-in flash or RAM check error was occurred with communication CPU.
<Countermeasure>
If the alarm cannot be deactivated even after the power is reapplied, please contact SMC.</td></tr>
<tr><td>CC-Link Communication stop</td><td>-</td><td>-</td><td>Off</td><td>Off</td><td>Turn ON the reset flag, and then input RESET or turn OFF the control power supply.</td><td><Contents>
Communication time-out and communication abnormality occurred in CC-Link.
<Countermeasure>
Check the connection with the upper-level device, and then reset the alarm according to the state of the L RUN LED on the PLC and the LECPMJ flag status.
<table>
<tr><th>PLC LED (LRUN)</th><th>LECPMJ The abnormal station detection flag RWr0,bit F</th><th>Alarm clear method</th></tr>
<tr><td>ON</td><td>ON</td><td>Turn on RWw0, bit 2: Reset flag, and then turn on Ry0B: RESET.</td></tr>
<tr><td>OFF</td><td>-</td><td>Power off controlled source and PLC</td></tr>
</table></td></tr>
<tr><td>CC-Link CRC error</td><td>-</td><td>-</td><td>Off</td><td>Red On</td><td>Turn ON the reset flag, and then input RESET or turn OFF the control power supply.</td><td><Contents>
The CRC error occurred in CC-Link.
<Countermeasure>
・When CC-Link communication is available
Turn ON RWw0,bit3: Restart flag. In addition, when the undefined parameter 11 (Operation-setting parameter at CC-Link communication error) is 10, turn ON the RWw0,bit2: Reset flag, and then turn ON Ry0B: RESET.
・When CC-Link communication is unavailable
Turn OFF the control power supply.</td></tr>
</table>

STATION No. error	-	-	Green flashing	Red On	Power off	**<Contents>** This error is generated when a station number that is outside the station-number setting range (1 to 63) is set by the rotary switch (STATION No.). **<Countermeasure>** Check whether the rotary switch (STATION No.) is set correctly.
Communication speed error (unused range)	-	-	Green On	Red flashing	Power off	**<Contents>** When Rotary Switch (B RATE) is set within the range (5 to 9) of unused, the alarm will be occurred. **<Countermeasure>** Please confirm whether the setting of Rotary Switch (B RATE) is correct.
WDT Time-out error	-	-	Green flashing	Red flashing	Power off	**<Contents>** The WDT time-out was generated by communication CPU. **<Countermeasure>** If the alarm cannot be deactivated even after the power is reapplied, please contact SMC

－: The LED display is unrelated

● The following table shows the details for the alarms that can be checked by referring to the corresponding memory on the CC-Link, and the countermeasures for them.

Controller state	RWr						Alarm clear method	Contents , Countermeasure
	0				6 (2 Stations)	C (4 Stations)		
	bit5	bitD	bitE	bitF	0－F	0－F		
Data editing error received (Address is out of range) *1)	ON	ON	-	-	0002h	-	RWw0,bit2: Reset flag ON	**<Contents>** When the setting of the reading/writing start number is out of address range, or when writing in a number (address) which is not permitted, this alarm will happen. **<Countermeasure>** Please confirm whether the reading/writing number (address) is correct.
					-	0002h		
Data editing error received (Number of access points is out of range) *1)	ON	ON	-	-	0003h	-	RWw0,bit2: Reset flag ON	**<Contents>** When the setting of the reading/writing final number is out of the range, this alarm will happen. **<Countermeasure>** Please confirm whether the reading/writing data is correct.
					-	0003h		
Parameter anomaly detection	ON	-	ON	-	-		Turn on RWw0,bit 2: Reset flag	**<Contents>** There is a mistake in the Input / Output flag etc. specified from PLC. The conditions that Parameter anomaly detection becomes ON are as follows. (a) When use in Numerical data instructions operation ・RWw0,bit4 to C: Setting numerical data is not set correctly. (b) When use in Step data editing function ・When write in an address which is not permitted. ・When the setting of the reading / writing start address number is out of range. **<Countermeasure>** Please confirm whether the 'Setting numerical data' flag and the data at the time of parameter rewriting is correct.
Abnormal station detection	ON	-	-	ON	-		R Turn on RWw0,bit 2: Reset flag or Power off	**<Contents>** The abnormal station is detected in CC-Link. **<Countermeasure>** Please confirm whether the station number setting is correct by programming of PLC side.

*1) Only in Parameter writing mode　　-: ON, OFF does no matter

17. Wiring of cables/Common precautions

⚠ Warning

(1) Adjusting, mounting or wiring change should never be done before shutting off the power supply to the product.

Electrical shock, malfunction and damaged can result.

(2) Never disassemble the cable. Use only specified cables.

(3) Do not remove or connect the cable and connector while power is supplied.

⚠ Caution

(1) Wire the connector securely. Do not apply any voltage to the terminals other than those specified in the product Manual.

(2) Wire the connector securely.

Check for correct connector wiring and polarity.

(3) Take appropriate measures against noise.

Noise in a signal line may cause malfunction. As a countermeasure, separate high voltage and low voltage cables, and shorten wiring lengths, etc.

(4) Do not route wires and cables together with power or high voltage cables.

The product can malfunction due to interference of noise and surge voltage from power and high voltage cables to the signal line. Route the wires of the product separately from power or high voltage cables.

(5) Take care that electric actuator movement does not catch cables.

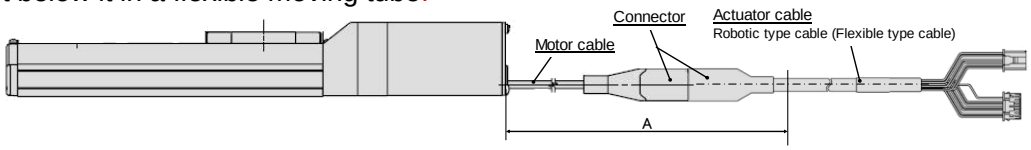
(6) Operate with cables secured. Avoid bending cables at sharp angles where they enter the product.

(7) Avoid twisting, folding, rotating or applying an external force to the cable.

Risk of electric shock, wire break, contact failure and loss of control for the product can happen.

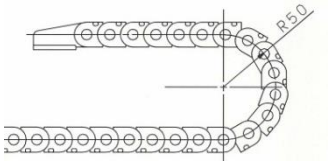
(8) Fix the motor cable protruding from the product in place before using.

The motor and lock cables are not robotic type cables and can be damaged when moved. Therefore, do not place A part below it in a flexible moving tube.



(9) Select "Robotic type cables" in case of inflecting actuator-cable repeatedly. And do not put cables into a flexible moving tube with a radius smaller than the specified value. (Min. 50mm).

Risk of electric shock, wire break, contact failure and loss of control for the product can happen if "Standard cables" are used in case of inflecting the cables repeatedly.



(10) Confirm proper wiring of the product.

Poor insulation (interference with other circuits, poor insulation between terminals and etc.) can apply excessive voltage or current to the product causing damage.

(11) The Speed / pushing force may vary, depending on the cable length, load and mounting conditions etc.

If the cable length exceeds 5m, the speed / pushing force will be reduced by a maximum of 10% per 5m. (If cable length is 15m: Maximum 20% reduction.)

[Transportation]

⚠Caution

(1) Do not carry or swing the product by the motor or the cable

18. Electric actuators/Common precautions

18.1 Design and selection

⚠Warning

(1) Be sure to read the Operation Manual.

Handling or usage/operation other than that specified in the Operation Manual may lead to breakage and operation failure of the product.

Any damage attributed to the use beyond the specifications is not guaranteed.

(2) There is a possibility of dangerous sudden action by the product if sliding parts of machinery are twisted due to external forces etc.

In such cases, human injury may occur, such as by catching hands or feet in the machinery, or damage to the machinery itself may occur. Design the machinery should be designed to avoid such dangers.

(3) A protective cover is recommended to minimize the risk of personal injury.

If a driven object and moving parts of the product are in close proximity, personal injury may occur. Design the system to avoid contact with the human body.

(4) Securely tighten all stationary parts and connected parts so that they will not become loose.

When the product operates with high frequency or is installed where there is a lot of vibration, ensure that all parts remain secure.

(5) Consider a possible loss of power source.

Take measures to prevent injury and equipment damage even in the case of a power source failure.

(6) Consider behavior of emergency stop of whole system.

Design the system so that human injury and/or damage to machinery and equipment will not be caused, when it is stopped by a safety device for abnormal conditions such as a power outage or a manual emergency stop of whole system.

(7) Consider the action when operation is restarted after an emergency stop or abnormal stop of whole system.

Design the system so that human injury or equipment damage will not occur upon restart of operation of whole system.

(8) Disassembly and modification prohibited

Do not modify or reconstruct (including additional machining) the product. An injury or failure can result.

(9) Do not use stop signal, “EMG” of the controller and stop switch on the teaching box as the emergency stop of system.

The stop signal, “EMG” of controller and the stop switch on the teaching box are for decelerating and stopping the electric actuator.

Design the system with an emergency stop circuit which is applied relevant safety standard separately.

(10) When using it for vertical application, it is necessary to build in a safety device.

The rod may fall due to the weight of work. The safety device should not interfere with normal operation of the machine.

⚠ Caution

(1) Operate within the limits of the maximum usable stroke.

The product will be damaged if it is used with the stroke which is over the maximum stroke. Refer to the specifications of the product.

(2) When the product repeatedly cycles with partial strokes, operate it at a full stroke at least once a day or every 1000 strokes.

Otherwise, lubrication can run out.

(3) Do not use the product in applications where excessive external force or impact force is applied to it.

The product can be damaged. Each component that includes motor is made with accurate tolerance. So even slightly deformed or miss-alignment of component may lead operation failure of the product.

(4) Return to origin cannot return while operating.

It cannot be done during positioning operation, pushing operation and pushing.

(5) Refer to a common auto switch /matter (Best Pneumatics No 2) when an auto switch is built in and used.

(6) When conformity to UL is required, the electric actuator and controller should be used with a UL1310 Class 2 power supply.

18.2 Mounting

⚠Warning

(1) Install and operate the product only after reading the Operation Manual carefully and understanding its contents. Keep the manual in a safe place future reference.

(2) Observe the tightening torque for screws.

Tighten the screws to the recommended torque for mounting the product.

(3) Do not make any alterations to this product.

Alterations made to this product may lead to a loss of durability and damage to the product, which can lead to human injury and damage to other equipment and machinery.

(4) When using external guide, the guide axis should be parallel to the electric actuator axis.

There will be damage/excessive wear on the lead screw if the external guide is not parallel.

(5) When an external guide is used, connect the moving parts of the product and the load in such a way that there is no interference at any point within the stroke.

Do not scratch or dent the sliding parts of the product tube or piston rod etc., by striking or grasping them with other objects. Components are manufactured to precise tolerances, so that even a slight deformation may cause faulty operation.

(6) Prevent the seizure of rotating parts.

Prevent the seizure of rotating parts (pins, etc.) by applying grease.

(7) Do not use the product until you verify that the equipment can be operated properly.

After mounting or repair, connect the power supply to the product and perform appropriate functional inspections to check it is mounted properly.

(8) At the overhang mounted impeller fixation

There is a possibility that the power at the bending moment damages the electric actuator when moving it at high speed.

The support metal fittings that suppress the vibration of the main body of the electric actuator are installed.

Lower and use speed for the state that the electric actuator doesn't vibrate.

(9) When mounting the electric actuator or attaching to the work piece, do not apply strong impact or large moment.

If an external force over the allowable moment is applied, it may cause looseness in the guide unit, an increase in sliding resistance or other problems.

(10) Maintenance space.

Allow sufficient space for maintenance and inspection.

18.3 Precautions for Use

⚠Warning

(1) Do not touch the motor while in operation.

The surface temperature of the motor can increase to approx. 90 °C to 100 °C due to operating conditions. Energizing alone may also cause this temperature increase. As it may cause burns, do not touch the motor when in operation.

(2) If abnormal heating, smoking or fire, etc., occurs in the product, immediately shut off the power supply.

(3) Immediately stop operation if abnormal operation noise or vibration occurs.

The product may have been mounted incorrectly. Unless operation of the product is stopped for inspection, the product can be seriously damaged.

(4) Never touch the rotating part of the motor or moving part of the electric actuator while in operation.

(5) When installing, adjusting, inspecting or performing maintenance on the product, controller and related equipment, be sure to shut off the power supply to each of them. Then, lock it so that no one other than the person working can turn the power on, or implement measures such as a safety plug.

(6) In the case of the electric actuator that has a servo motor (24 VDC), the "motor phase detection step" is done by inputting the servo on signal just after the controller power is turned on. The "motor phase detection step" operates the table/rod to the maximum distance of the lead screw. (The motor rotates in the reverse direction if the table hits an obstacle such as the end stop damper.) Take the "motor phase detection step" into consideration for the installation and operation of this electric actuator.

⚠Caution

(1) Keep the controller and product combined as delivered for use.
The product is set in parameters for shipment. If it is combined with a different parameter, failure can result.

(2) Check the product for the following points before operation.
a) Damage to electric driving line and signal lines
b) Looseness of the connector to each power line and signal line
c) Looseness of the electric actuator cylinder and controller/driver mounting
d) Abnormal operation
e) Emergency stop of the total system

(3) When more than one person is performing work, decide on the procedures, signals, measures and resolution for abnormal conditions before beginning the work. Also, designate a person to supervise work other than those performing work.

(4) Actual speed of the product will be changed by the workload.
Before selecting a product, check the catalog for the instructions regarding selection and specifications.

(5) Do not apply a load, impact or resistance in addition to a transferred load during return to origin.
In the case of the return to origin by pushing force, additional force will cause displacement of the origin position since it is based on detected motor torque.

(6) Do not remove the name plate.

(7) Operation test should be done by low speed. Start operation by predefined speed after confirming there is no trouble.

[Ground]

⚠Warning

(1) Be sure to ground the electric actuator.

(2) Grounding should be dedicated ground.
Ground construction is Class D grounding. (Ground resistance 100 Ω or less)

(3) Make the grounding as close as possible to the electric actuator and shorten the distance to ground.

[Unpackaging]

⚠Caution

(1) Check the received product is as ordered.
If a different product is installed from the one ordered, injury or damage can result.

18.4 Operating environment

⚠Warning

(1) Do not use the product in environment below.

a. Locations where a large amount of dusts and cutting chips are airborne.
b. Locations where the ambient temperature is outside the range of the temperature specification. (Refer to specifications).
c. Locations where the ambient humidity is outside the range of the humidity specification. (Refer to specifications).
d. Locations where corrosive gas, flammable gas, sea water, water and steam are present.
e. Locations where strong magnetic or electric fields are generated.
f. Locations where direct vibration or impact is applied to the product.
g. Areas that are dusty, or are exposed to splashes of water and oil drops.
h. Areas exposed to direct sunlight (ultraviolet ray).
i. Environment at an altitude of 1000 meters or higher
Heat radiation and withstand voltage will decrease. Contact SMC for details.

(2) Do not use in an environment where the product is directly exposed to liquid, such as cutting oils.
If cutting oils, coolant or oil mist contaminates the product, failure or increased sliding resistance can result.

(3) Install a protective cover when the product is used in an environment directly exposed to foreign matters such as dust, cutting chips and spatter.
Play or increased sliding resistance can result.

(4) Shade the sunlight in the place where the product is applied with direct sunshine.

(5) Shield the valve from radiated heat generated by nearby heat sources.
The radiated heat from the heat source can increase the temperature of the product beyond the operating temperature range.

(6) Grease oil can be decreased due to external environment and operating conditions, and it deteriorates lubrication performance to shorten the life of the product.

[Storage]

⚠Warning

(1) Do not store the product in direct contact with rain or water drops or is exposed to harmful gas or liquid.

(2) Store in an area that is shaded from direct sunlight and has a temperature and humidity within the specified range (-10 ºC to 60 ºC and 35 to 85% No condensation or freezing).

(3) Do not apply vibration and impact to the product during storage.

18.5 Maintenance

⚠Warning

(1) Do not disassemble or repair the product.
Fire or electric shock can result.

(2) Before modifying or checking the wiring, the voltage should be checked with a tester 5 minutes after the power supply is turned off.
Electrical shock can result.

⚠Caution

(1) Maintenance should be performed according to the procedure indicated in the Operating Manual.

Incorrect handling can cause injury, damage or malfunction of equipment and machinery.

(2) Removal of product.

When equipment is serviced, first confirm that measures are in place to prevent dropping of work pieces and run-away of equipment, etc., and then cut the power supply to the system. When machinery is restarted, check that operation is normal with electric actuators in the proper positions.

(3) When moving the electric actuator slider manually by hand, please disconnect the actuator cable.

The electric actuator cannot be moved smoothly by the induced voltage of the motor goes to the controller when electric actuator slider is moved with the electric actuator connected with the controller. Moreover, the controller might break down by the induced voltage when moving the electric actuator slider at high frequency.

[Lubrication]

⚠Caution

(1) The product has been lubricated for life at manufacturer, and does not require lubrication in service.

Contact SMC if lubrication will be applied.

18.6 Precautions for electric actuator with lock

⚠Warning

(1) Do not use the lock as a safety lock or a control that requires a locking force.

The lock used for the product with a lock is designed to prevent dropping of work piece.

(2) For vertical mounting, use the product with a lock.

If the product is not equipped with a lock, the product will move and drop the work piece when the power is removed.

(3) "Measures against drops" means preventing a work piece from dropping due to its weight when the product operation is stopped and the power supply is turned off.

(4) Do not apply an impact load or strong vibration while the lock is activated.

If an external impact load or strong vibration is applied to the product, the lock will lose it's holding force and damage to the sliding part of the lock or reduced lifetime can result. The same situations will happen when the lock slips due to a force over the thurst of the product, as this accelerates the wear to the lock.

(5) Do not apply liquid or oil and grease to the lock or its surrounding.

When liquid or oil and grease is applied to the sliding part of the lock, its holding force will reduce significantly.

(6) Take measures against drops and check that safety is assured before mounting, adjustment and inspection of the product.

If the lock is released with the product mounted vertically, a work piece can drop due to its weight.

(7) When the electric actuator is operated manually (when SVRE output signal is off), supply 24 DCV to the [BK RLS] terminal of the power supply connector.

If the product is operated without releasing the lock, wearing of the lock sliding surface will be accelerated, causing reduction in the holding force and the life of the locking mechanism.

(8) Do not supply 24 VDC power supply constantly to the [BK RLS (Lock release)] terminal.

Stop supplying 24VDC power supply to the [BK RLS (Lock release)] terminal during normal operation. If power is supplied to the [BK RLS] terminal continuously, the lock will be released, and work pieces may be dropped at stop (EMG).

19. Controller and its peripheral devices /Specific product precautions

19.1 Design and selection

⚠Warning

(1) Be sure to apply the specified voltage.

Otherwise, a malfunction and breakage of the controller may be caused.

If the applied voltage is lower than the specified, it is possible that the load cannot be moved due to an internal voltage drop. Please check the operating voltage before use.

(2) Do not operate beyond the specifications.

It may cause a fire; malfunction or electric actuator damage can result. Please check the specifications before use.

(3) Install an emergency stop circuit.

Please install an emergency stop outside of the enclosure so that it can stop the system operation immediately and intercept the power supply.

(4) In order to prevent danger and damage due to the breakdown and the malfunction of this product, which may occur at a certain probability, a backup system should be established previously by giving a multiple-layered structure or a fail-safe design to the equipment, etc.

(5) If a fire or danger against the personnel is expected due to an abnormal heat generation, ignition, smoking of the product, etc., cut off the power supply for this product and the system immediately.

19.2 Handling

⚠Warning

(1) The inside of the controller and its connector should not be touched.

It may cause an electric shock or damage to the controller.

(2) Do not perform the operation or setting of this equipment with wet hands.

It may cause an electric shock.

(3) Product with damage or the one lacking of any components should not be used.

It may cause an electric shock, fire, or injury.

(4) Use only the specified combination between the controller and electric actuator.

It may cause damage to the controller or the electric actuator.

(5) Be careful not to be caught or hit by the work piece while the electric actuator is moving.

It may cause an injury.

(6) Do not connect the power supply or power on the product before confirming the area where the work moves is safe.

The movement of the work may cause accident.

(7) Do not touch the product when it is energized and for some time after power has been disconnected, as it is very hot.

It may lead to a burn due to the high temperature.

(8) Check the voltage using a tester for more than 5 minute after power-off in case of installation, wiring and maintenance.

There is a possibility of getting electric shock, fire and injury.

(9) Do not use in an area where dust, powder dust, water or oil is in the air.

It will cause failure or malfunction.

(10) Do not use in an area where a magnetic field is generated.

It will cause failure or malfunction.

(11) Do not install in the environment of flammable gas, corrosive gas and explosive gas.

It could lead to fire, explosion and corrosion.

(12) Do not apply radiant heat from a large heat source such as direct sunlight or heat treatment furnace.

It will cause failure of the controller or its peripheral devices.

(13) Do not use the product in an environment subject to a temperature cycle.
It will cause failure of the controller or its peripheral devices.

(14) Do not use in a place where surges are generated.
When there are units that generate a large amount of surge around the product (e.g., solenoid type lifters, high frequency induction furnaces, motors, etc.), this may cause deterioration or damage to the product's' internal circuit. Avoid supplys of surge generation and crossed lines.

(15) Do not install this product in an environment under the effect of vibrations and impacts.
It will cause failure or malfunction.

(16) If this product is used with a relay or solenoid valve, they should be the surge absorbing element built-in type.

19.3 Installation

⚠Warning

(1) The controller and its peripheral devices should be installed on a fire-proof material.
A direct installation on or near a flammable material may cause fire.

(2) Do not install this product in a place subject to vibrations and impacts.
It may cause an electric shock, fire, or injury.

(3) Take measure so that the operating temperature of this controller and its peripheral devices are within the range of the specifications. Also, this controller should be installed with 50mm or larger spaces between each side of it and the other structures or components.
It may cause a malfunction of the controller and its peripheral devices and a fire.

(4) Do not mount this controller and its peripheral devices together with a large-sized electromagnetic contactor or no-fuse breaker, which generates vibration, on the same panel. Mount them on different panels, or keep the controller and its peripheral devices away from such a vibration supply.

(5) This controller and its peripheral devices should be installed on a flat surface.
If the mounting surface is distorted or not flat, an unacceptable force may be added to the housing, etc. to cause troubles.

19.4 Wiring

⚠Warning

(1) Do not apply any excessive force to cables by repeated bending, tensioning or placing a heavy object on the cables.
It may cause an electric shock, fire, or breaking of wire.

(2) Connect wires and cables correctly.
Incorrect wiring could break he controller or its peripheral devices depending on the seriousness.

(3) Do not connect wires while the power is supplied.
It can break the controller or its peripheral devices could be damaged to cause a malfunction.

(4) Do not carry this product by holding its cables.
It may cause an injury or damage to the product.

(5) Do not connect power cable or high-voltage cable in the same wiring route as the unit.
The wires to the controller or its peripheral devices can be interrupted with noise or induced surge voltage from power lines or high-voltage lines and malfunction could be caused.
Separate the wiring of the controller and its peripheral device from that of power line and high voltage line.

(6) Verify the insulation of wiring.
Insulation failure (interference with other circuit, poor insulation between terminals and etc.) could introduce excessive voltage or current to the controller or its peripheral devices and damage them.

19.5 Power supply

⚠Warning

(1) Use a power supply that has low noise between lines and between power and ground.
In cases where noise is high, an isolation transformer should be used.

(2) The power supplys should be separated between the controller power and the I/O signal power and both of them do not use the power supply of "inrush current restraining type".
If the power supply is "inrush current restraining type", a voltage drop may be caused during the acceleration of the electric actuator.

(3) To prevent surges from lightning, an appropriate measure should be taken. Ground the surge absorber for lightning separately from the grounding of the controller and its peripheral devices.

19.6 Ground

⚠Warning

(1) Be sure to ground to ensure noise immunity of the controller.
It may cause electric shock or fire.

(2) Grounding should be dedicated ground.
Ground construction is Class D grounding. (Ground resistance 100 Ω or less)

(3) Grounding should be performed near the unit as much as possible to shorten the grounding distance.

(4) Make the grounding as close as possible to the controller or peripheral equipment and shorten the distance to ground.

19.7 Maintenace

⚠Warning

(1) Perform a maintenance check periodically.
Confirm wiring and screws are not loose.
Loose screws or wires may cause unintentional malfunction.

(2) Conduct an appropriate functional inspection after completing the maintenance.
In case of any abnormities (in the case that the electric actuator does no move, etc.), stop the operation of the system. Otherwise, an unexpected malfunction may occur and it will become impossible to secure the safety.

(3) Do not disassemble, modify or repair this controller and the peripheral equipment.

(4) Do not put anything conductive or flammable inside of this controller.
It may cause a fire and explosion.

(5) Do not conduct an insulation resistance test and withstand voltage test on this product.

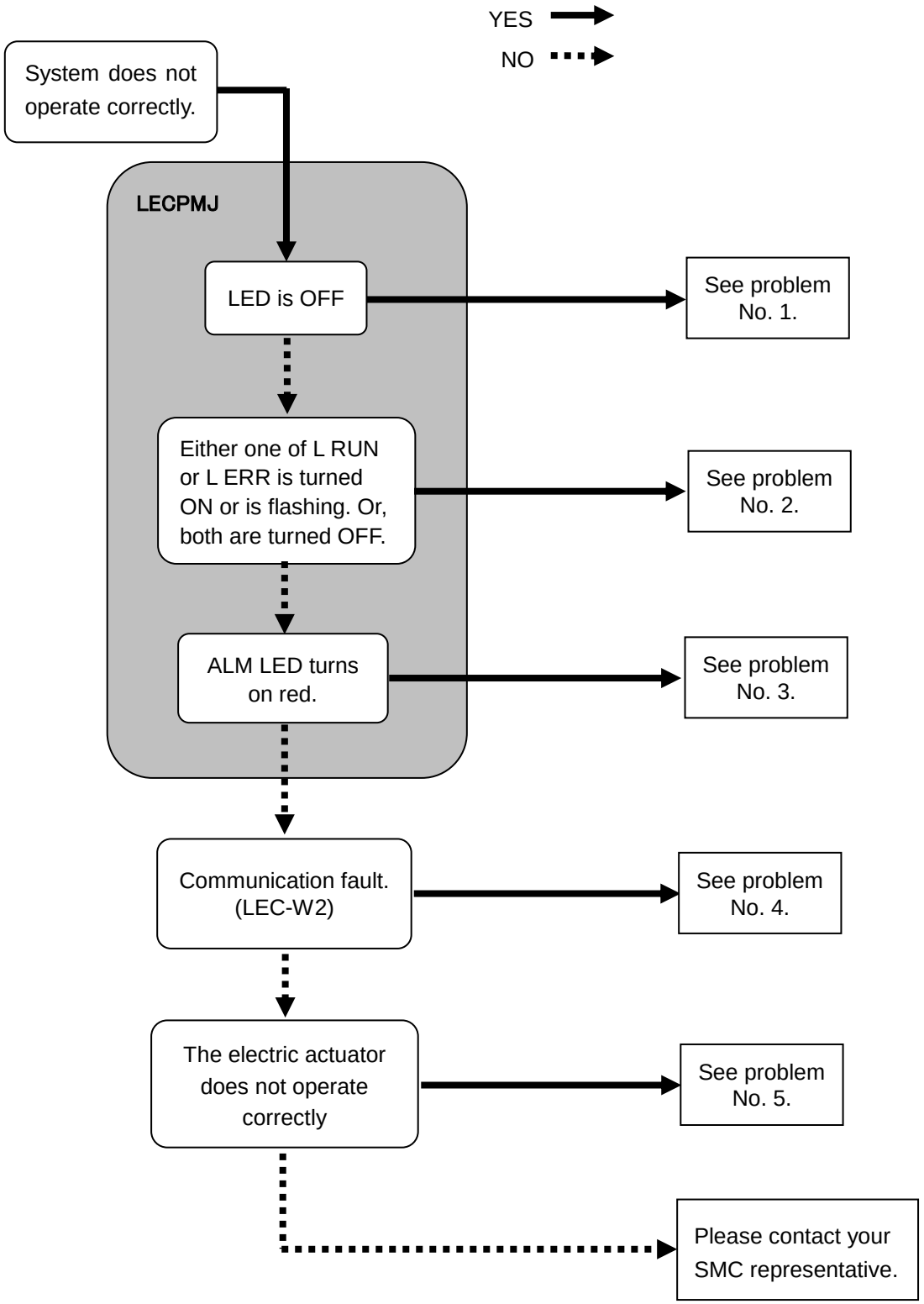
(6) Ensure sufficient space for maintenance activities. Provide space required for maintenance.
Design the system that allows required space for maintenance.

20. Troubleshooting

In case of any troubles, please consult the following table.

Consider replacing controller, if not of the causes on this table are applicable.

It is possible that this product is damaged due to the operating conditions (applications), please contact SMC to discuss appropriate measures.



Trouble No.	Trouble	Possible cause	How to diagnose the trouble	Solutions
1	LED is OFF	Power fault	Check if the LED (green) of the controller is lit.	The power supply, voltage or current should be modified to an appropriate one. →5. External Wiring Diagram →6. CN1: Power supply connector details
		Wiring fault	Is the wiring connected correctly?	Check if the wiring is connected correctly or if there is broken wire or short-circuit by referring to this Operation Manual. Correct the wiring and check that the input/output of each signal is correct. Separate the power supply for the CN1controller and the CN5 I/O signal power supply. → 5. External Wiring Diagram →10. Memory map
2	L RUN and L ERR LED are ON/OFF	CPU ALM	Are both the L RUN (green) and L ERR (red) LED ON?	It is possible that the CPU or surrounding circuits have failed, or the CPU is malfunctioning due to electrical noise. If the alarm is still generated when power is reapplied, please contact SMC.
		CC-Link communication error	What are the states of the L RUN (green) and L ERR (red) LED?	Take appropriate measures by referring to and following the controller operation manual. ⇒8. LED Display ⇒16. Alarm Detection for CC-Link Communication
3	ALM is ON	Alarm condition	Check if the controller is in the alarm condition.	Refer to the controller operation manual, and take appropriate measures. Take appropriate measures based on the operation manual. ⇒15. Alarm Detection of Motor Control
4	Communication fault. (LEC-W2)	USB driver is not installed	Check that the USB driver for the communication cable is installed.	Please install the USB driver of USB cable. The USB driver's installation starts when the communication cable is connected with PC. Refer to the Installation Manual for setting kit (LEC-W2) for the installation procedure.
		Incorrect COM port setting	Please confirm if the correct COM port is set to the controller setting kit.	The COM port allocated to the communication cable is different for different PC's. Please confirm the COM port number with the communication cable connected. The COM port number can be checked using the Device Manager of the PC. Refer to the Installation Manual for controller setting kit (LEC-W2) for the checking and setting method for COM port numbers.

		Inappropriate connection	Check the wiring.	Please confirm motor controller = communications cable = USB cable = PC is connected. As example, cannot make the communication if the connector has been damaged. Please confirm the power supply of motor controller has been turned on. The communication is not made if the Power supply is off If the equipments (PLC and measurement hardware) except motor controller is connected with PC. (There is a possibility that the communication with other equipment interferes in PC.)
5	The electric actuator does not move at all.	Lock release error	Check if you can hear the sound of lock release when the manual lock switch is turned on and off.	If there is no sound of lock release from the electric actuator with lock, the lock may be broken. If the trouble continues, please contact SMC.
		External device fault	Check that the PLC connected to the controller operates correctly.	Check the operation by test run using the controller setting kit, etc. If the electric actuator is operated, a signal output from the PLC is suspected. Take appropriate measures by referring to the Operation Manual for the controller. →10. Memory map
		Inappropriate specifications	Check that the combination of the electric actuator and controller is correct?	Check if the product number of the used electric actuator matches with the electric actuator which is applicable to the controller. → 3. Product Specifications
		Stop command	If it is not energized, the servo will be OFF and does not operate. Check if a voltage of 24 VDC is applied to the EMG terminal.	Apply 24 VDC to the EMG terminal.
	Move occasionally.	Wiring fault	Is the wiring connected correctly?	Check if the wiring is connected correctly or if there is broken wire or short-circuit by referring to this Operation Manual. Correct the wiring and check that the input/output of each signal is correct. Separate the power supply for the CN1controller and the CN5 I/O signal power supply. → 5. External Wiring Diagram →10. Memory map
		Electric noise	Check that the Grounding is connected correctly? Are power cables for other equipment and controller cables bundled together?	Connect to Ground correctly. Avoid bundling the cables with power cables of other equipment. Take appropriate measures by referring to the Operation Manual for the controller. → 3.4 How to install
		Inappropriate parameter	Check that the parameter values are correct.	Check the combination of the electric actuator and controller. Modify the parameters accordingly and check the operation. → 11. Setting Data Entry

5	Move occasionally.	Voltage drop	Check if there has been any temporary voltage drop in the power supply. (If there is a temporary voltage drop in the power supply, the EMG terminal of CN1 power connector will turn OFF so the electric actuator will stop. However, this stop will be released when the voltage recovers.)	There is a possibility of a momentary voltage drop because the capacity of the power supply is insufficient, or the power supply has inrush current restraining specification. →3. Product Specifications
		The pushing operation defective.	Check during pushing operation the INP output signal is turning on. (On completion of pushing the operation the output INP signal is generated, the PLC cannot confirm the completion of driving.)	If the controller version is below SV1.00 The pushing force is reduced when the energy saving mode is turned on. If the pushing force is reduced to a value less than the value in step data “trigger LV” the INP output signal is turned off. Check the INP output signal before the energy saving mode is turned on. →10. Memory map
		Inappropriate specifications	Check that the combination of the electric actuator and controller is correct?	Check if the product number of the used electric actuator matches with the electric actuator which is applicable to the controller. → 3. Product Specifications
		Signal timing	Check the timing of the signal from the PLC to the controller.	Leave an interval of a minimum of 15 ms (recommendation is 30 ms) between input signals and maintain the state of the signal for a minimum of 15 ms (recommendation is 30 ms), because PLC processing delays and controller scanning delays can occur. → 12.4 Controller input signal response time
		SVON time	Check if the electric actuator is operated when the SVRE output is turned on after the SVON input is turned on.	When power is applied, it may take up to 10 seconds (max. 20 sec.) from SVON input to SVRE output depending on the electric actuator position. Command operation after SVRE output is turned ON.
		Alarm condition	Is controller alarm generated?	Refer to the controller operation manual, and take appropriate measures. Take appropriate measures based on the operation manual. → 15. Alarm Detection of Motor Control → 16. Alarm Detection for CC-Link Communication

5	The electric actuator does not move to the correct position.	Incorrect origin position	If it is a pushing operation, repeat return to origin operations several times to check if the electric actuator returns to the origin correctly.	Perform the return to origin position operation several times to check the origin position. Take measure to make the electric actuator operates normally (remove foreign matters that interferes with the electric actuator movement, etc.)
		Inappropriate basic parameters	Check that the parameter values are appropriate and the program is correct.	Check the max. speed, acceleration speed, and deceleration speed of the electric actuator and be sure to input the correct parameters. → 11. Setting Data Entry
		Inappropriate specifications	Check that the combination of the electric actuator and controller is correct?	Check if the product number of the used electric actuator matches with the electric actuator which is applicable to the controller. → 3. Product Specifications
	The electric actuator does not move correctly.	Wiring fault	Is the wiring connected correctly?	Check if the wiring is connected correctly or if there is broken wire or short-circuit by referring to this Operation Manual. Correct the wiring and check that the input/output of each signal is correct. Separate the power supply for the CN1controller and the CN5 I/O signal power supply. → 5. External Wiring Diagram →10. Memory map
		Inappropriate specifications	Check that the combination of the electric actuator and controller is correct?	Check if the product number of the used electric actuator matches with the electric actuator which is applicable to the controller. → 3. Product Specifications
		Signal timing	Check the timing of the signal from the PLC to the controller.	PLC processing delay and controller scan delay are generated. Please ensure an interval of 15ms (30 ms if possible) or more between input signals, and maintain the signal state. → 12.4 Controller input signal response time
		Data writing failure	Is the data (step data or parameters) written correctly?	One of the following actions occurred during data writing (while the power supply LED (green) was on). ・Turn off the controller input power supply ・Disconnected/ connected cables. Input correct data (step data, parameter) again and confirm operation. → 3.2 Parts description → 11. Setting Data Entry

5	Insufficient speed	Inappropriate basic parameters	Check that the parameter values are correct.	Check the max. speed and acceleration speed of the electric actuator and be sure to input the correct parameters. → 11. Setting Data Entry
		Inappropriate basic parameters	Check that the parameter values are correct.	Check the max. speed and acceleration speed of the electric actuator and be sure to input the correct parameters. → 11. Setting Data Entry
		Inappropriate specifications	Check that the combination of the electric actuator and controller is correct? Check if the electric actuator is operating within the specification range.	Check if the product number of the used electric actuator matches with the electric actuator which is applicable to the controller. Check if the operating condition of the electric actuator is within the specification range. → 3. Product Specifications
		Voltage drop	Check if there has been any temporary voltage drop in the power supply. (If there is a temporary voltage drop in the power supply, the EMG terminal of CN1 power connector will turn OFF so the electric actuator will stop. However, this stop will be released when the voltage recovers.)	There is a possibility of a momentary voltage drop because the capacity of the power supply is insufficient, or the power supply has inrush current restraining specification. →3. Product Specifications

21. Memory map list

The memory map according to the mode is shown below. Please refer to **"10. Memory map"** for details of each signal.

● Single numerical data instructions (1 Stations occupied) [Remote IO]

PLC memory address	Signal name	PLC memory address	Signal name
Rx		Ry	
00	OUT0	00	IN0
01	OUT1	01	IN1
02	OUT2	02	IN2
03	OUT3	03	IN3
04	OUT4	04	IN4
05	OUT5	05	IN5
06	―	06	―
07	―	07	―
08	BUSY	08	HOLD
09	SVRE	09	SVON
0A	SETON	0A	DRIVE
0B	INP	0B	RESET
0C	AREA	0C	SETUP
0D	WAREA	0D	JOG (-)
0E	ESTOP	0E	JOG (+)
0F	ALARM	0F	FLGTH
10 to 1A	CC-Link system area	10 to 1F	CC-Link system area
1B	Remote station READY		
1C to 1F	CC-Link system area		

● Single numerical data instructions (1 Stations occupied) [Remote register]

PLC memory address		RWr Data name	PLC memory address		RWw Data name	
RWr	bit		RWw	bit		
0	0	Return of Occupied number of stations(L)	0	0	Setting read numerical data	
	1	Return of Occupied number of stations(H)		1	(No used)	
	2	Sending		2	Reset flag	
	3	Sending completed		3	Restart flag	
	4	READY		4	Movement MOD	
	5	ALARM flag		5	Speed	
	6	Initial		6	Position	
	7	Return of the read numerical data		7	Acceleration	
	8	(No used)		8	Deceleration	
	9			9	Pushing force	
	A			A	Trigger LV	
	B			B	Pushing speed	
	C			C	Moving force	
	D	Data editing error receiving		D	Area 1	
	E	Parameter anomaly detection		E	Area 2	
	F	The abnormal station detection		F	In position	
1	F to 0	Current position	1	0	Start flag	
				7 to 1	(No used)	
				F to 8	Movement MOD	
2	F to 0		2	F to 0	Numerical data instructions data (2 word data) *1)	Numerical data instructions data (1 word data) *2
3	F to 0	Current position	3	F to 0		(No used) *2)

*1) RWw0, bit4 to F: Setting numerical data in the case of "Position" or "Area 1" or "Area 2".

*2) RWw0,bit4 to F: Setting numerical data in the case of " Speed " or " Acceleration " or " Deceleration " or "Pushing force" or "Trigger LV" or "Pushing speed" or "Moving force" or "In position".

● Half numerical data instructions (2 Stations occupied) [Remote IO]

PLC memory address	Signal name	PLC memory address	Signal name
Rx		Ry	
00	OUT0	00	IN0
01	OUT1	01	IN1
02	OUT2	02	IN2
03	OUT3	03	IN3
04	OUT4	04	IN4
05	OUT5	05	IN5
06	—	06	—
07	—	07	—
08	BUSY	08	HOLD
09	SVRE	09	SVON
0A	SETON	0A	DRIVE
0B	INP	0B	RESET
0C	AREA	0C	SETUP
0D	WAREA	0D	JOG (-)
0E	ESTOP	0E	JOG (+)
0F	ALARM	0F	FLGTH
10 to 2F	(No used)	10 to 2F	(No used)
30 to 3A	CC-Link system area	30 to 3F	CC-Link system area
3B	Remote station READY		
3C to 3F	CC-Link system area		

● Half numerical data instructions (2 Stations occupied) [Remote register]

PLC memory address		RWr Data name		PLC memory address		RWw Data name	
RWr	bit	Numerical data instructions operation	Numerical data instructions operation	Numerical data instructions operation	bit	Numerical data instructions operation	Data editing
0	0	Return of Occupied number of stations (L)		0	0	Setting read numerical data	
	1	Return of Occupied number of stations (H)			1	Setting parameter rewriting	
	2	Sending			2	Reset flag	
	3	Sending completed			3	Restart flag	
	4	READY			4	Movement MOD	Start flag
	5	ALARM flag			5	Speed	(No used)
	6	Initial			6	Position	
	7	Return of the read numerical data			7	Acceleration	
	8	Return of parameter rewriting			8	Deceleration	
	9	(No used)			9	Pushing force	
	A				A	Trigger LV	
	B				B	Pushing	
	C				C	(No used)	
	D	Data editing error receiving			D		
	E	Parameter anomaly detection			E		
	F	The abnormal station detection			F		
1	F to 0	Current position		1	0	Start flag	Sub Function
					7 to 1	(No used)	
					F to 8	Movement MOD	
2	F to 0			2	F to 0	Speed	Address
3	F to 0	Current speed	Sub Function	3	F to 0	Target position	Address (always 0)
4	F to 0	Current Force	Address	4	F to 0		DATA (H)
5	F to 0	Target position	Address (always 0)	5	F to 0	Acceleration (Pushing force)	DATA (L)
6	F to 0		DATA (H)	6	F to 0	Deceleration (Trigger LV)	Occupation area
7	7 to 0	Alarm 1	DATA (L)	7	F to 0	Pushing speed	
	F to 8	Alarm 2					

● Full numerical data instructions (4 Stations occupied) [Remote IO]

PLC memory address	Signal name	PLC memory address	Signal name
Rx		Ry	
00	OUT0	00	IN0
01	OUT1	01	IN1
02	OUT2	02	IN2
03	OUT3	03	IN3
04	OUT4	04	IN4
05	OUT5	05	IN5
06	—	06	—
07	—	07	—
08	BUSY	08	HOLD
09	SVRE	09	SVON
0A	SETON	0A	DRIVE
0B	INP	0B	RESET
0C	AREA	0C	SETUP
0D	WAREA	0D	JOG (-)
0E	ESTOP	0E	JOG (+)
0F	ALARM	0F	FLGTH
10 to 6F	(No used)	10 to 6F	(No used)
70 to 7A	CC-Link system area	70 to 7F	CC-Link system area
7B	Remote station READY		
7C to 7F	CC-Link system area		

● Full numerical data instructions (4 Stations occupied) [Remote register]

PLC memory address		RWr Data name		PLC memory address		RWw Data name	
RWr	bit	Numerical data instructions operation	Data editing	RWw	bit	Numerical data instructions operation	Data editing
0	0	Return of Occupied number of stations (L)		0	0	Setting read numerical data	
	1	Return of Occupied number of stations (H)			1	Setting parameter rewriting	
	2	Sending			2	Reset flag	
	3	Sending completed			3	Restart flag	
	4	READY			4	Movement MOD	Start flag
	5	ALARM flag			5	Speed	(No used)
	6	Initial			6	Position	
	7	Return of the read numerical data			7	Acceleration	
	8	Return of parameter rewriting			8	Deceleration	
	9	(No used)			9	Pushing force	
	A				A	Trigger LV	
	B				B	Pushing speed	
	C				C	Moving force	
	D	Data editing error receiving			D	Area 1	
	E	Parameter anomaly detection			E	Area 2	
	F	The abnormal station detection			F	In position	
1	F to 0	Current position		1	0	Start flag	Sub Function
					7 to 1	(No used)	
					F to 8	Movement MOD	
2	F to 0			2	F to 0	Speed	Address
3	F to 0	Current speed		3	F to 0	Target position	Address
4	F to 0	Current Force		4	F to 0		DATA (H)
5	F to 0	Target position		5	F to 0	Acceleration	DATA (L)
6	F to 0			6	F to 0	Deceleration	Occupation area
7	7 to 0	Alarm 1		7	F to 0	Pushing force	
	F to 8	Alarm 2					
8	7 to 0	Alarm 3		8	F to 0	Trigger LV	
	F to 8	Alarm 4					
9	F to 0	Occupation area	Sub Function	9	F to 0	Pushing speed	
10	F to 0		Address	10	F to 0	Moving force	
11	F to 0		Address (always 0)	11	F to 0	Area 1	
12	F to 0		DATA (H)	12	F to 0		
13	F to 0		DATA (L)	13	F to 0	Area 2	
14	F to 0		Occupation area	14	F to 0		
15	F to 0			15	F to 0	In position	

22. Handling Remote Registers

There are 1-bit data, 1-byte data, 1-word data, or 2-word data assigned to the remote registers (RWr and RWw), depending on the data content.

22.1 Relationship of bit data, byte data, and word data

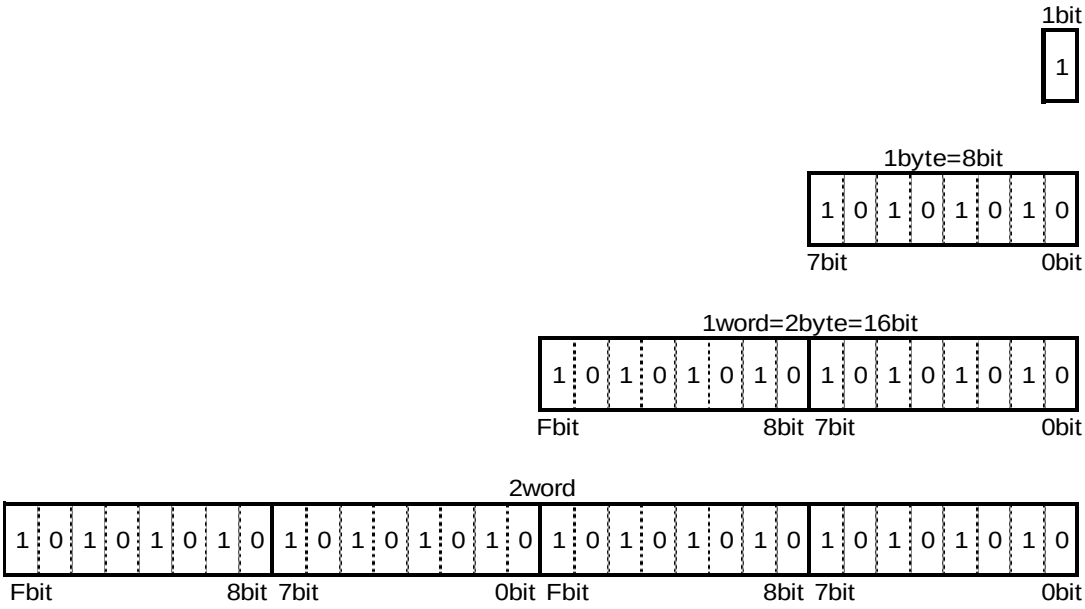
The following describes the relationship of each bit data, byte data, and word data for the LECPMJ.

- 1-bit data
  This indicates the OFF state (0) and ON state (1) by using one of the two types of data, "0" or "1".
  It is used to specify signal ON / OFF outputs such as RWr0,bit3: Sending completed, as well as signal input instructions such as the RWw0,bit0: Read numerical data flag.

- 1-byte data
  A group of eight 1-bit data items.
  This indicates 0 to 255 data as an 8-digit binary number.
  It is used to output an alarm code such as RWr7: Alarm.

- 1-word data
  A group of 16 1-bit data or two 1-byte data.
  This indicates the ON/OFF state of 16 types of signals or 0 to 65,535 data as a 16-digit binary number.
  It is used to output numerical data by using RWr3: Current speed, etc. as well as input numerical data by using RWw2: Speed, etc.

- 2-word data
  A group of two 1-word data.
  This indicates 0 to 2,147,483,647 data as a 32 - digit binary number or -2,147,483,647 to -1 data as a complement to 2.
  It is used to output numerical data by using RWr1 - RWr2: Current position, etc. or input numerical data by using RWw3 - RWw4: Target position, etc.



22.2 Relationship of binary (BIN), decimal (OCT), and hexadecimal (HEX) numbers

The following describes the relationship of binary (BIN), decimal (OCT), and hexadecimal (HEX) numbers.

Example) 1 byte

Binary (BIN)								**Decimal** (OCT)	**Hexadecimal** (HEX)
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	1	1	1
0	0	0	0	0	0	1	0	2	2
0	0	0	0	0	0	1	1	3	3
0	0	0	0	0	1	0	0	4	4
0	0	0	0	0	1	0	1	5	5
0	0	0	0	0	1	1	0	6	6
0	0	0	0	0	1	1	1	7	7
0	0	0	0	1	0	0	0	8	8
0	0	0	0	1	0	0	1	9	9
0	0	0	0	1	0	1	0	10	A
0	0	0	0	1	0	1	1	11	B
0	0	0	0	1	1	0	0	12	C
0	0	0	0	1	1	0	1	13	D
0	0	0	0	1	1	1	0	14	E
0	0	0	0	1	1	1	1	15	F
0	0	0	1	0	0	0	0	16	10
0	0	0	1	0	0	0	1	17	11
≀								≀	≀
0	0	0	1	1	1	1	0	30	1E
0	0	0	1	1	1	1	1	31	1F
0	0	1	0	0	0	0	0	32	20
0	0	1	0	0	0	0	1	33	21
≀								≀	≀
0	0	1	1	1	1	1	0	62	3E
0	0	1	1	1	1	1	1	63	3F
0	1	0	0	0	0	0	0	64	40
0	1	0	0	0	0	0	1	65	41
≀								≀	≀
0	1	1	1	1	1	1	0	126	7E
0	1	1	1	1	1	1	1	127	7F
1	0	0	0	0	0	0	0	128	80
1	0	0	0	0	0	0	1	129	81
≀								≀	≀
1	1	1	1	1	1	1	0	254	FE
1	1	1	1	1	1	1	1	255	FF

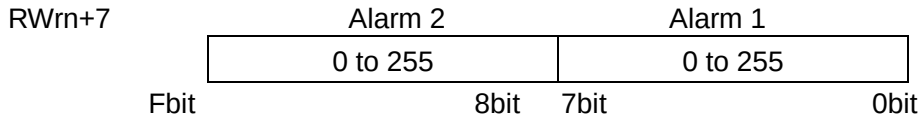
22.3 Installation

Remote register allocates 1 byte data, 1 word data and 2 word data according to the content of data.

1 byte data

Please treat 1 byte data of the alarm as follows.

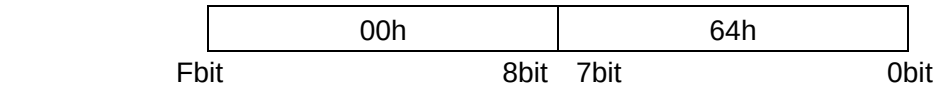
When Alarm 1 and Alarm 2 are displayed in RWwn+7.
(Full numerical data instructions, 4 Stations occupied)
Alarm 1 and Alarm 2 are expressed by the decimal number. Display form of the value of RWrn+7 is different according to the setting of PLC. So please convert it into the decimal number to read.



1 word data

Please treat 1 word data of Speed, Acceleration, and Deceleration etc. as follows.

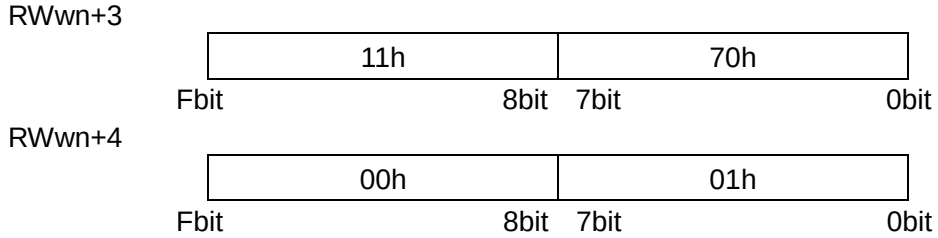
When input 100mm/s into Speed (RWwn+2). (Full numerical data instructions, 4 Stations occupied)
100mm/s becomes 0064h by the hexadecimal number.
Please do as follows when input " 00 64 h" into the register.



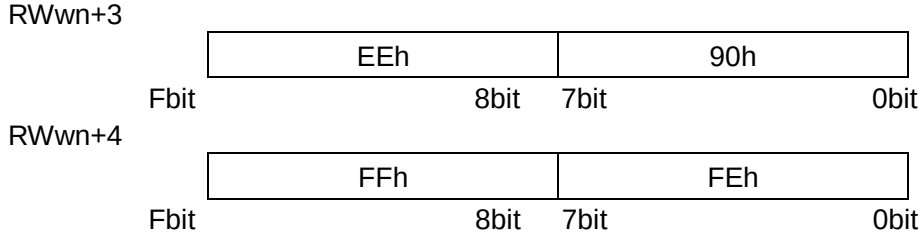
2 word data

Please treat 2 word data of Position etc. as follows.

1) When input 700.00mm into Position (RWwn+3, 4). (Full numerical data instructions, 4 Stations occupied)
The position is data of the 0.01mm unit.
700.00mm is shown by 70000 and it becomes 00011170h in the hexadecimal number.
Please do as follows when input 00 01 11 70 h into the register.



2) When input -700.00mm into Position (RWwn+3, 4). (Full numerical data instructions, 4 Stations occupied)
The position is data of the 0.01mm unit. The value of minus sign uses the 2's complement expression.
-700.00mm is shown by -70000 and it becomes FFFEEE90h in the hexadecimal number.
Please do as follows when input FF FE EE 90 h into the register.



23. Glossary

The main term used in this operation manual is as follows.

	Term	Definition
C	CC-Link	It is a standard of the field bus that Mitsubishi Electric Corporation etc. promote. The share in the Asian area and Japan is high and CC-Link is used mainly in a large number of companies.
	Communication speed	It is a speed at which data is sent and received in the field bus etc. It depends on PLC etc., and the unit uses bps (bit per second).
F	Field bus	It is a standard to perform the communication of signal of Spot apparatus (measuring instrument, operation device) which operates in factories and PLC by the digital signal.
N	Number of stations	It is the total of the occupation station of all slaves station connected in CC-Link.
O	Occupied number of stations	Number of the stations on the network which one slave station uses. It is possible to set from Station 1 to Station 4 according to the number of the data.
P	PLC	Abbreviation of Programmable Logic Controller. It is a controller which sequential control by programs of the Boolean operation, the order operation, and the arithmetic operation, etc.
R	Remote device station	It is the slave station that can use bit data and word data.
	Remote IO	It is a memory area that treats the bit data.
	Remote register	It is a memory area that treats the word data.
	RWr	It is a remote register region of the input side which the master station receives the word data from the slave station.
	RWw	It is a remote register region of the output side which the master station sends the word data from the slave station.
	Rx	It is a remote I/O region of the input side which the master station receives the bit data from the slave station.
	Ry	It is a remote I/O region of the output side which the master station sends the bit data from the slave station.
S	Station No.	It is 0 of the master station and numbers from 1 to 64 to assign to the slave station on CC-Link .The slave station is necessary to assign it not to repeat in consideration of the number of the occupation station.
	Station type	It is a generic name of the slave station. By usable data (bit data and word data), there is a type of the remote I/O station, the remote device station and the intelligent device station.
U	Upper level device	Controller setting kit, Teaching box, PLC

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