No. JXC※-OMT0042-C

Operation Manual

PRODUCT NAME

Step Motor Driver
(Pulse input type)

MODEL / Series / Product Number

LECPA Series

SMC Corporation

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LECPA Series / Driver
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 and safety requirements for systems and their components
ISO 4413: Hydraulic fluid power - General rules and safety requirements for systems and their components
IEC 60204-1: Safety of machinery - Electrical equipment of machines - Part 1: General requirements
ISO 10218-1: Robots and robotic devices - Safety requirements for industrial robots - Part 1:Robots
etc.

Danger	**Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
Warning	**Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
Caution	**Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate 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 implemented and 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. SMC products cannot be used beyond their specifications. They are not developed, designed, and manufactured to be used under the following conditions or environments. Use under such conditions or environments is not allowed.
1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Use for nuclear power, railways, aviation, space equipment, ships, vehicles, military application, equipment affecting human life, body, and property, combustion equipment, entertainment equipment, emergency shut-off circuits, press clutches, brake circuits, safety equipment, etc., and use for applications that do not conform to standard specifications such as catalogs and operation manuals.
3. Use for interlock circuits, except for use with double interlock such as installing a mechanical protection function in case of failure. Please periodically inspect the product to confirm that the product is operating properly.

LECPA Series / Controller
1.Safety Instructions

⚠ Caution

SMC develops, designs, and manufactures products to be used for automatic control equipment, and provides them for peaceful use in manufacturing industries.
Use in non-manufacturing industries is not allowed.
Products SMC manufactures and sells cannot be used for the purpose of transactions or certification specified in the Measurement Act of each country.
The new Measurement Act prohibits use of any unit other than SI units in Japan.

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. Please consult 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.

2. Product Outline

2.1 Product features

The followings are the main functions of this driver:

■ 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).

■ 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 serial communication and parallel I/O control are still available.

■ Return to origin

Return the electric actuator to the home position by sending a single signal to a dedicated terminal.

■ Alarm detection function

Automatically detect the abnormal conditions and output the appropriate alarm signal via the serial interface and parallel I/O. The alarm information (up to the last 8 alarms) will be recorded into the memory in the driver.

■ Data input method

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

■ Specified force operation

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

⚠ Caution

The operation with specified thrust is available for driver version 1.60 or more.

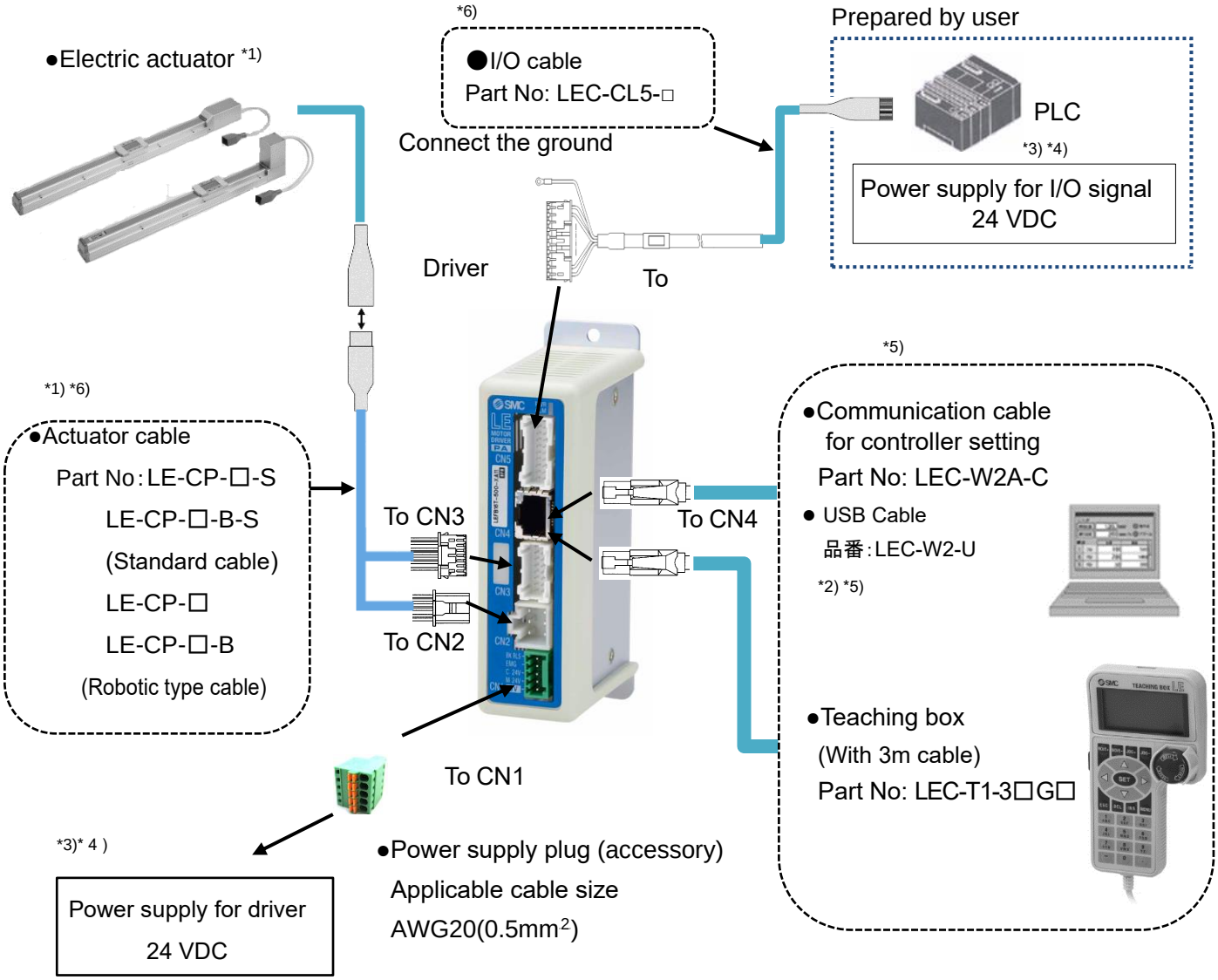
Please refer to the **"3.2 Parts description (page 13)"** for the confirm method of the driver version.

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 fault finding.

Keep this operation manual accessible for reference.

2.2 Product configuration

The product configuration of this driver is as follows.



*1) These items are included when ordered using the part number for an 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 driver should be used with a UL1310 Class 2 power supply.
*4) 24 VDC power supply for driver input and 24 VDC power supply for I/O signal should be separated.
*5) PC is prepared by the user.
*6) Optional.

⚠ Warning

Refer to section **"4. External Connection for wiring"**.
Refer to **"13. Precautions for wiring and cables"** when handling the wiring and cables.
Do not connect the teaching box directly to the Personal computer.
Do not use LAN cable to connect to the driver, it will cause damage to the personal computer.

2.3 How to Order

The part number construction for this product is as follows:

L E C P A N □ □ – □

Compatible

P	Step motor (Servo / 24 VDC)

Driver type

A	Pulse input type

Parallel I/O type

N	NPN type
P	PNP type

I/O cable length

Nil	None
1	1.5m
3	3m*2)
5	5m*2)

Electric actuator model

Stroke example: For LEFS25B-100B-S3AN1, specify LEFS25B-100

Rotating angle: For LER10K-2L-R1AN1D, specify LER10K-2.

(For an electric rotary table, the rotation angle must also be entered. Note, this product is not specified for continuous rotation).

BC	Blank controller *1)

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

Option

Nil	Screw mounting
D	DIN rail mounting

*2) Available only with the differential pulse input type.
Only 1.5 m cable is available for the open collector type.

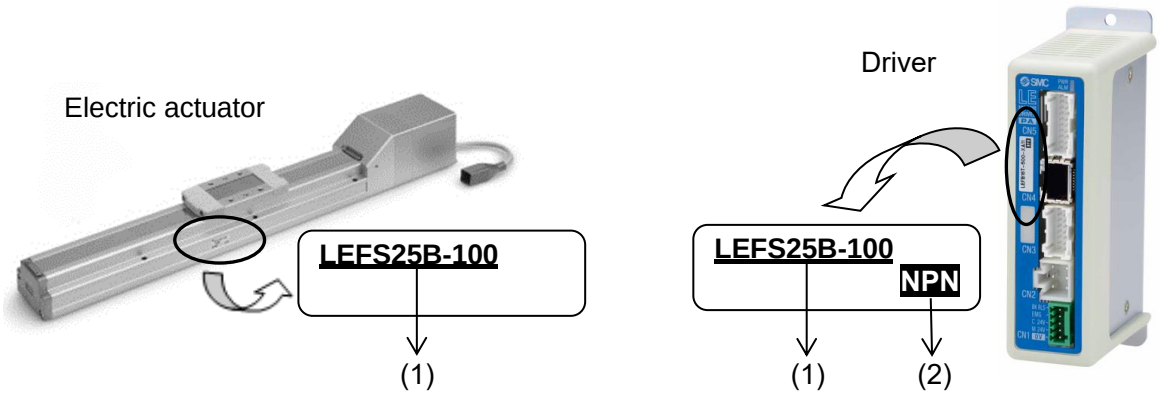
⚠ Caution

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

<Check the following before use.>

(1) Check the electric actuator label for the model number. Check that this matches the driver.

(2) Check Parallel I/O configuration matches (NPN or PNP)



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

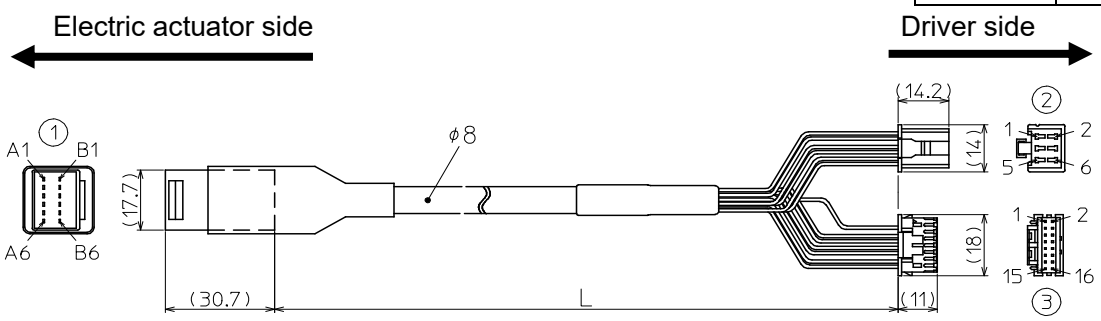
Shield

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

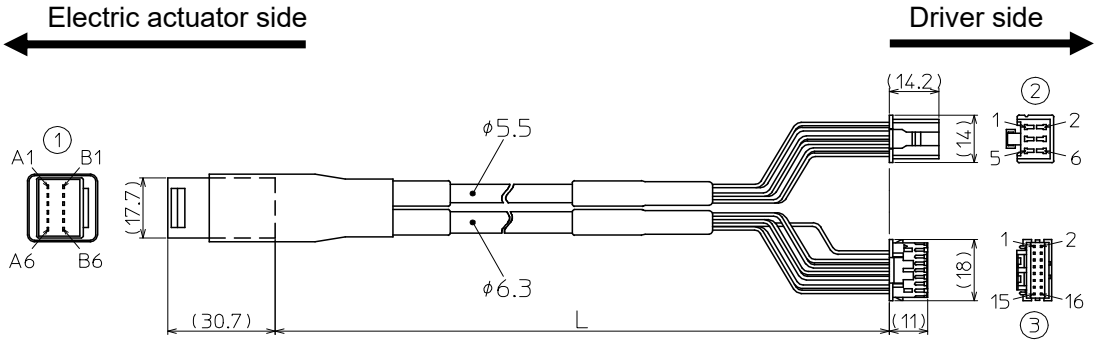
Shield

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



(30.7)

(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

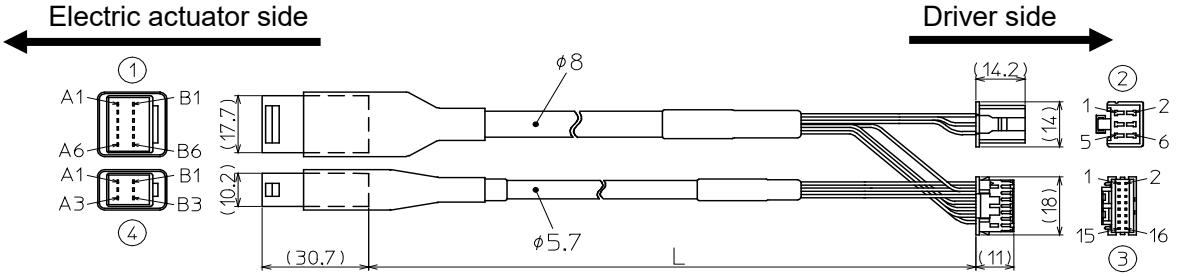
③

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

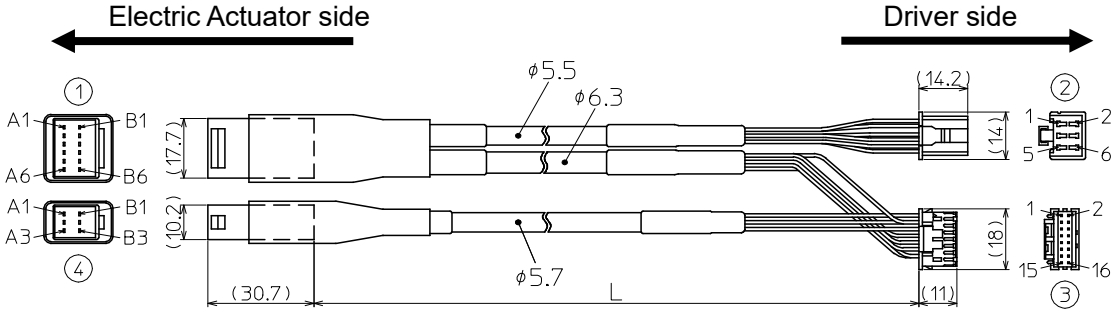
③

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



No.JXC※-OMT0042-C

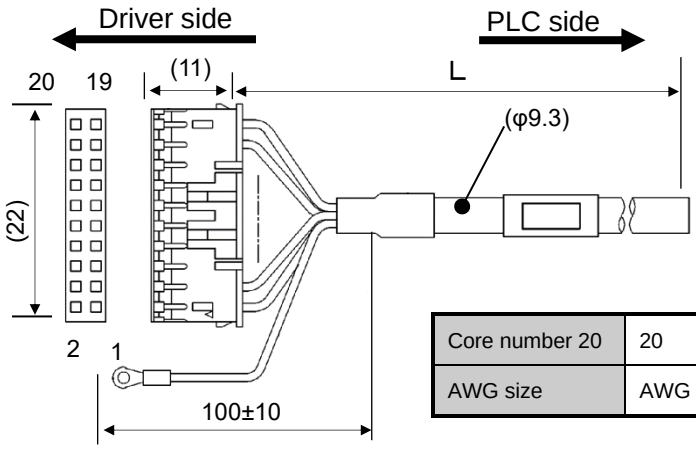
(5) I/O Cable

L E C – C L 5 – □

Cable length(L)

1	1.5m
3	3m *1)
5	5m *1)

* Available only when differential pulse input. Only 1.5m cable is available for open collector.



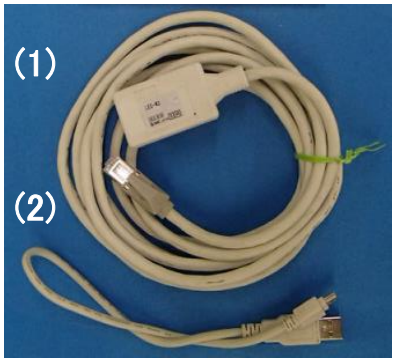
Core number 20	20
AWG size	AWG 24

Pin No.	Color of insulation	Dot mark	Dot color
1	Light brown	■	Black
2	Light brown	■	Red
3	Yellow	■	Black
4	Yellow	■	Red
5	Light green	■	Black
6	Light green	■	Red
7	Gray	■	Black
8	Gray	■	Red
9	White	■	Black
10	White	■	Red
11	Light brown	■■	Black
12	Light brown	■■	Red
13	Yellow	■■	Black
14	Yellow	■■	Red
15	Light green	■■	Black
16	Light green	■■	Red
17	Gray	■■	Black
18	Gray	■■	Red
19	White	■■	Black
20	White	■■	Red

(6) Communication cable for controller setting

Contents

Item	Product No.*1)	Quantity
(1) Communication cable(3m)	LEC-W2A-C	1
(2) USB cable(0.3m)	LEC-W2-U	1



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

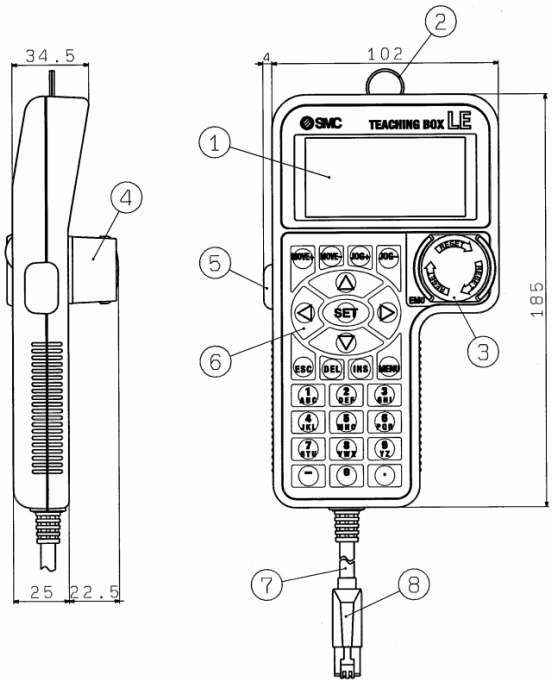
Enable switch

Nil	No enable switch
S	Equipped with enableswitchchluded.

Stop switch

G	Equipped with stop switch

Dimensions

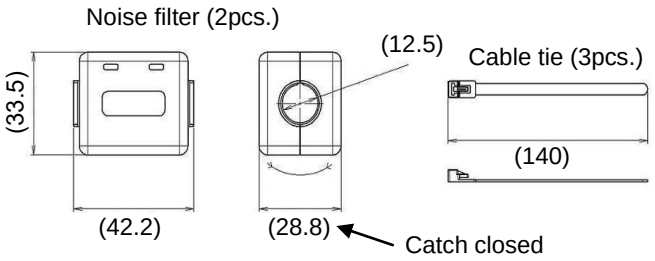


No.	Name	Function
(1)	LCD	A screen of liquid crystal display(with backlight)
(2)	Ring	A ring for hanging the teaching box.
(3)	Stop switch	When switch is pushed in,the switch locks and stops.The lock is released when it is turned to the right.
(4)	Stop switch guard	A guard for the stop switch
(5)	Enable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

(8) Noise filter set

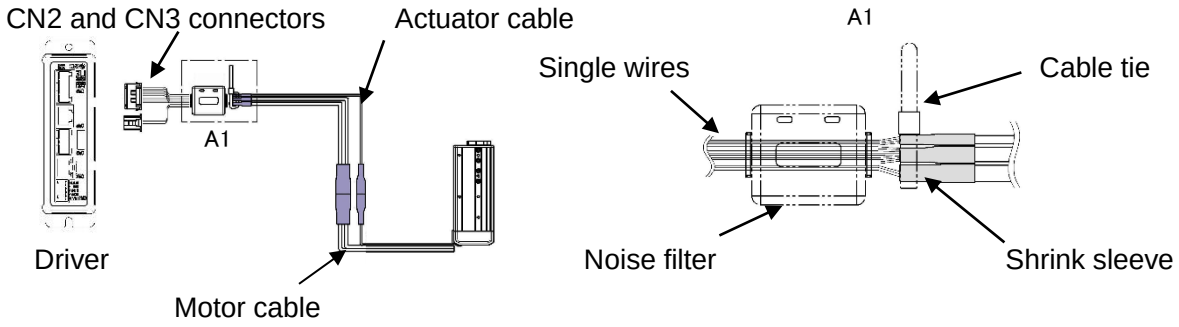
LEC－NFA

Noise filter set



Assembly procedure:

1) Mount a noise filter around the single wires of the actuator cable close to the driver connectors. Next, fasten a cable tie to the shrink sleeve as shown (refer to A1).
2) Mount a noise filter to the motor cable, and fasten with a cable tie at both ends.



⚠Caution

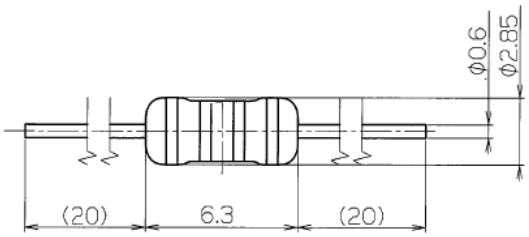
When installing a noise filter on the actuator cable, bundle all of the single wires together and then house them inside the noise filter case. When locking the noise filter, make sure not to damage the wires.
Attach the noise filter at the root of the cable immediately next to the connector.
When unplugging the actuator cable connectors CN2 and CN3 from the driver, remove the cable tie and move the noise filter towards the shrink sleeve. After re-mounting, return the noise filter to its original position and re-fasten the cable tie.

(9) Current limiting resistor

Use this resistor when the positioning unit's pulse-train output signal is specified as an open collector type output.

LEC－PA－R－□

Current limiting resistor



Symbol	Resistance	Power supply voltage for pulse input signal
332	3.3kΩ±5%	24VDC ±10%
391	390Ω±5%	5VDC ±5%

Select the current limiting resistor R which corresponds to the pulse signal voltage.

LEC-PA-R-□ is provided with 2 pcs in one set.

2.5 Startup Procedures

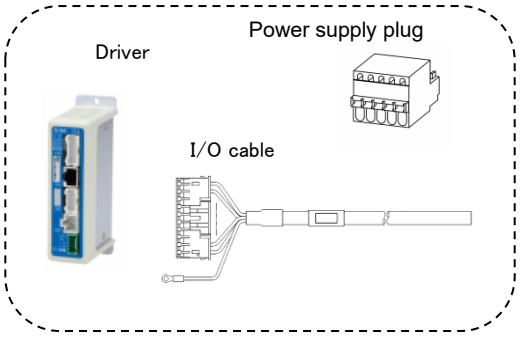
Be sure to check the procedure below before use.

(1) Confirmation of the package content

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

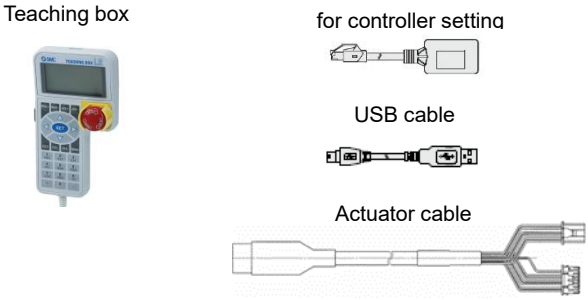
Item	Quantity
Driver (LECPA□□□-□)	1 unit
Power supply plug	1 piece
I/O cable (LEC-CN5-□) *1)	1 piece

*1) Included in the package only when the I/O cable length is specified.



【Option】

- Teaching box
- Controller setting kit
- Actuator cable
- Noise filter set
- Current limiting resistor



(2) Installation

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

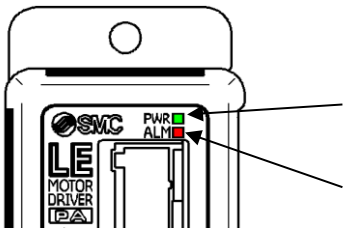
(3) Wiring and connection

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

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

(4) Power ON alarm (error)

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



Driver

Function	LED color	Status
PWR	Green	Normal
ALM	Off	Normal
	Red	Problems

If the LED [PWR] lights in green, the driver is in the normal condition.

However, if the LED [ALM] lights in red, the driver is in the alarm (error) condition.

⚠Caution

In case of alarm (error) condition:

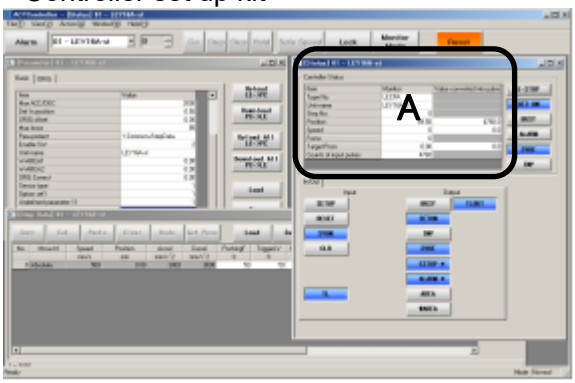
Connect a PC or the teaching box to the CN4 serial I/O connector and check the details of the alarm. Then, remove the cause of the error referring to the **"12. Alarm Detection"**

Please refer to the manuals of the controller setting software or the teaching box for details of the alarms.

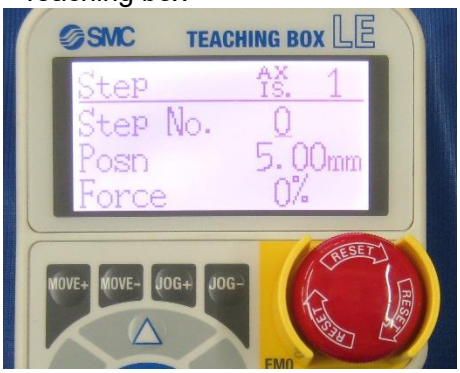
(5) Operation pattern setting

Setup the operation pattern (step data, basic parameter and return to origin parameters) by using a Controller setting kit or the teaching box. **Specifically, be sure to configure the parameter"option set 1" from the basic parameters section.** Refer to **"7. Setting Data Entry (page 31)"** for details.

● Controller set up kit

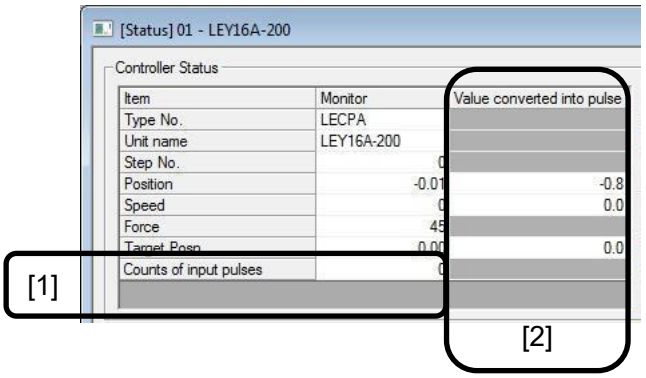


● Teaching box



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

A: Status window



[1] Counts of input pulses

The pulse number input from the positioning unit is displayed. However, please take care that under the situation that the driver doesn't count the pulse (The SVRE power output: turning off, the return to origin inside, and

CLR input: turn on, Test in operation by Controller setting kit /teaching box), this value is changed.

[2] Value converted into pulse

The values about the speed and the target position, current position converted into the pulse number are displayed. Conversion formula is shown in below.

Position [Pulse]

= Position [mm] / Actuator lead [mm/rotation] x 800 [Pulse/rotation] x electronic gear (denominator) / electronic gear (numerator)

Speed [Pulse/sec]

= Speed [mm/s] / Actuator lead [mm/rotation] x 800 [Pulse/rotation] x electronic gear (denominator) / electronic gear (numerator)

Please refer to **"7.2 Basic parameter"** for electronic gear (denominator, numerator).

(6) Trial run (Electric actuator adjustment)

After confirming that an unexpected operation can be stopped externally, check the operation by inputting the pulse signal from the positioning unit.

3. Product Specifications

3.1 Basic specifications

The basic specifications of this driver are as follows:

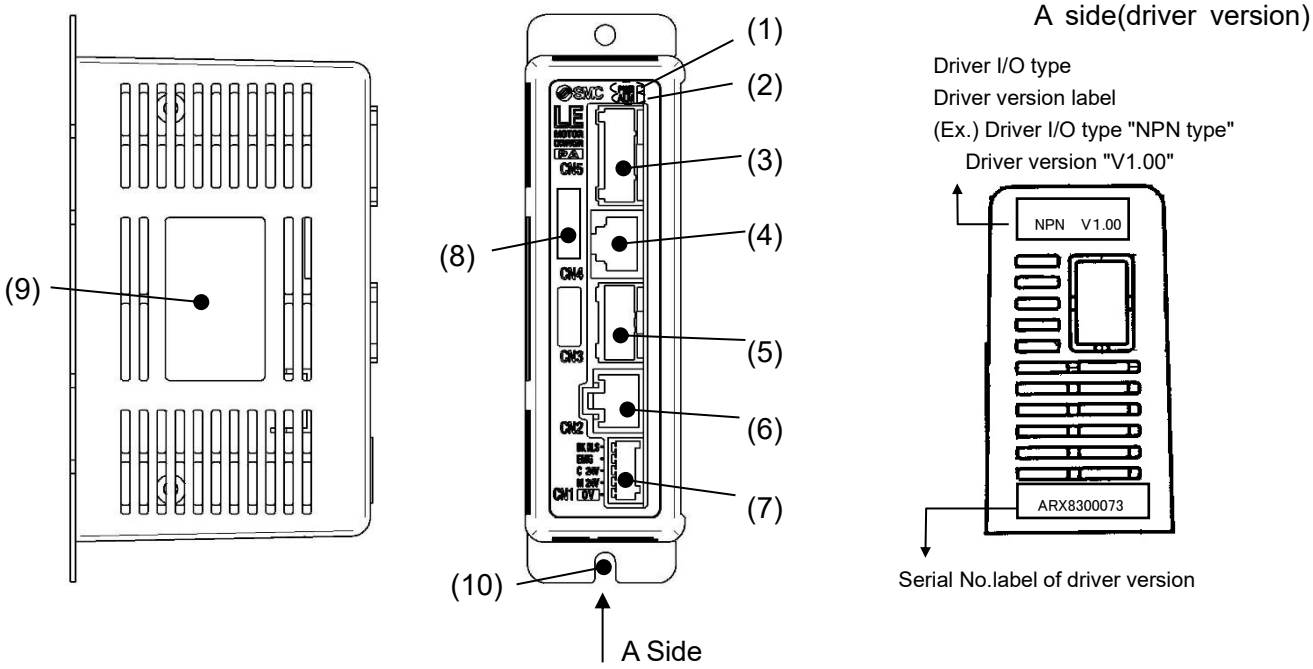
<table>
<tr><th>Item</th><th>Specifications</th></tr>
<tr><td>Compatible motor</td><td>Step Motor (Servo / 24 VDC)</td></tr>
<tr><td>Power supply *1) *2)</td><td>Power voltage: 24 VDC +/-10%</td></tr>
<tr><td>Current consumption</td><td>150 mA or less (Controller)
Refer to the specification of actuator to be connected for total power consumption.</td></tr>
<tr><td>Compatible encoder</td><td>Incremental A/B phase (800 pluse/rotation)</td></tr>
<tr><td>Parallel input</td><td>5 inputs (photo-coupler isolation)
Except pulse signal input terminal and COM terminal</td></tr>
<tr><td>Parallel output</td><td>9 outputs (photo-coupler isolation)</td></tr>
<tr><td>Pulse signal input</td><td>
<table>
<tr><th></th><th>Open collector input</th><th>Differential input</th></tr>
<tr><td>Maximum frequency</td><td>60kpps</td><td>200kpps</td></tr>
<tr><td>Input type</td><td>1 pulse mode
(Direction and pulse input)
2 pulse mode
(Pulse for each direction)</td><td>1 pulse mode
(Direction and pulse input)
2 pulse mode
(Pulse for each direction)</td></tr>
</table>
</td></tr>
<tr><td>Serial communication</td><td>Conforming to RS485.（Modbus protocol compliant）</td></tr>
<tr><td>Memory</td><td>EEPROM</td></tr>
<tr><td>LED indicator</td><td>2 of LED’s (green and red)</td></tr>
<tr><td>Lock control</td><td>Forced-lock release terminal (Applicable to non -magnetizing lock.)</td></tr>
<tr><td>Cable length</td><td>I/O cable:1.5m or less (Open collector input)
5m or less (Differential input)
Actuator cable: 20m or less</td></tr>
<tr><td>Cooling system</td><td>Natural air cooling</td></tr>
<tr><td>Operating temperature range</td><td>0– 40ºC(No freezing)</td></tr>
<tr><td>Operating humidity range</td><td>90%RH or less (No condensation)</td></tr>
<tr><td>Storage temperature range</td><td>-10 – 60ºC (No freezing)</td></tr>
<tr><td>Storage humidity range</td><td>90%RH or less (No condensation)</td></tr>
<tr><td>Insulation resistance</td><td>Between external terminals and case
50MΩ (500VDC)</td></tr>
<tr><td>Mass</td><td>120g(Screw mount type)
140g(DIN rail mount type)</td></tr>
</table>

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

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

3.2 Parts description

The detailed descriptions of each part are as follows:

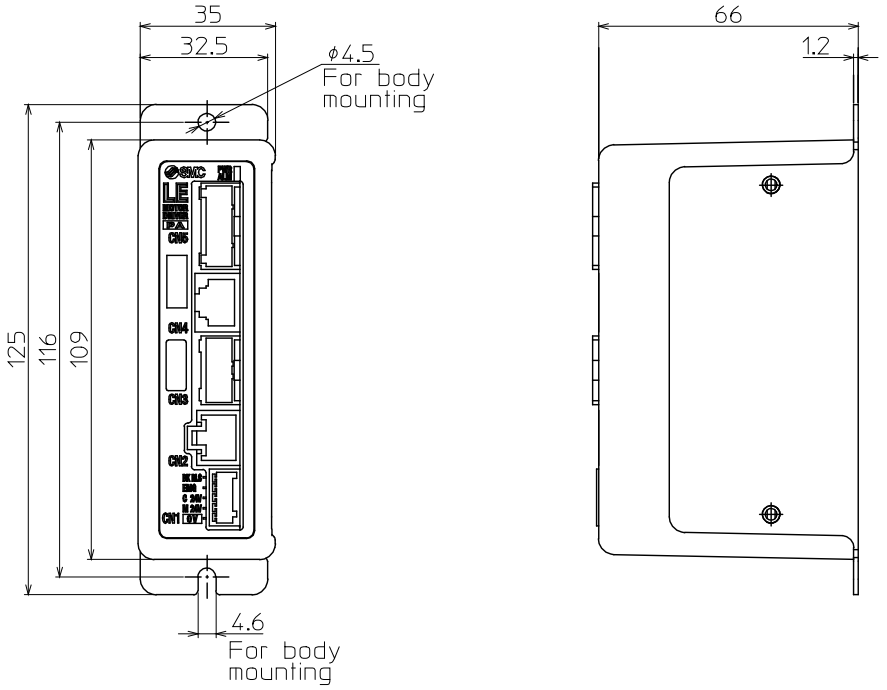


No.	Label	Name	Description
(1)	PWR	Power LED (green)	Power ON/No alarm: Green light Data (step data, parameter) writing /green light flashing **⚠ Caution** Do not turn off the input power supply for the driverr while the data is being written (power supply LED (green) flashes). Data (step data ,parameter) may not be written correctly.
(2)	ALM	Power LED (red)	Power ON/Alarm: Red light
(3)	CN5	Parallel I/O Connector (20 pins)	Used to connect PLC, etc. with the I/O cable.
(4)	CN4	Serial I/O Connector (8 pins)	Used to connect the teaching box, PC, etc.
(5)	CN3	Encoder connector (16 pins)	Used to connect the actuator cable.
(6)	CN2	Motor power connector (6 pins)	
(7)	CN1	Power connector (5 pins)	Used to connect the driver power supply (24 VDC) with the power supply plug. Common power (-) ,Motor power (+) ,Control power (+) ,Stop signal (+) ,Lock release (+)
(8)	—	Applicable electric actuator model number label	The label indicating the applicable electric actuator model. It also indicates the type of the parallel I/O (PNP/NPN).
(9)	—	Driver label	The label indicating the part number of the driver.
(10)	—	FG	Functional ground (When the driver is mounted, tighten screws and connect the grounding cable)

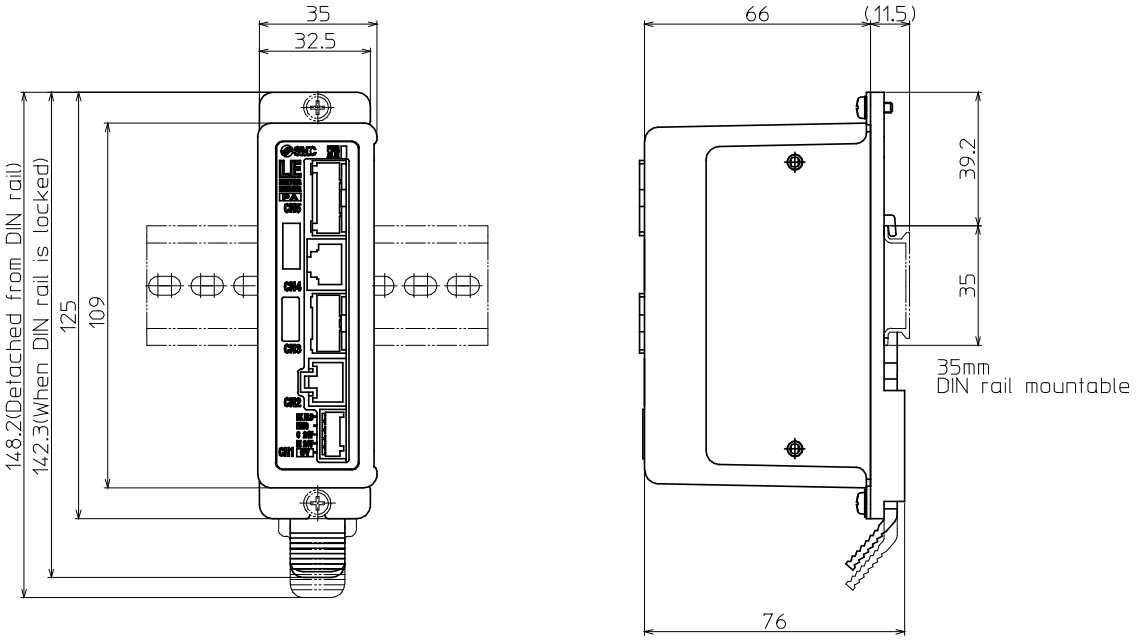
3.3 Outside dimension diagram

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

(1) Screw mount type (LECPA□□-□)



(2) DIN rail mount type (LECPA□□D-□)



3.4 How to install

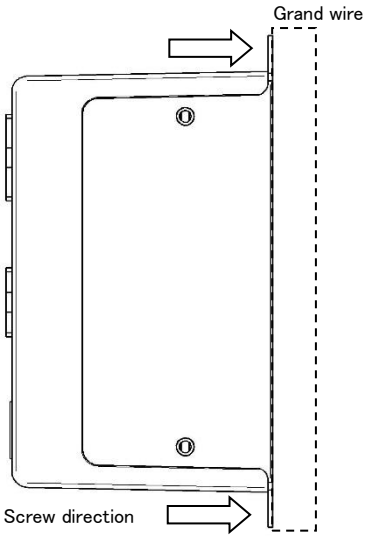
(1) How to install

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

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

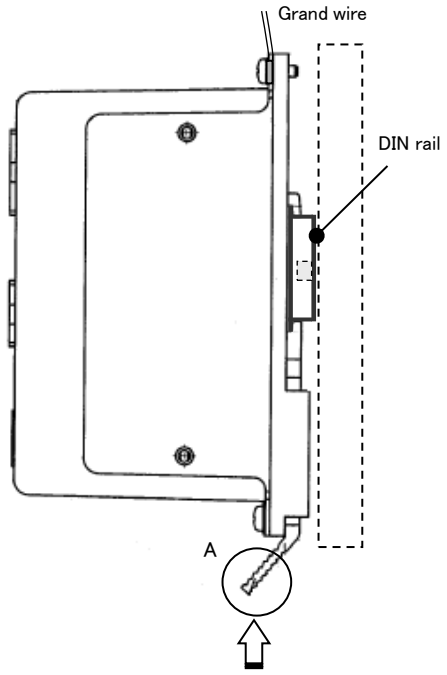
1) Screw mount type (LECPA□□-□)

(Installation with two M4 screws)



2) DIN rail mount type (LECPA□□D-□)

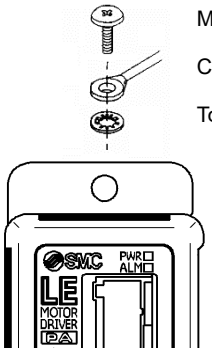
(Installation with the DIN rail)



Hook the driver on the DIN rail and press the lever of section A in the arrow direction to lock it.

(2) Ground wire connection

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



Driver

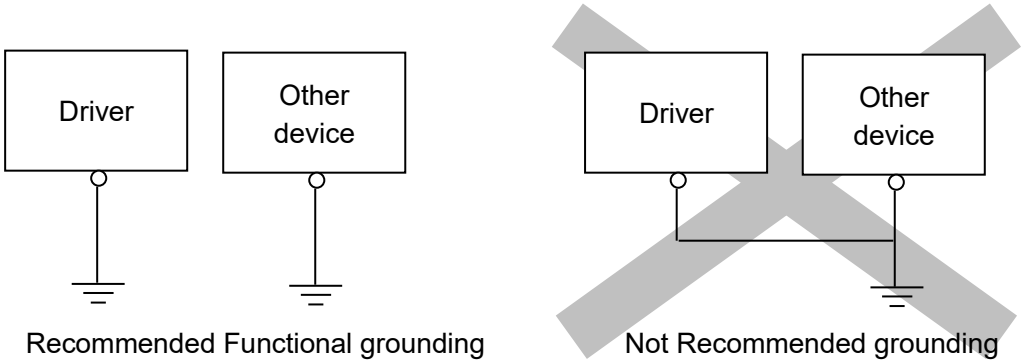
⚠ Caution

The M4 screw, cable with crimping terminal, and toothed washer should be obtained separately.
Ground the drive 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 driver to make the wire length shorter.



Recommended Functional grounding　　Not Recommended grounding

(3) Installation location

Select the size and the installation style so that the surrounding temperature of driver is 40 ºC or less.

Mount the driver 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 driver so that the operating temperature of the driver stays within the specification range.

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

Fig.1

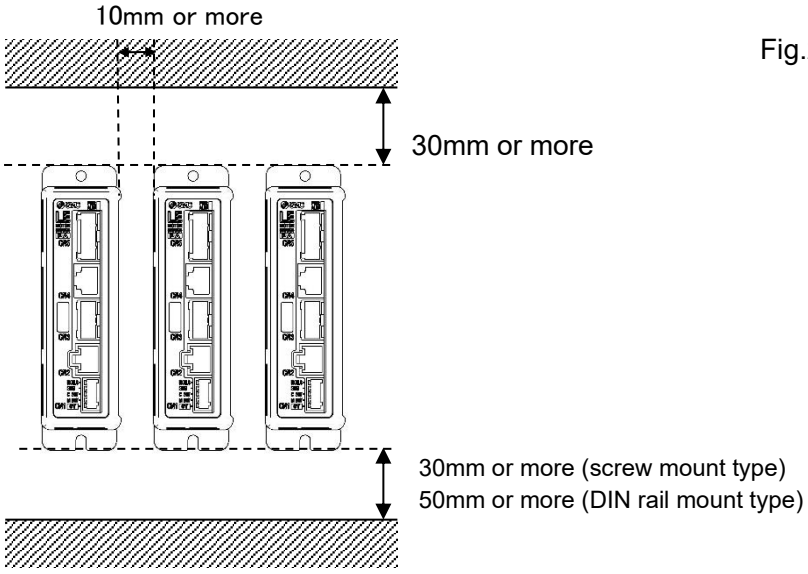
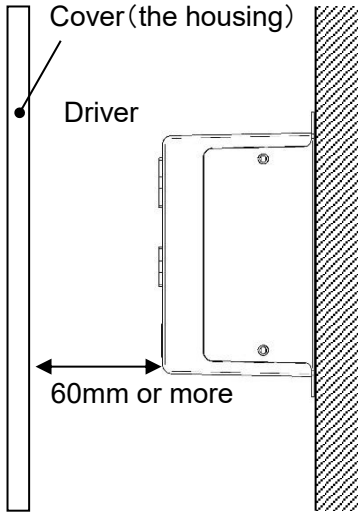


Fig.2



⚠ Caution

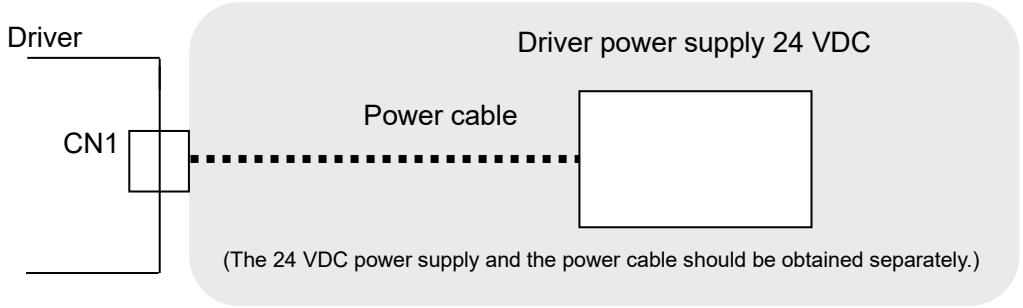
If the mounting surface of the driver is distorted or not flat, excessive force may be applied to the housing, etc. causing malfunction.

Mount this product on a plane flat surface.

4. External Wiring Diagram

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

4.1 CN1: Power connector



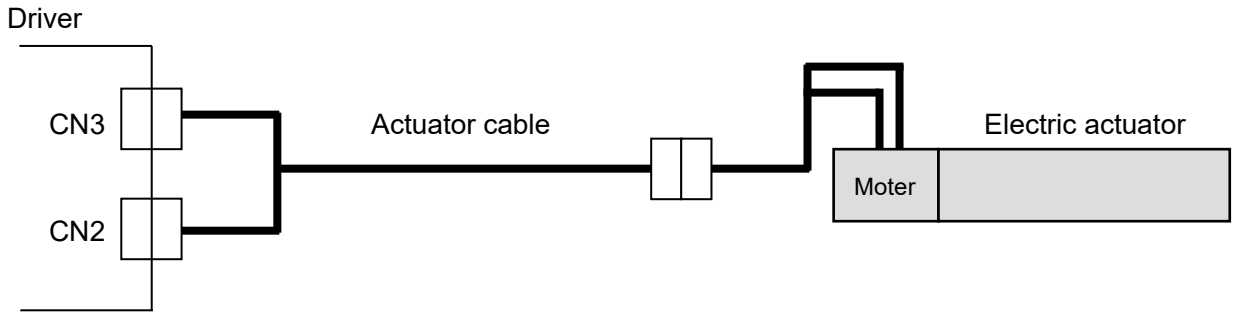
Please refer to **"5. CN1: Power supply plug"** for how to wire the CN1 connector.

⚠ Caution

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

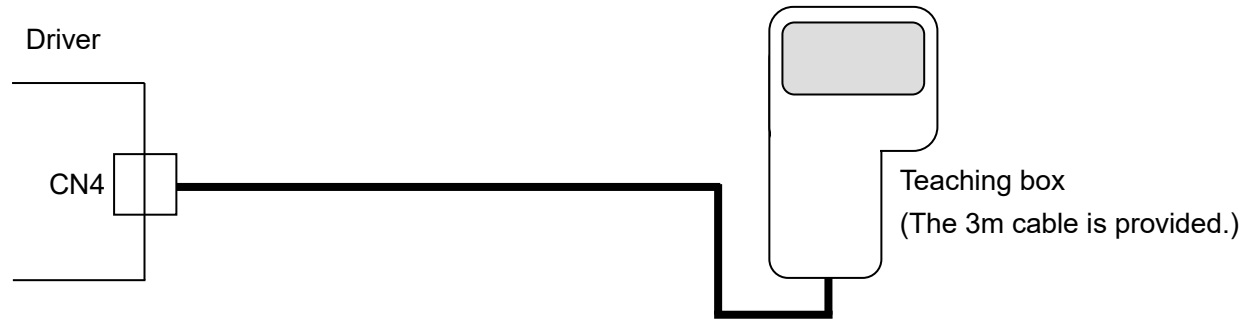
4.2 CN2: Motor power connector and CN3: Encoder connector

Connect the driver and the electric actuator with the actuator cable (LE-CP-□-□).

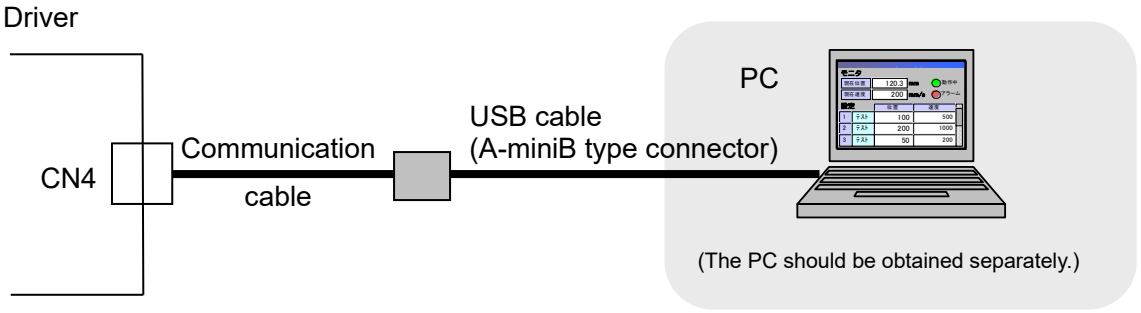


4.3 CN4: Serial I/O connector

(1) Connection with the teaching box



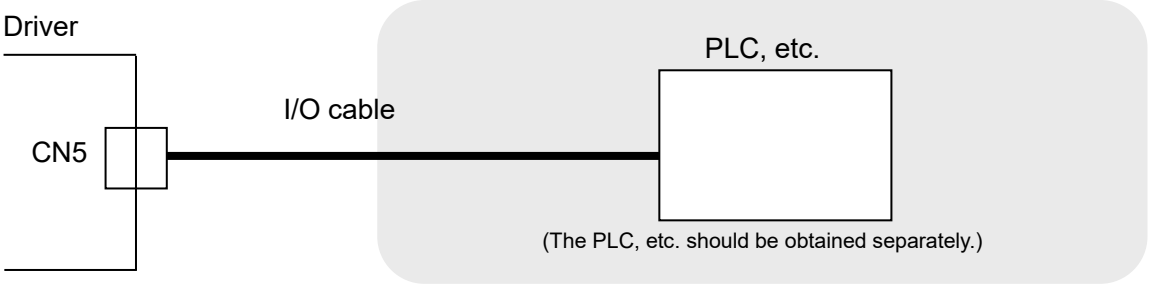
(2) Connection with a PC



⚠ Caution

Do not connect to equipment other than specified (LEC-W1, LEC-W2, LEC-T1).
When connected to equipment which is not specified, the product will be damaged by incorrect signal wiring.
When connecting the cable, make sure that no electrically conductive materials are present in the connector insertion port.
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.

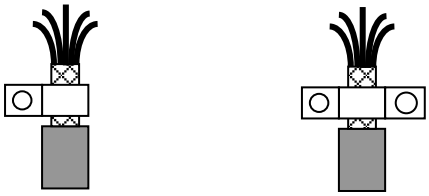
4.4 CN5: Parallel I/O connector



Please refer to **"6.4 Parallel I/O Wiring Example"** for how to wire the CN5 connector.
Please refer to **"6.3 The parallel I/O signal is detailed"** for details of each signal of parallel I/O.

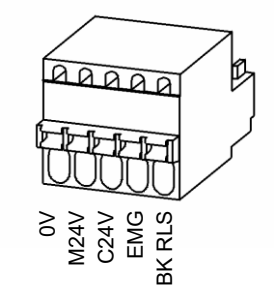
⚠ Caution

Ground the both I/O cable ends for the protection from the noise.
Ground the cable end at the positioning unit side with metal cable clamp so that the entire circumference of I/O cable shield contacts the clamp. Keep the stripped part of shield as short as possible.



5.1 Power supply plug specifications

Power supply plug

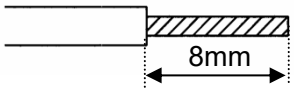


Terminal	Function	Descriptions
0V	Common power (-)	The negative common power for M24V, C24V, EMG and BK RLS.
M24V	Common power (+)	The positive power for the actuator motor to be supplied via the driver.
C24V	Control power (+)	The positive control power.
EMG	Stop signal (+)	The positive power for Stop 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）

5.2 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°C or more
Stripped section length	

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

⚠ Caution

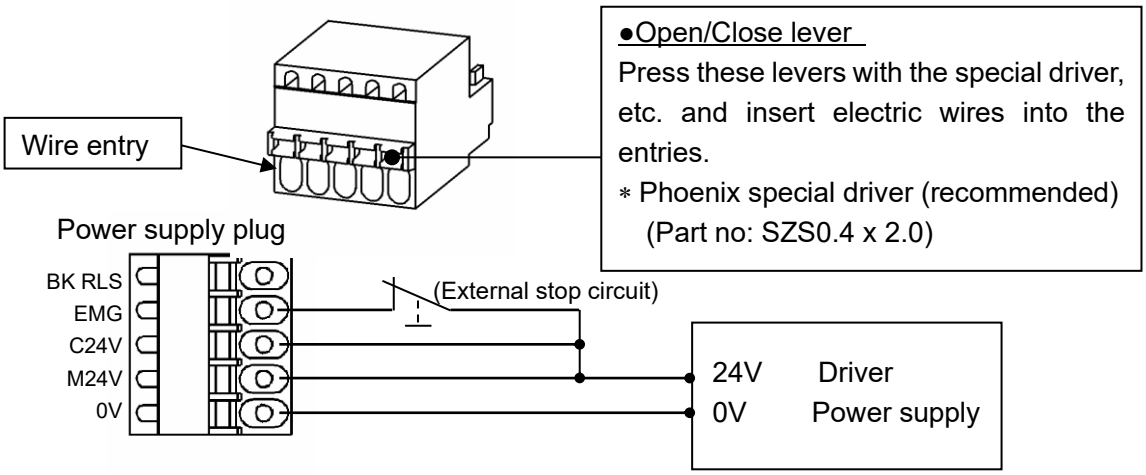
Multiple electric wires should not be connected to one terminal.
Arrange wiring so that conductors of each terminal do not contact other lines.

5.3 Wiring of power supply plug

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

(1) Wiring of the power supply

Connect the positive of the 24 VDC driver power supply of the driver to the C24V, M24V and EMG terminal of the power supply connector, and connect the negative of that power supply to the 0V terminal.



⚠ Caution
For driver input power supply (24 VDC) use a power supply with a capacity not less than the “momentary maximum power” of the electric actuator spedfications. Do not use “inrush current restraining type” power supply.

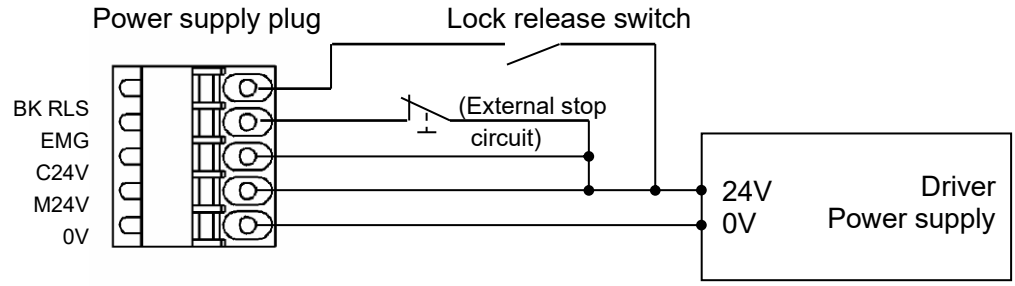
(2) Wiring of the stop switch

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 **“5.4 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.

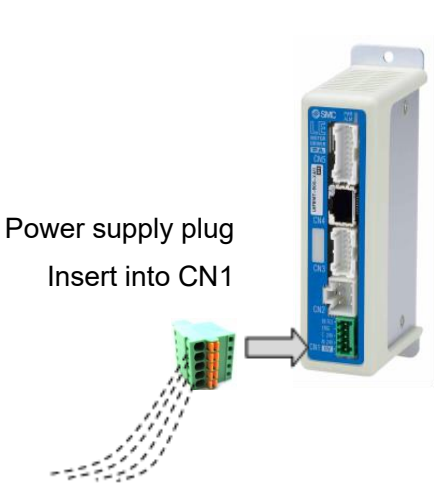
(3) Wiring of the lock release

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
If the electric actuator is a non-lock type, it is not necessary to wire the BK RLS terminal. Do not supply power to the BK RLS (lock release) during normal operation.

After the wiring of the power supply plug is completed, connect it to the CN1 connector of the driver.
Please refer to **“5.3 Wiring of power supply plug”** for how to wire the power supply plug.

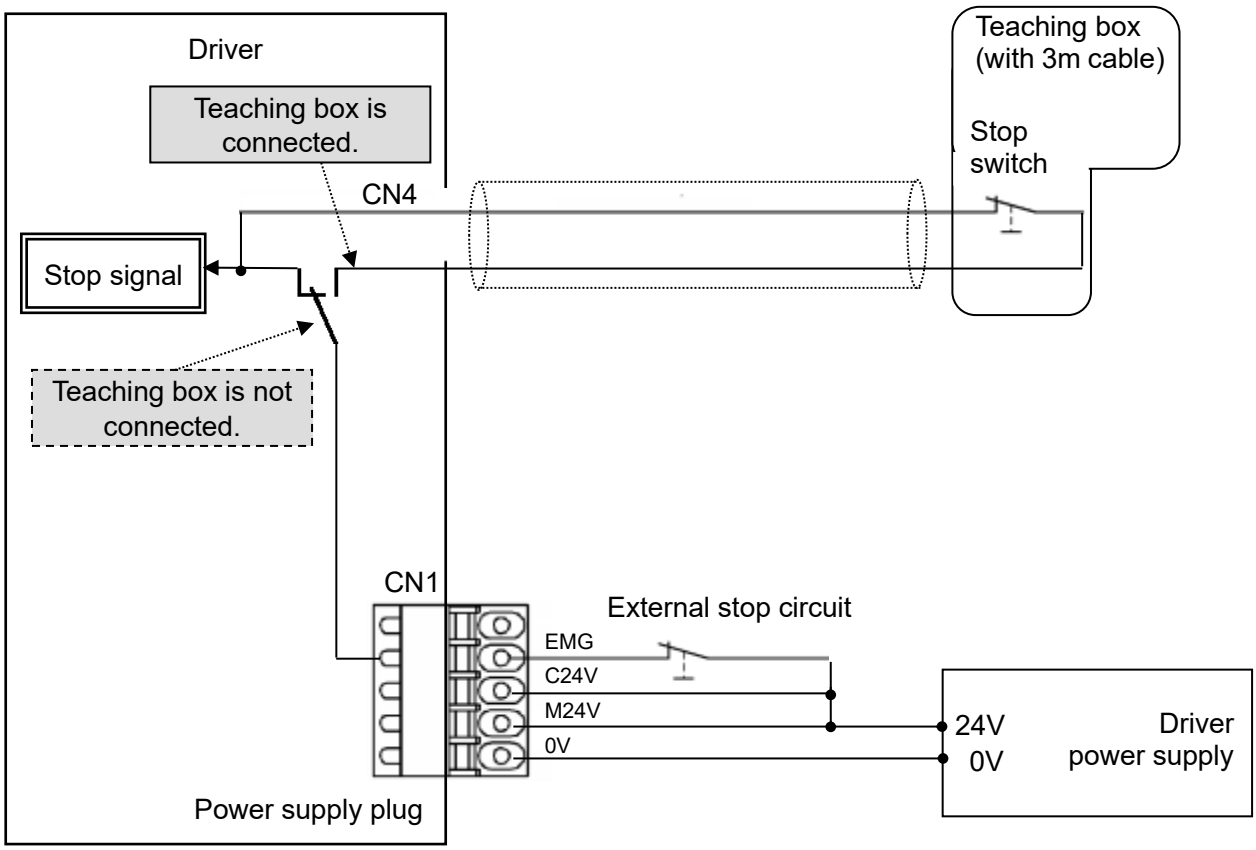


5.4 Stop circuits

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

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

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



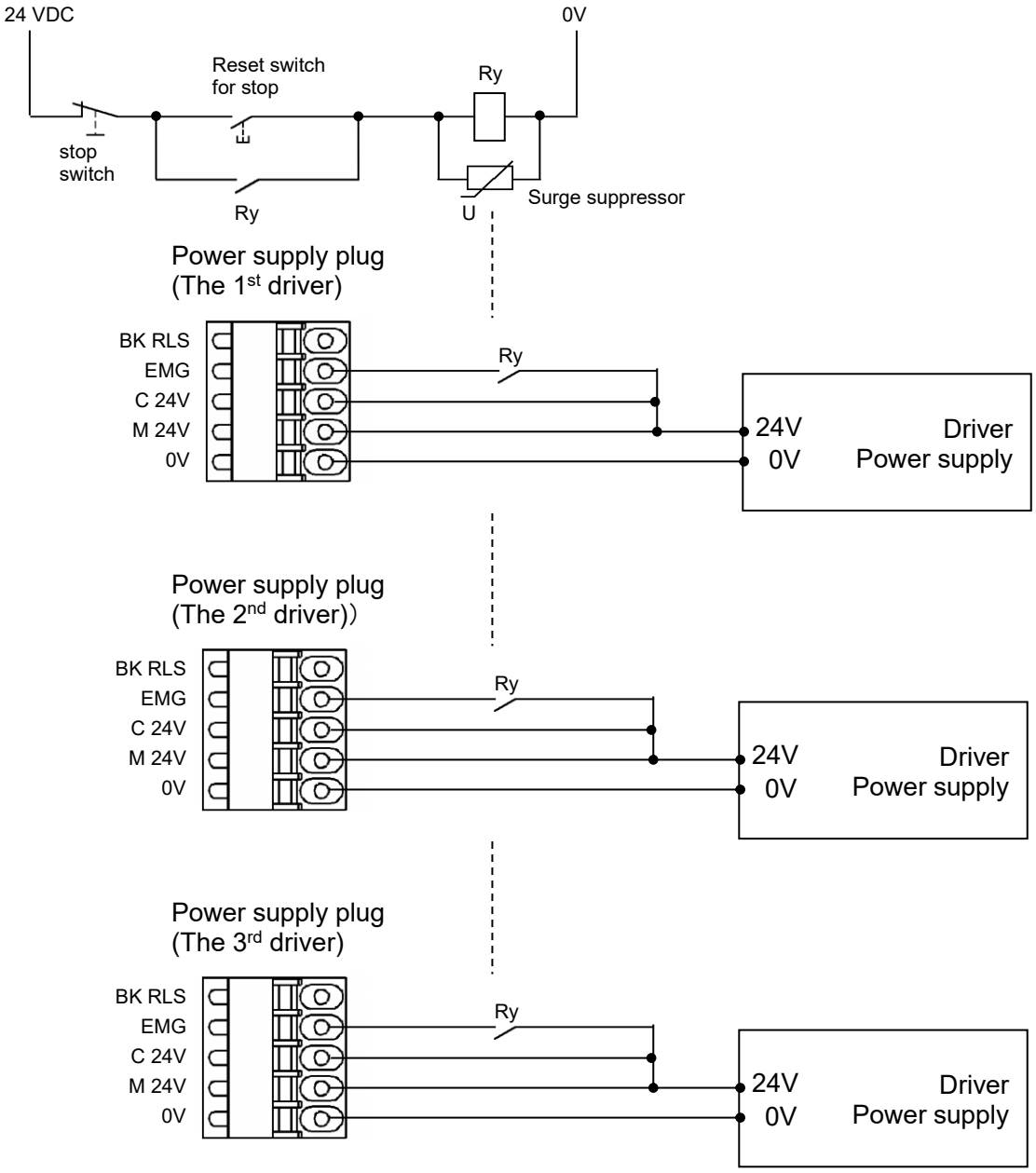
⚠ Warning

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

(2) Example circuit 2（Stop relay contact(1)）

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

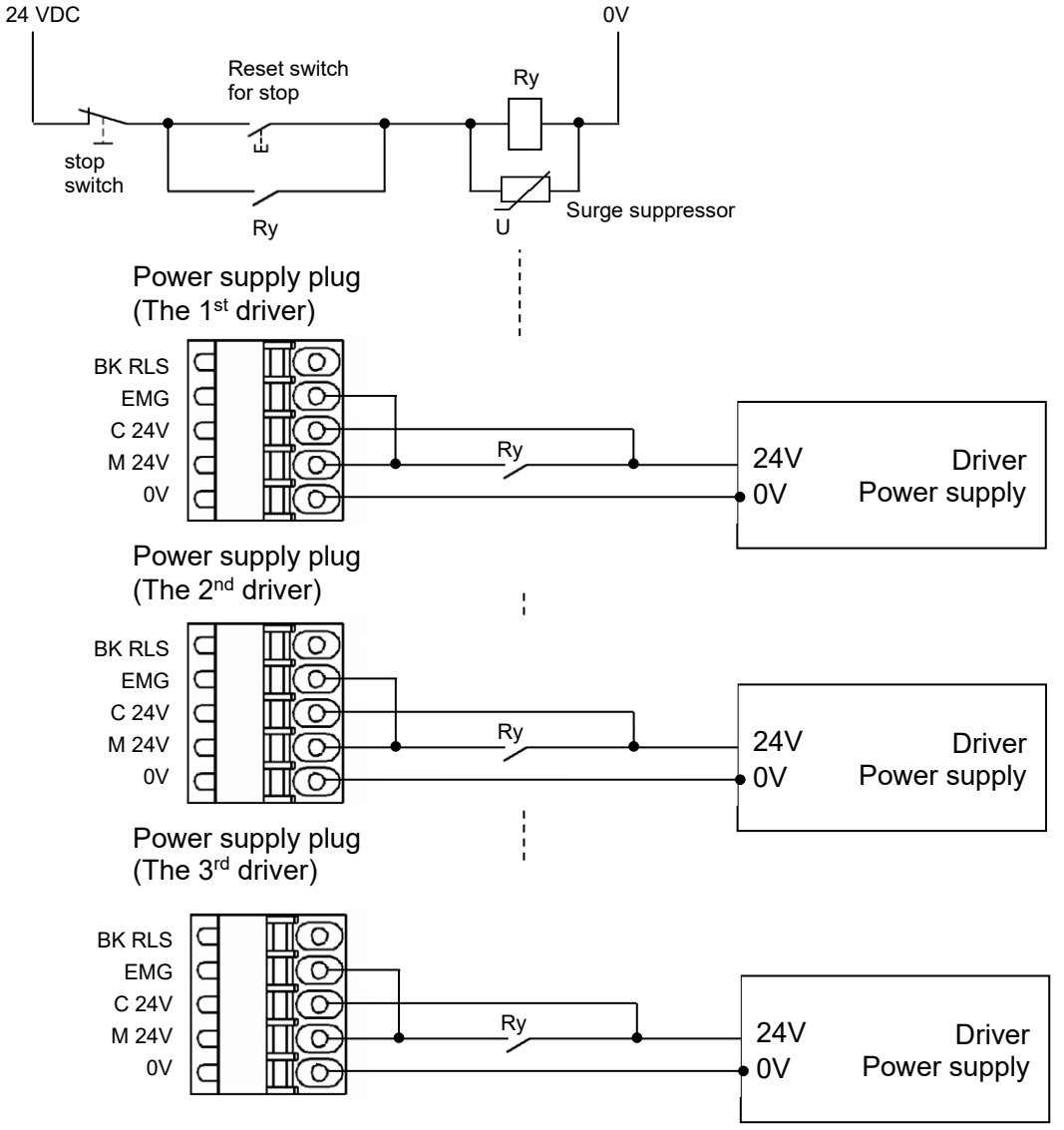
(Circuit example: The figure below shows the stopped state.)



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

(3) Example circuit 3 Motor power shutdown(Stop relay contact(2))

If there is a necessity to have circuit to shut down the motor power externally, relay contacts should be made between the 24 VDC driver power supply and the M24V 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 driver power supply and the M24V 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 (M24V) is disconnected. The driver cannot recognize the correct origin point if a return to origin instruction is made with the motor drive power (M24V) 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 (M24V), 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 RLS terminal when there is a necessity to shut down the motor drive power (M24V) externally.

Because the BK RLS terminal is connected with M24V in the driver, 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.

6. CN5: Parallel I/O Connector

6.1 Parallel I/O specifications

● **Input specifications**
(NPN,PNP common,pulse signal input terminal is excluded.)

No.	Item	Specification
1	Input circuit	Internal circuit and photo coupler isolation
2	Number of inputs	5 inputs
3	Voltage	24VDC +/- 10%
4	Input current when ON	2.4mA+/-20% (at 24VDC)
5	Input current at OFF	Current 1.5mA or less Voltage 11V or less

● **Output specification**
(NPN and PNP common)

No.	Item	Specification
1	Output circuit	Internal circuit and photo coupler isolation
2	Number of outputs	9 outputs
3	Max. voltage between terminal	30VDC
4	Max. output current	10mA
5	Saturation voltage	4.0V (Max.)

6.2 Parallel I/O type (NPN/PNP type)

There are two types of parallel I/O for this driver: NPN type(LECPAN□□-□) and PNP type(LECPAP□□-□).

(1) Parallel I/O input circuit (same for both NPN and PNP type)

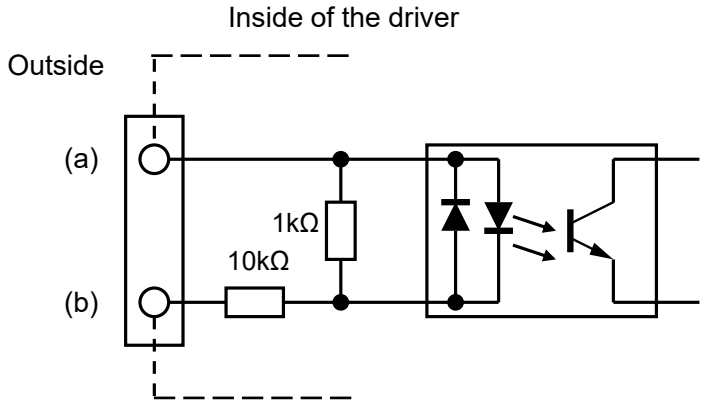
NPN and PNP common

●NPN type (LECPAN□-□)

(a)	COM+〈1〉
(b)	SETUP<7> to TL<11>

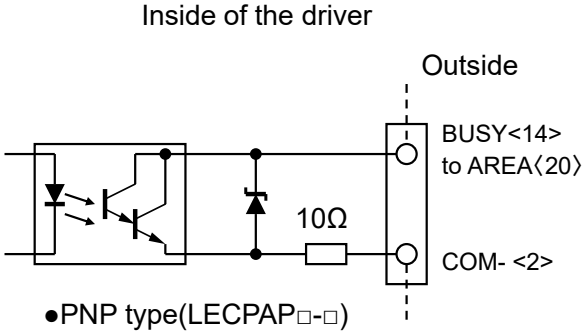
●PNP type (LECPAP□-□)

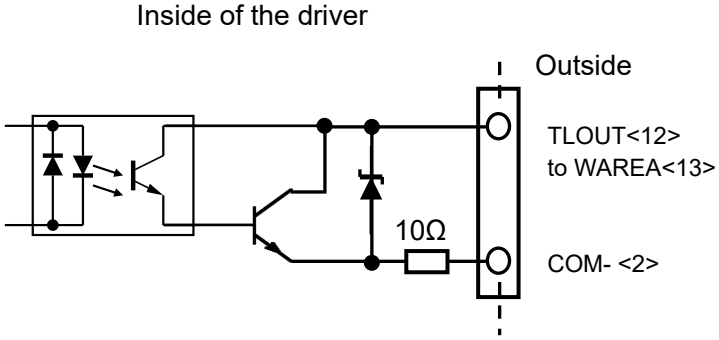
(a)	COM-〈2〉
(b)	SETUP<7> to TL<11>



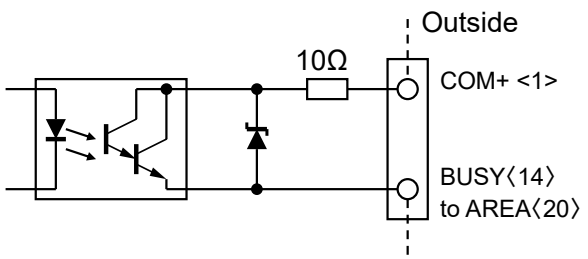
(2) Parallel I/O output circuit

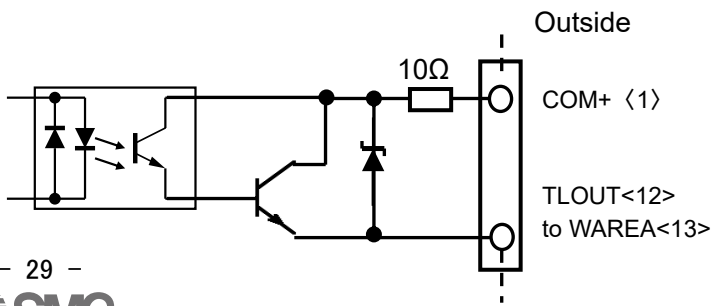
●NPN type(LECPAN□-□)





●PNP type(LECPAP□-□)

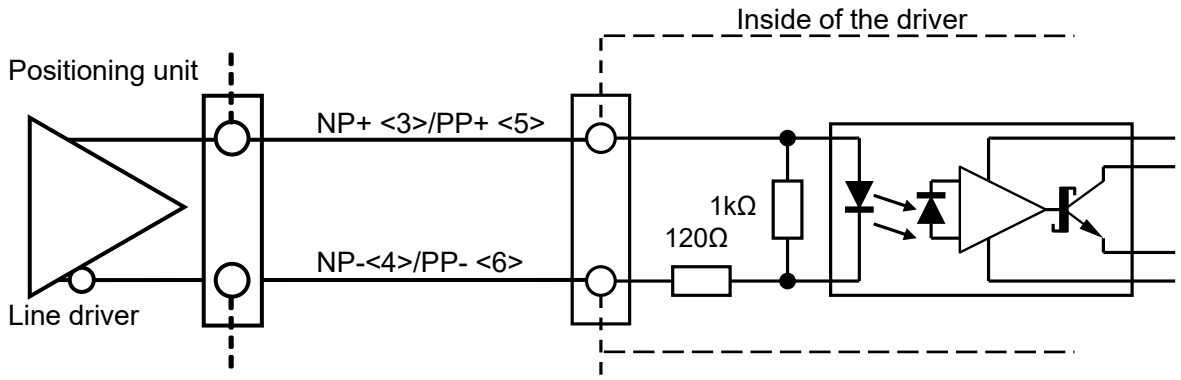




(3) Pulse signal input circuit

1) Differential input

Connect the differential output terminal of the positioning unit directly to the NP+/NP- terminal and the PP+/PP- terminal.



⚠ Caution
For differential input, connect the positioning unit using the line driver which is equivalent to DS26C31T.

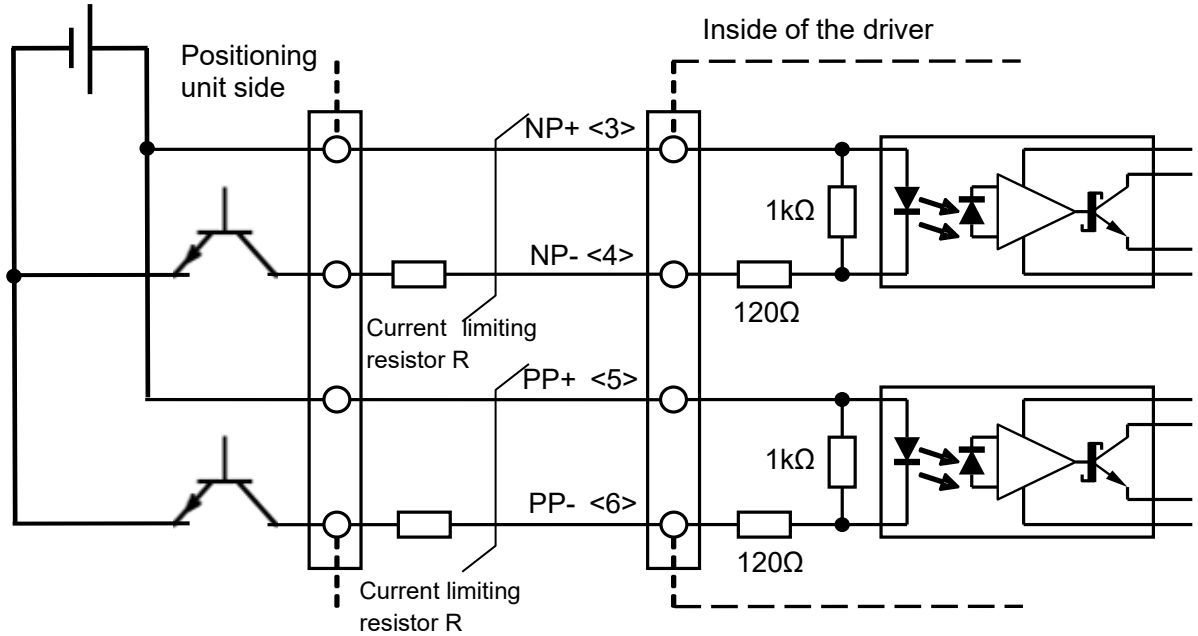
2) Open collector input

Connect the current limiting resistor R which is corresponding the pulse signal voltage in series.

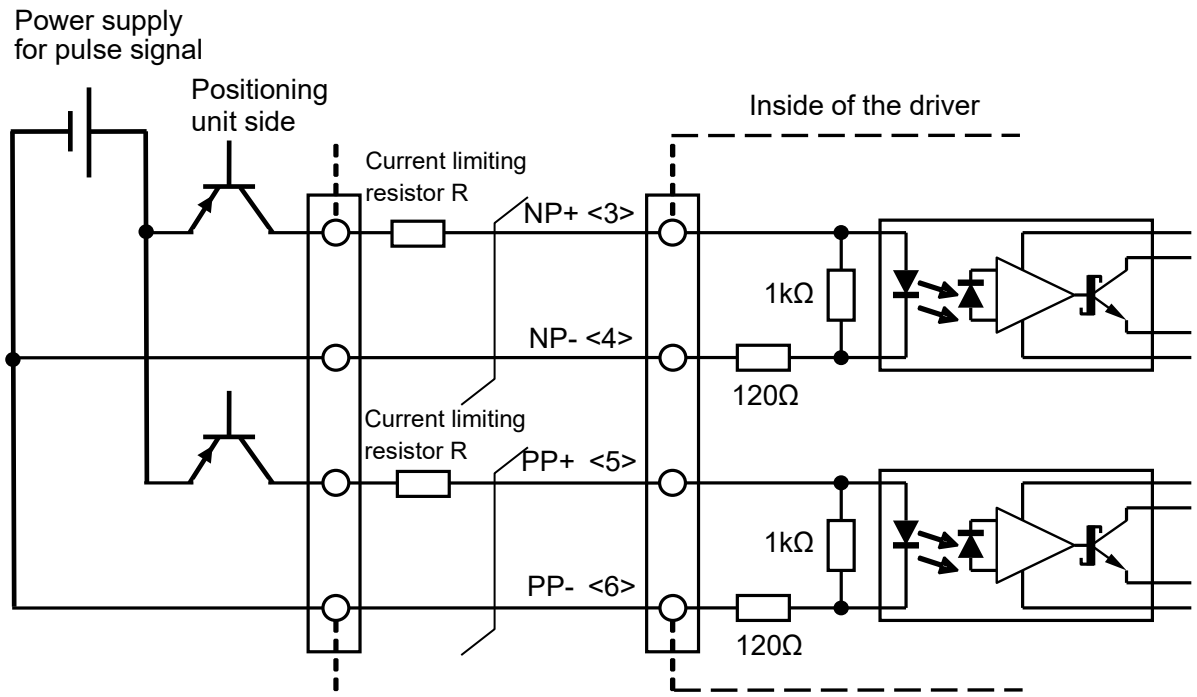
Power supply voltage for pulse signal	Current limiting resistor R type	Power supply current limiting resistor
24V DC ±10%	3.3kΩ ±5% (0.5W or more)	LEC-PA-R-332
5 VDC ±5%	390Ω ±5% (0.1W or more)	LEC-PA-R-391

● NPN type (LECPAN□-□)

Power supply for pulse signal



● PNP type (LECPAP□-□)



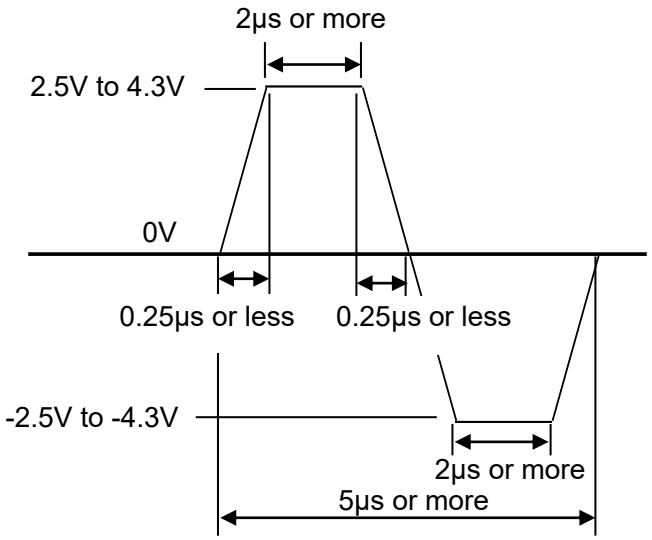
⚠ Caution

Be sure to install a current-limiting resistor R according to the pulse-train signal voltage.
Without the current-limiting resistor R, an overcurrent may damage the circuit.

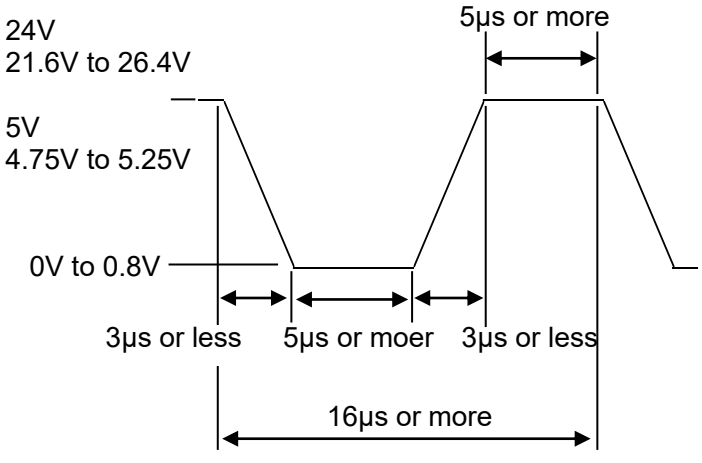
3) Pulse-input signal specification

Use a positioning unit that is compatible with the following input signal specification.

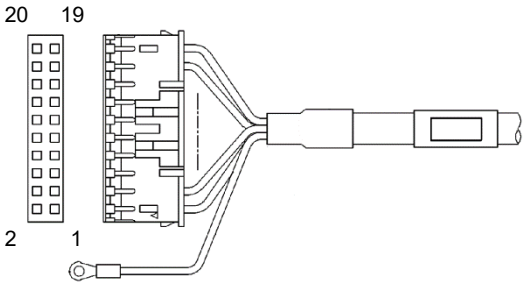
Differential input



Open collector input



6.3 The parallel I/O signal is detailed



Connected to the cable shield Be sure to provide grounding.

Pin No.	Color of insulation	Dot mark	Dot color	Category	Terminal
1	Light brown	■	Black	24V	COM+
2	Light brown	■	Red	0V	COM-
3	Yellow	■	Black	Pulse signal	NP+
4	Yellow	■	Red	Pulse signal	NP-
5	Light green	■	Black	Pulse signal	PP+
6	Light green	■	Red	Pulse signal	PP-
7	Grey	■	Black	Input	SETUP
8	Grey	■	Red	Input	RESET
9	White	■	Black	Input	SVON
10	White	■	Red	Input	CLR
11	Light brown	■■	Black	Input	TL
12	Light brown	■■	Red	Output	TLOUT
13	Yellow	■■	Black	Output	WAREA
14	Yellow	■■	Red	Output	BUSY
15	Light green	■■	Black	Output	SETON
16	Light green	■■	Red	Output	INP
17	Grey	■■	Black	Output	SVRE
18	Grey	■■	Red	Output	*ESTOP
19	White	■■	Black	Output	*ALARM
20	White	■■	Red	Output	AREA

A dot mark in a specific colour is printed on each cable.

- Input terminal-

No.	Function	Description
1	COM+	The terminal for the 24V of the 24 VDC I/O signal power.
2	COM-	The terminal for the 0V of the 24 VDC I/O signal power.
3	NP+	Assignment of the function depends on the parameter which determines the method for inputting the pulse signal (Basic parameter “Option1”) Refer to **“7.2 Basic parameter (page 33)”**for details. Function / 2 pulse mode / 1 pulse mode PP+/PP- / Normal (CW) or reversed (CCW) pulse. / Pulse NP+/NP- / Reverse (CCW) or normal (CW) pulse. / Direction For 2 pulse type, PP is for normal rotation (CW), and NP is for reversed rotation (CCW) as initial setting.
4	NP-	
5	PP+	
6	PP-	
7	SETUP	Command to Return to origin. Returning to home position starts when turned on while the servo is ON.
8	RESET	Resets alarm. Alarm output is OFF when RESET is ON while alarm is generated.
9	SVON	Specify the servo ON.When SVON is ON, the servo motor will be turned ON. When this is OFF, the servo motor will be turned OFF. *1)
10	CLR	Deviation reset signal.Signal to reset the difference between the movement commanded by the pulse signal and the actual movement. ⚠ Cation 1. Clear the deviation counter when CLR is turned ON from OFF. (Recognized by the edge) 2. The electric actuator does not operate when the pulse is input while CLR is ON.
11	TL	Signal to switch to pushing operation. When TL is ON, it becomes pushing operation

*1) 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.

Valid condition of parallel I/O (ON: Only ON is recognized, OFF: Only OFF is recognized, ON/OFF: Recognized regardless of ON or OFF)

Input signal with Reception condition	Reception condition					
	SETON output	SVRE output	BUSY output	Returning to home position	CLR input	RESET input
Pulse signal (PP, NP)	ON/OFF	ON	ON/OFF	Other than during operation	OFF	ON/OFF
SETUP					ON/OFF	OFF
TL					ON/OFF	ON/OFF

-Output terminal-

No.	Function	Description
12	TLOUT	Turns ON during pushing operation. However, the TLOUT output is turned OFF in the following condition. 1. Alarm generated 2. Return to origin instruction 3. Servo is OFF (SVRE output is OFF)
13	WAREA	When the electric actuator is within the output range between "W-AREA1 and W-AREA2" of basic parameter, this terminal will be turned ON. Note that when the SETON output is OFF, the WAREA signal will also be OFF.
14	BUSY	This terminal is ON during positioning and the electric actuator operation.
15	SETON	When the electric actuator position information is established after returning to home position, this terminal is turned ON. However, the SETON output is turned OFF in the following condition. 1. Servo is OFF (SVRE output is OFF) 2. Alarm generated 3. CLR input is ON (including the return-to-origin operation, after TLOUT ON during pushing operation) 4. When it is in the condition above following the test operation from the controller setting kit/teaching box, the pulse instruction signal from a PLC (such as the positioning unit) differs from the positioning information inside the driver. This turns the SETON output OFF.
16	INP	Because of the electric actuator action, if INP signal is ON, the electric actuator condition can vary. 1. Return to origin The output signal INP turns ON when the electric actuator operation stops (BUSY output is OFF) and the position is within the range of the origin position ±basic parameter “initial positioning range”. 2. During positioning operation If pulse signal is not input for 10ms or longer, INP signal is ON when the difference becomes smaller than the step data No.0 "positioning width". 3. During pushing operation Turns on when the pushing force exceeds the value set in the step data No.0. **⚠Caution** If "positioning width" of the step data No.0 is too large during slow movement of the electric actuator, INP signal may be ON even if the positioning of the electric actuator is not completed.
17	SVRE	When the servo motor is ON, SVRE is ON. When the servo motor is OFF, SVRE is OFF. *1)
18	*ESTOP *2)	ESTOP is ON during normal operation. During activation of Teaching Box stop switch or by the stop command, this terminal is OFF.
19	*ALARM *2)	When there are no alarms, this terminal is ON. When there are alarms, this is OFF.
20	AREA	When the electric actuator is within the output range between Area1 and Area2 in the step data No.0, this terminal will be turned ON. Note that when the SETON output is OFF, the AREA signal will also be OFF.

*1) It maybe takes about ten seconds from turning on SVON to SVRE turned on when after the power supply.

*2) The “ALARM” and “ESTOP” become the negative-true logic output.

The change of output signal under the condition of the driver.

State \ Output signal	BUSY	INP	SVRE	Lock	SETON
Servo OFF status at stop after power supply	OFF	OFF	OFF	Lock	OFF
Servo ON status at stop after power supply	OFF	ON	ON	Release	OFF
During returning to origin,	ON	OFF	ON	Release	OFF*2)
The electric actuator is at the origin. On completion of [SETUP]	OFF	ON*1)	ON	Release	ON
During movement by positioning after returning to home position.	ON	OFF	ON	Release	ON
Stopping for pushing after returning to origin. (Holding)	OFF	ON	ON	Release	ON
Stopped due to no detection of work-load during pushing operation after returning to origin.	OFF	OFF	ON	Release	ON
Positioning after returning to home position is completed (within positioning range).	OFF	ON	ON	Release	ON
Servo is OFF after returning to home position. off.	OFF	OFF	OFF	Lock	OFF
Stopped due to EMG signal after returning to home position.	OFF	OFF	OFF	Lock	OFF

*1) The output turns on when the electric actuator is within the range defined in the basic parameter setup.

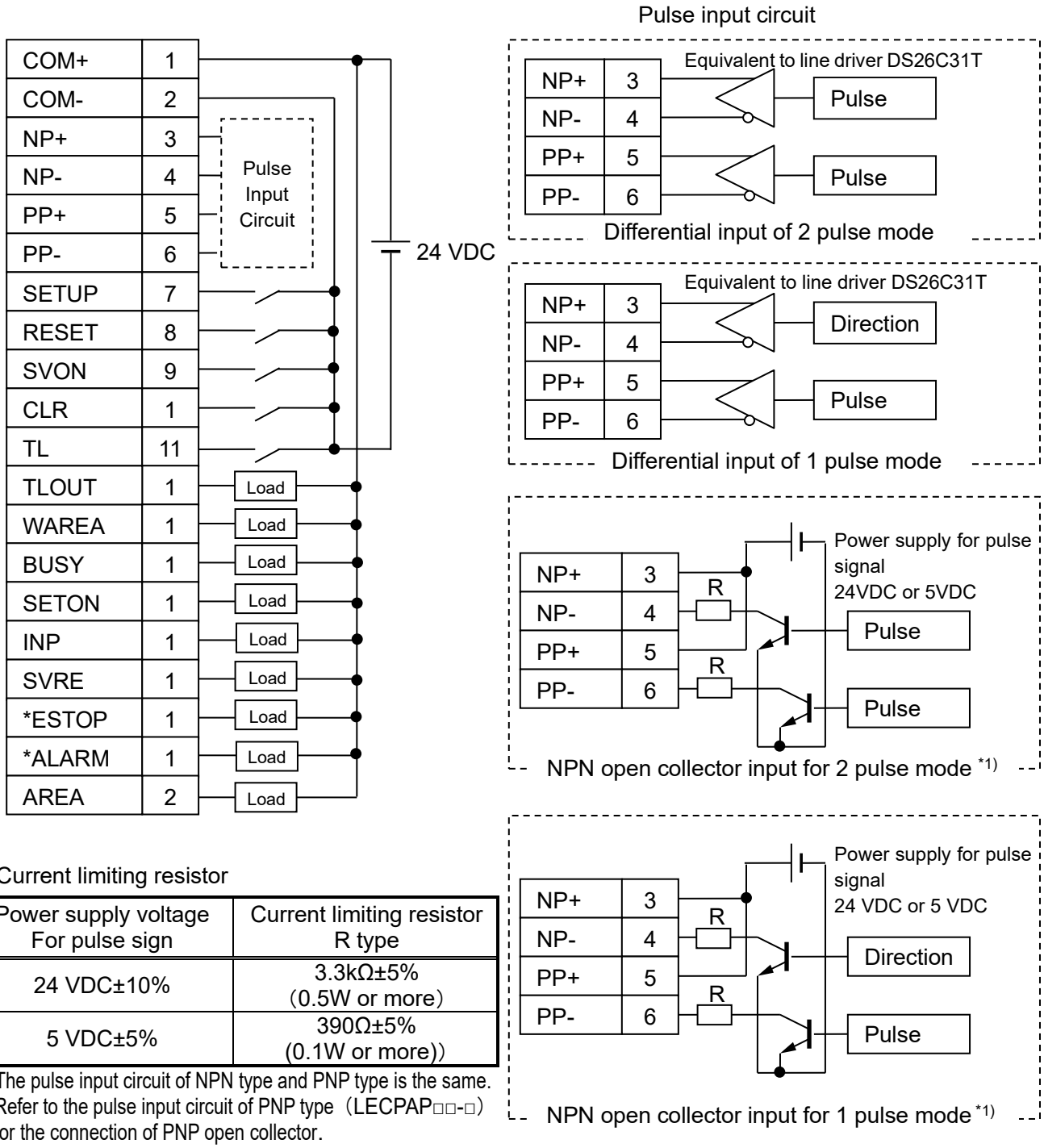
*2) When return to origin is performed while the SETON is turned ON, the SETON signal will remain ON.

6.4 Parallel I/O Wiring Example

When you connect a PLC, etc. to the CN5 parallel I/O connector, please use the I/O cable.

Wiring depends on the driver parallel input/output (NPN, PNP) and input pulse mode.

● **NPN type（LECPAN□□-□）**

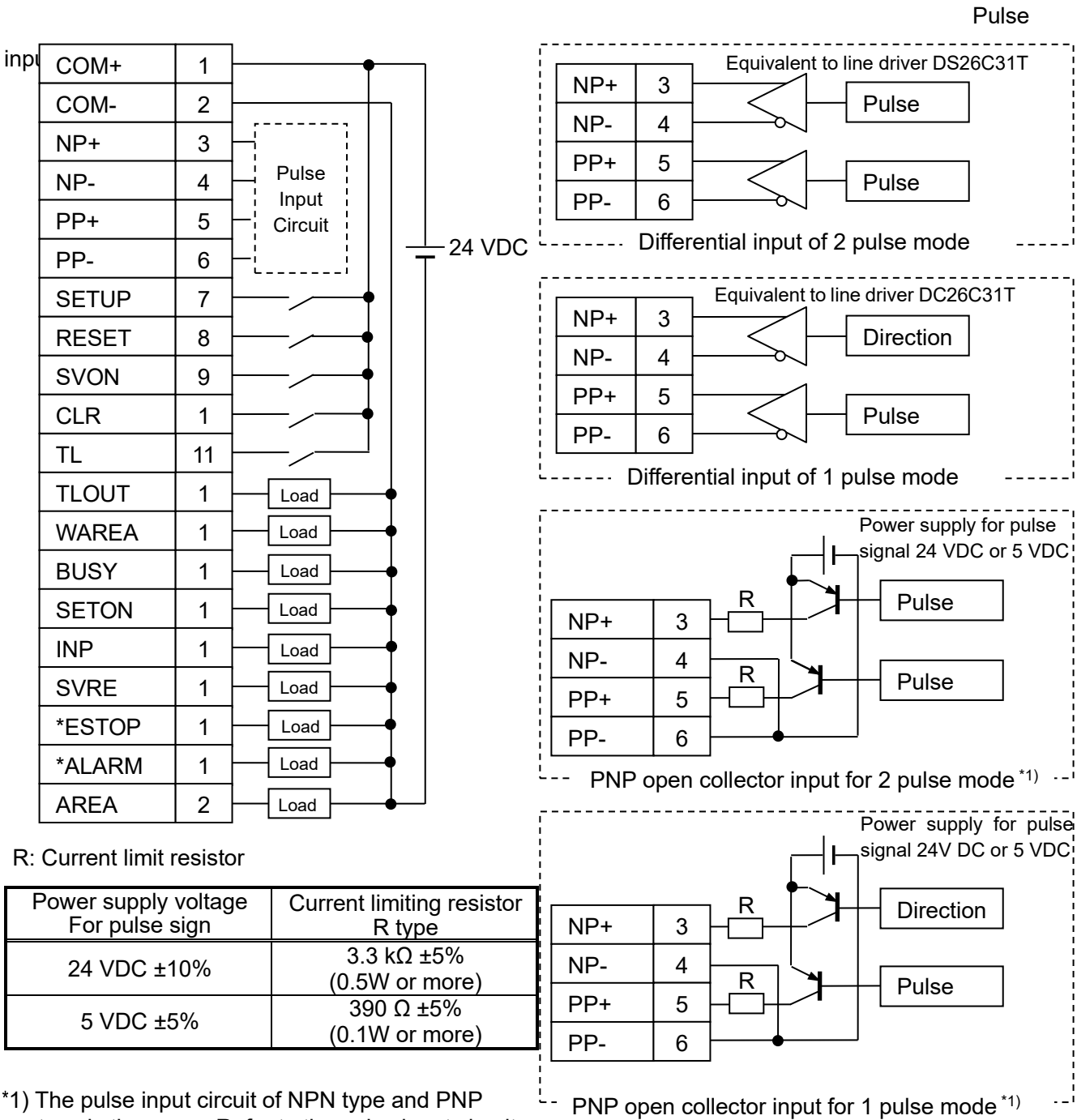


R: Current limiting resistor

Power supply voltage For pulse sign	Current limiting resistor R type
24 VDC±10%	3.3kΩ±5% （0.5W or more）
5 VDC±5%	390Ω±5% (0.1W or more))

*1) The pulse input circuit of NPN type and PNP type is the same. Refer to the pulse input circuit of PNP type（LECPAP□□-□） for the connection of PNP open collector.

● **PNP type（LECPAP□□-□）**



R: Current limit resistor

Power supply voltage For pulse sign	Current limiting resistor R type
24 VDC ±10%	3.3 kΩ ±5% (0.5W or more)
5 VDC ±5%	390 Ω ±5% (0.1W or more)

*1) The pulse input circuit of NPN type and PNP type is the same. Refer to the pulse input circuit of NPN type (LECPAN□□-□) for the connection of NPN open collector.

⚠Caution

For open collector input, connect current limiting resistor.
Refer to **"6.2(3) Pulse signal input circuit)"**.
The current limiting resistance should be prepared by a customer.
TL and TLOUT are available for driver's which version is V1.60 or more.
Do not use these terminals, if the driver version is earlier than V1.60.

7. Setting Data Entry

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 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 driver, 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.

7.1 Step data

Step data describes the data that sets items of operation (such as positioning width) excluding speed, position, acceleration, and deceleration, which are determined by the pulse-signal input. Step data will become effective as soon as it is recorded into the driver.

Each data is set by step data No.0. “Pushing force” *1), “Trigger LV” *1), “Pushing speed” *1), “Mvoving force”, “Area 1”, “Area 2” and, In position can be set”. Do not change the set value of other items.

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

No.	Move	Speed mm/s	Position mm	Accel mm/s²	Decel mm/s²	PushingF %	TriggerLV %	PushingSp mm/s	Moving F %	Area1 mm	Area2 mm	In posn mm
0	Fixed value	Fixed value	Fixed value	Fixed value	Fixed value	60	50	30	100	18.00	22.50	0.5
1	-	-	-	-	-	-	-	-	-	-	-	-
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
63	-	-	-	-	-	-	-	-	-	-	-	-

*1) Available only for driver's version V1.60 or more. Do not change the default value of these parameters, if the driver version is less than V1.60. Refer to **“Appendix 1. Default setting value per the electric actuator”**.

⚠ Caution

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

Details of step data

Refer to **"Appendix 1. Default setting value per the electric actuator"**

Setting name	Range	Description
No.	0 to 63	Number of the step data.
Movement MOD	3 options (Blank, Absolute, Relative)	Not used in this product. (Select Absolute or Relative. An alarm will be generated if this is blank.)
Speed	Minimum value *1) to "Max speed" of the basic parameter	Not used in this product. These should not be changed.
Position	Stroke (-)" to "Stroke (+)" of the basic parameter	
Acceleration	1 to "Max ACC/DEC" of the basic parameter	
Deceleration	1 to "Max ACC/DEC" of the basic parameter	
Pushing force	0 to "maximum pushing force" of the basic parameter	The maximum force for the pushing operatio. Please refer to the electric actuator manual for the appropriate range of the speed. When the "pushing force = 0," an alarm will sound.
Trigger LV	Minimum value to "maximum pushing force" of the basic parameter Note 1)	A condition where INP output signal during pushing operation is ON. When the electric actuator generates a force above this value during a pushing operation, INP will turn ON. Please refer to the electric actuator manual for the appropriate range of the speed.
Pushing speed	*1)	This sets the upper limit of the pushing speed during a pushing operation. Please refer to the electric actuator manual for the appropriate speed range.
Moving force	*1)	The setting to define the maximum torque during the positioning operation. [Unit: %] Enter a value within the range appropriate for the electric actuator.
Area1	"Stroke (-)" of the basic parameter to "area 2" of the step data	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).
Area2	"Area 1" of the step data to "stroke (+)" of the basic parameter	
In position	*1)	This is the setting to define the conditions where the INP will be turned ON. INP output is ON when the deviation to the pulse signal from PLC is within the positioning range while pulse signal is not input. If the set value is too small, INP signal is ON during operation. *2)

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

*2) Use this set value as the initial value.
If this is set to a value smaller than the initial setting, the INP output may chatter during positioning recovery upon reaching the target position.

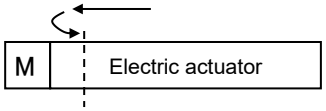
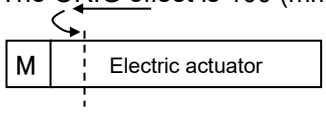
7.2 Basic parameter

The basic parameter is the data defining the driver operating conditions, the electric actuator condition, and other conditions.

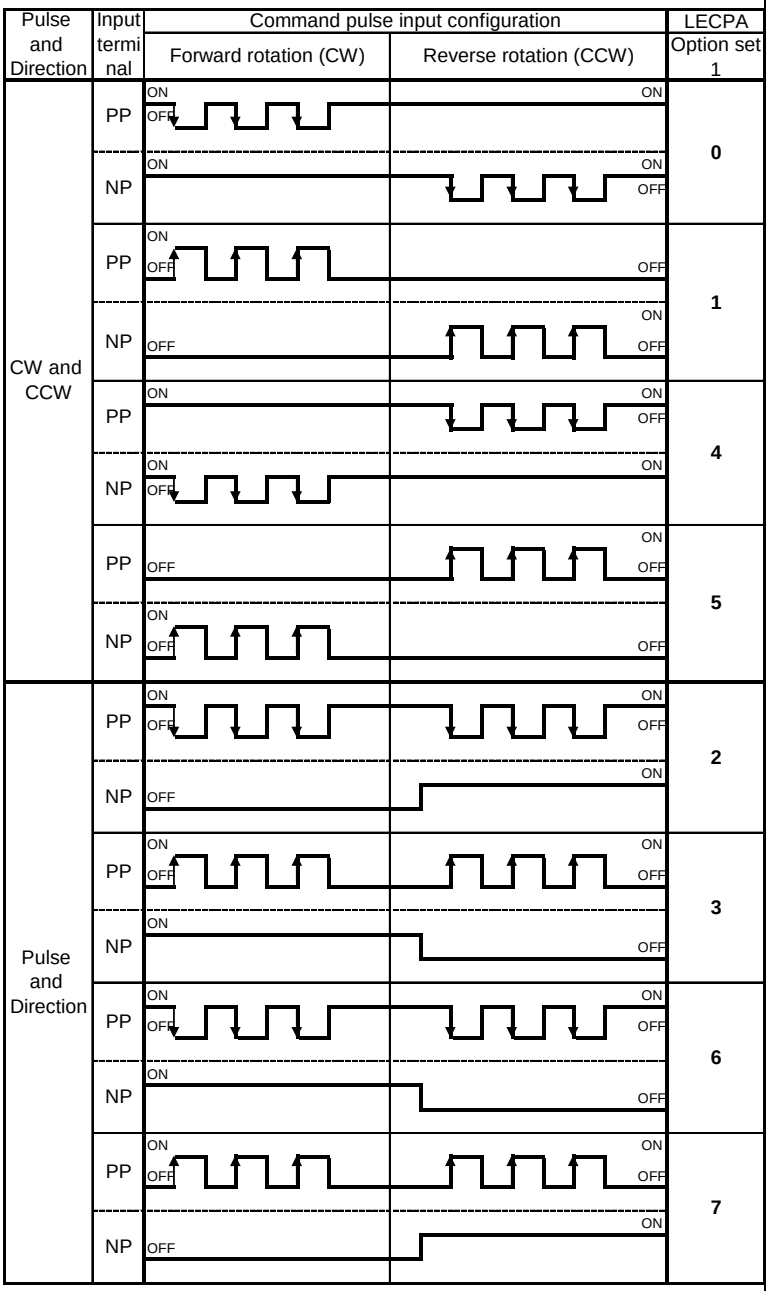
(1) Details of basic parameter

Activation:"XX" = Become effective just after recorded into the driver
"X" = Become effective after restarting the driver
"-" = The parameter cannot be changed (fixed value)

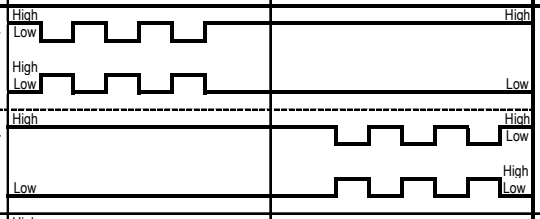
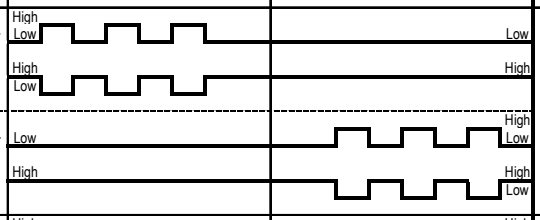
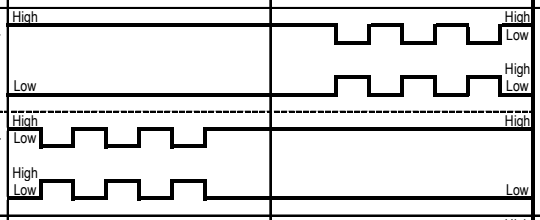
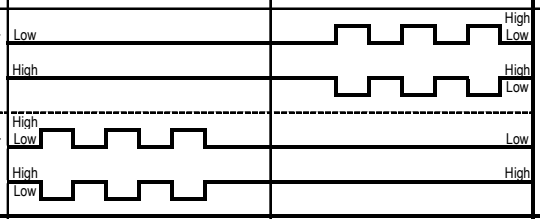
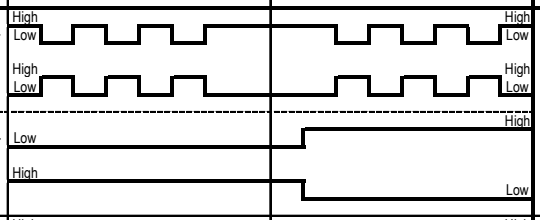
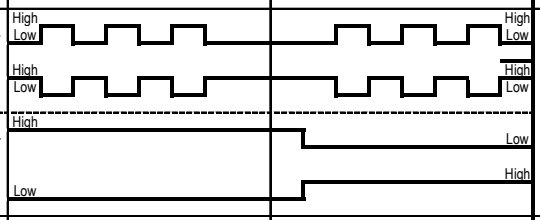
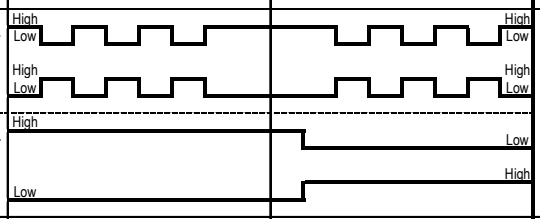
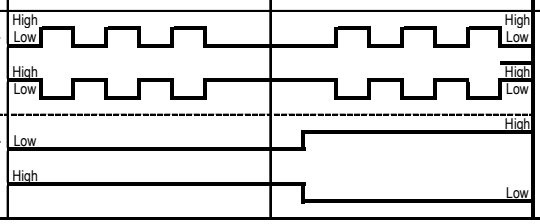
Refer to **"Appendix 1. Default setting value per the electric actuator "**

Parameter name	Range	Description	Acti-vation
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 driver(It should not be changed).	—
ACC/ DEC pattern	Fixed value		—
S-motion rate	Fixed value		—
Stroke (+)	*1)	This defines the positive (+) side limit of the position. (Unit: mm)	XX
Stroke (-)	*1)	This defines the negative (-) side limit of the position. (Unit: mm)	XX
Max speed	*1)	This defines the maximum limit of the speed (Unit: mm/s). It should not be changed.	-
Max ACC/DEC	*1)	This defines the maximum limit of the ACC/DEC (Unit: mm/s^2). It should not be changed.	-
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
ORIG offset	*1)	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 driver after the return to the origin operation (0mm). ● The ORIG offset is 100 (mm)  The position is identified by the driver 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 driver 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.	XX
Max force	*1)	The maximum force for the pushing operation (Unit: %).	XX

<table>
<tr><td>Para protect</td><td>1 to 2</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</td><td>Basic parameter + Return to origin parameter + Step data</td></tr><tr><td>2</td><td>Basic parameter + Return to origin parameter</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 driver. (It should not be changed)</td><td>—</td></tr>
<tr><td>W-AREA1</td><td>“Stroke(-)”to “Stroke (+)” of the basic parameter</td><td rowspan="2">The setting to define the conditions where the WAREA output will be turned ON (Unit: mm)
If the current position is within the range between the W-AREA1 and W-AREA2, the WAREA output will be turned ON.
If W-AREA1 >W-AREA2, the alarm “Parameter ALM” will be activated.(However,no alarm is generated if “W-AREA1”= W-“AREA2”= 0, the WAREA output will be turned OFF)</td><td>XX</td></tr>
<tr><td>W-AREA2</td><td>“Stroke(-)”to “Stroke (+)” of the basic parameter</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 driver.
(It should not be changed)</td><td>—</td></tr>
<tr><td>Sensor type</td><td>—</td></tr>
</table>

Option set 1	0 to 7	Set the pulse input mode according to the table below so that it is compatible with the pulse output setting of the PLC (such as a positioning unit). If a value of 8 or higher is set, it is recognized as 0. Open collector input connection.  ON/OFF in the table above indicates ON/OFF of the photo coupler of the pulse input circuit of this driver. Please refer to **6.2 (3) Pulse signal input circuit** for details of pulse input circuit. In the open collector input, two of the pulse input terminals (PP+, PP-, NP+, NP-) are connected to Pulse and other two terminals are connected to Common. Which pulse input terminals (+ or -) should be connected to Pulse or Common depends on the master device. Therefore, + / - of input terminal is not indicated in the table above	X

Differential input connection

Pulse and Direction	Input terminal	Command pulse input configuration		LECPA Option s 1
		Forward rotation (CW)	Reverse rotation (CCW)	
CW and CCW	PP+ / PP- / NP+ / NP-			0
	PP+ / PP- / NP+ / NP-			1
	PP+ / PP- / NP+ / NP-			4
	PP+ / PP- / NP+ / NP-			5
Pulse and Direction	PP+ / PP- / NP+ / NP-			2
	PP+ / PP- / NP+ / NP-			3
	PP+ / PP- / NP+ / NP-			6
	PP+ / PP- / NP+ / NP-			7

The pulse input circuit of this driver is not a differential receiver. The photo coupler turns ON when the terminal on the + side turns High and the terminal on the - side turns Low. Please refer to **6.2 (3) Pulse signal input circuit** for details of pulse input circuit.

Undefined parameter No.11	1 to 4096	Define the ratio of electronic gear of pulse signal input. ・Undefined parameter 11 : "Electronic gear (numerator)"(Default: 1) ・Undefined parameter 12 : "Electronic gear (denominator)"(Default: 1) This product controls LE series motor (800 pulse per rotation). Please refer to the electric actuator manual for the appropriate range of the movement due to the rotation of the motor. <Example> (1) "Electronic gear (numerator): 1", "Electronic gear (denominator): 1" → Motor makes one turn when 800 pulses are input. (2) "Electronic gear (numerator): 2", "Electronic gear (denominator): 2" → Motor makes one turn when 1600 pulses are input. (3) "Electronic gear (numerator): 2", "Electronic gear (denominator): 1" → Motor makes one turn when 400 pulses are input. "Electronic gear (numerator): 1", "Electronic gear (denominator): 1" is recommended. If other values are selected, the vibration or noise of the electric actuator can result.	X
Undefined parameter No.12	1 to 4096		X

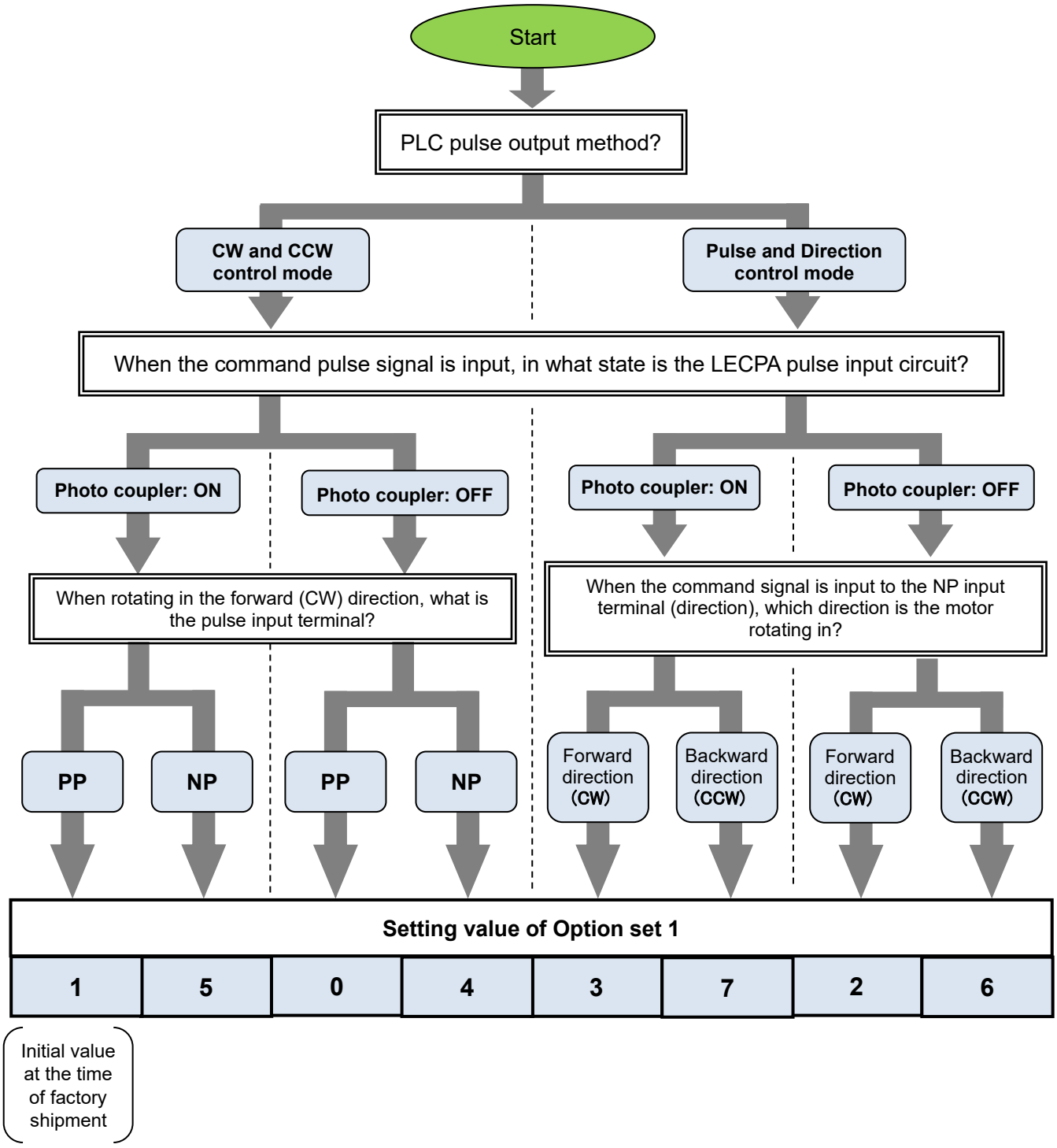
*1) The range varies depending on the electric actuator.Please refer to the manual of the electric actuator for more details.

(2) Setting "Options set 1"

Options set 1, the basic parameter, needs to be set so that it is compatible with the PLC pulse output.

Set Option set 1 by following the chart below.

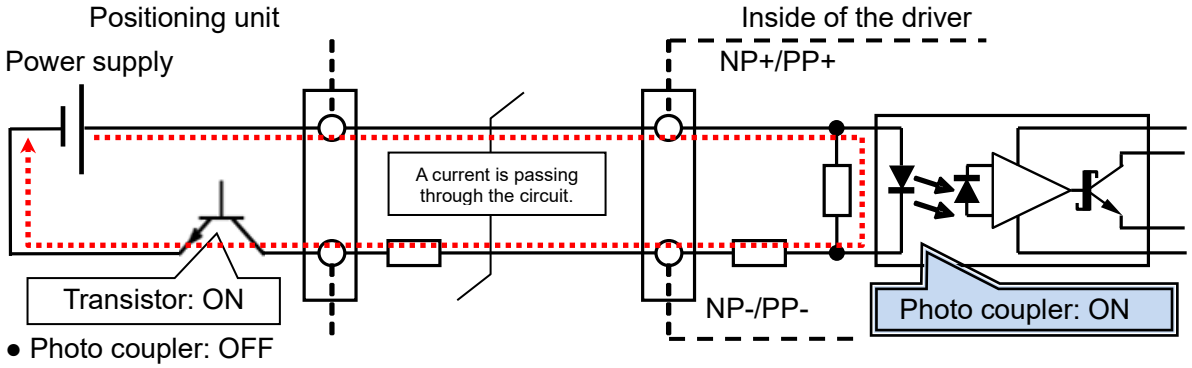
● Chart for open collector input connection



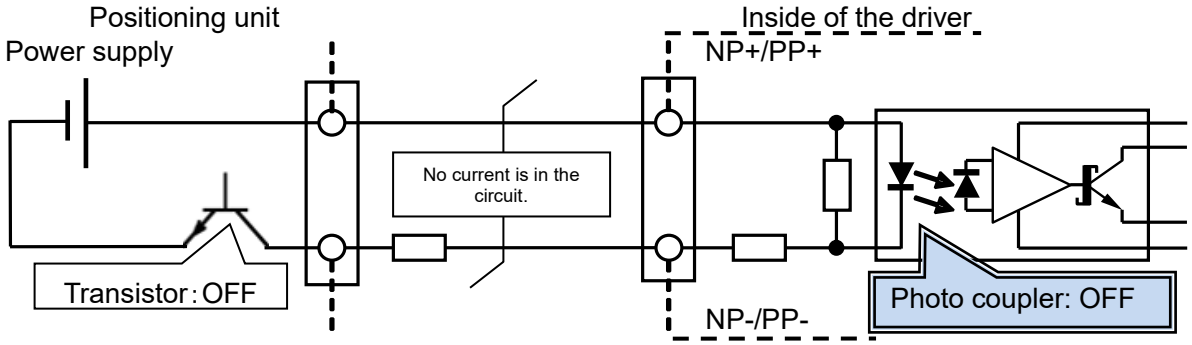
【About the photo coupler ON/OFF in the LECPA pulse input circuit during open corrector input connection】

1) NPN type

● Photo coupler: ON

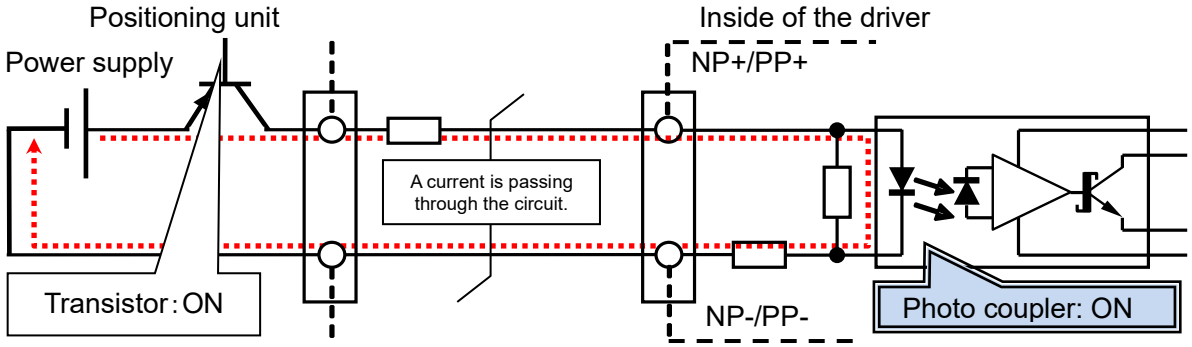


● Photo coupler: OFF

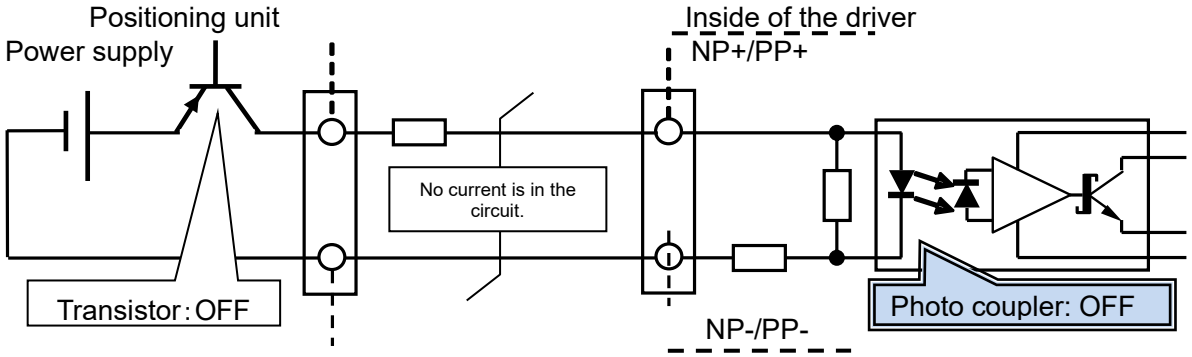


2) PNP type

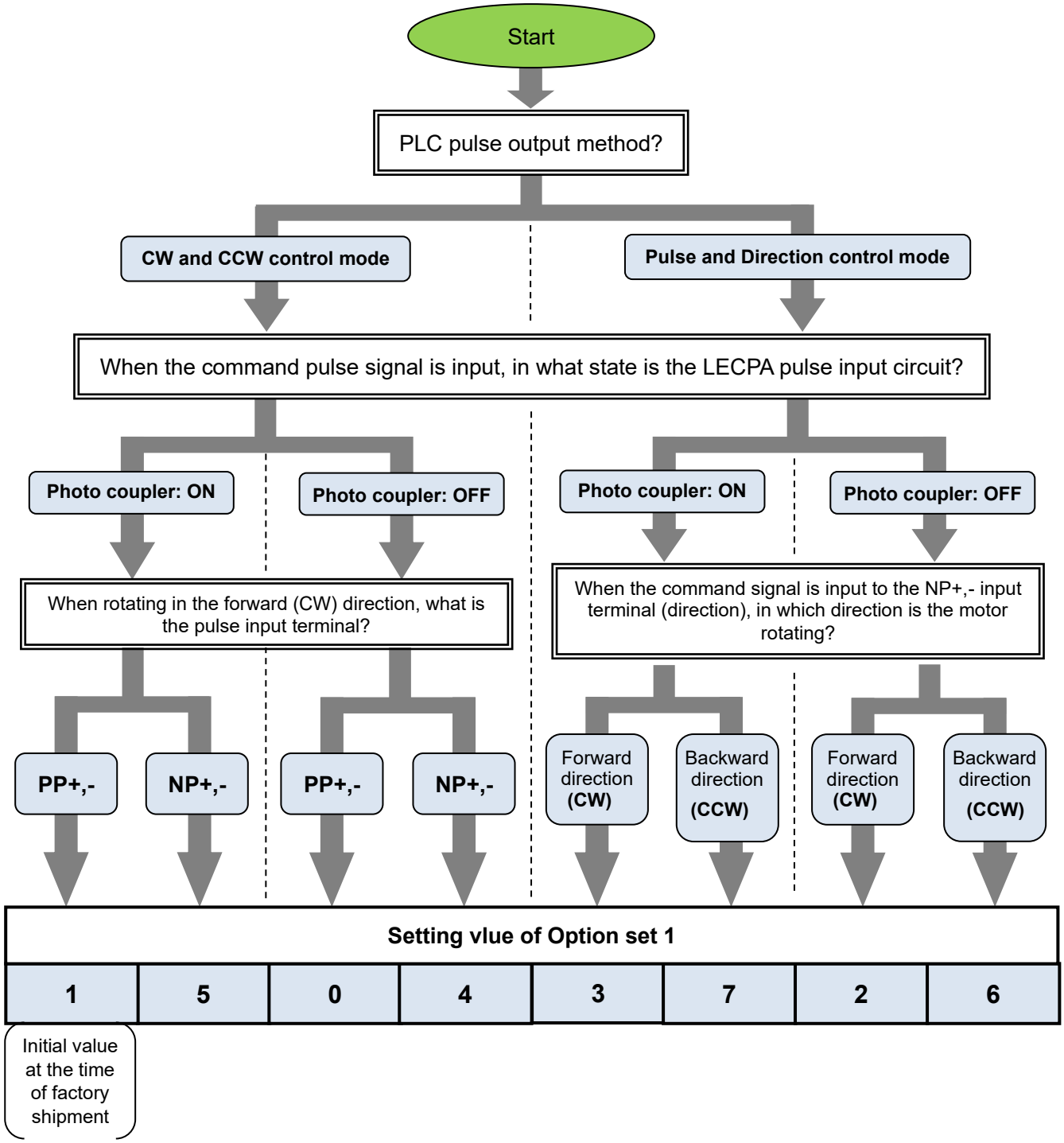
● Photo coupler: ON



● Photo coupler: OFF

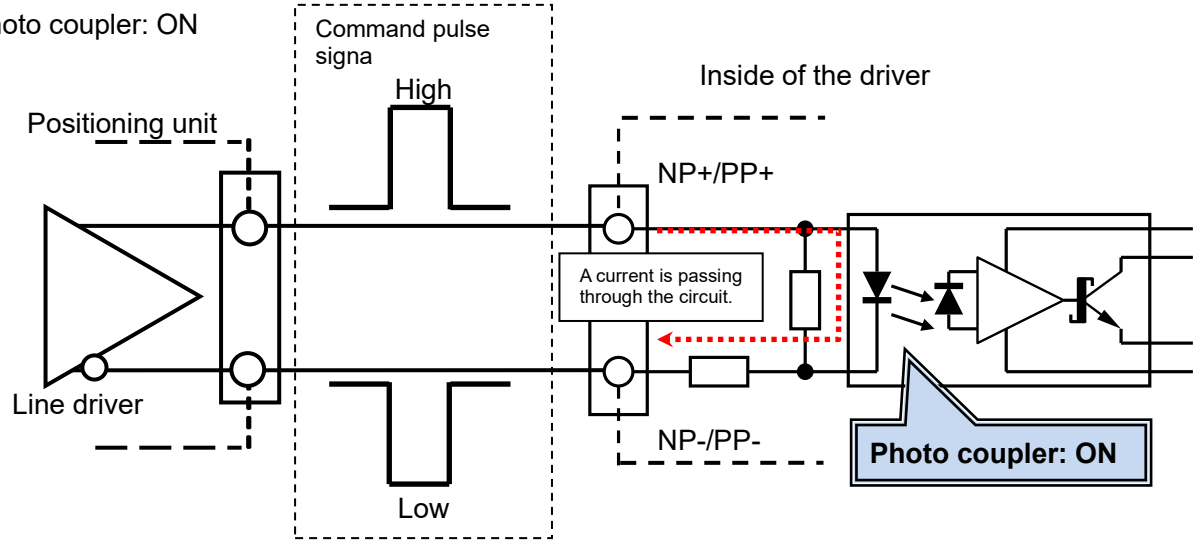


●Chart for differential input connection

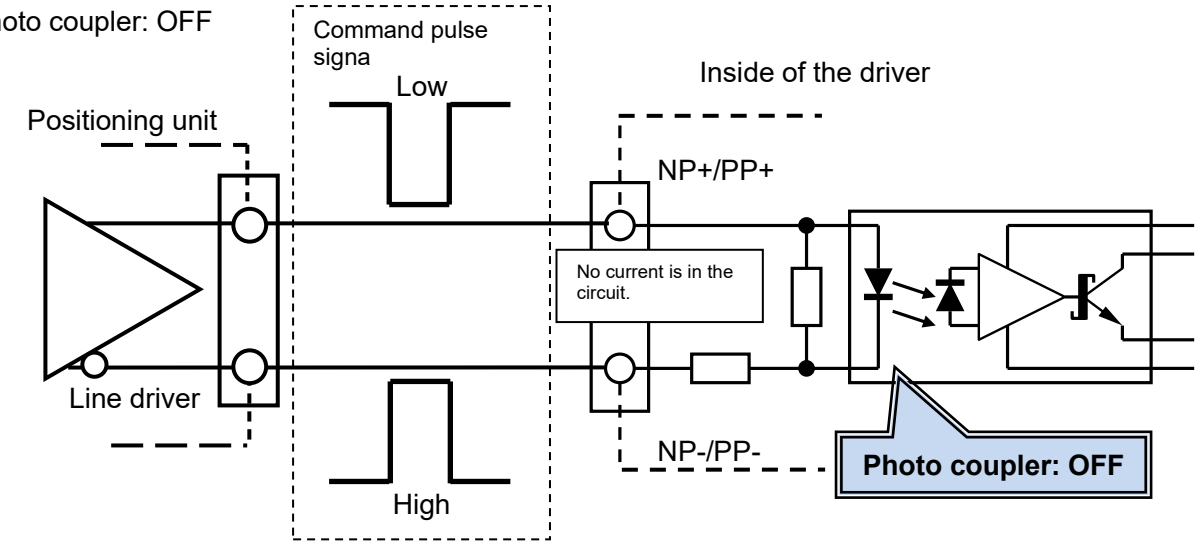


[About the photo coupler ON/OFF in the LECPA pulse input circuit during differential input connection]

● Photo coupler: ON



● Photo coupler: OFF



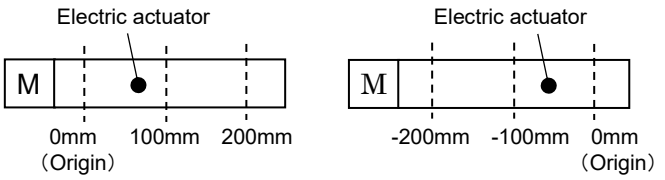
7.3 Return to origin parameter

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 driver,
“X” = Become effective after restarting the driver,
“-” = The parameter cannot be changed (fixed value).

Refer to **“Appendix1. Defalt setting value per actuator”**

<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 driver.
(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>XX</td></tr>
<tr><td>ORIG ACC/ DEC</td><td>*1)</td><td>The acceleration and deceleration during find origin.</td><td>XX</td></tr>
<tr><td>Creep speed</td><td>Fixed value</td><td>This is the fixed value for this driver.
(It should not be changed).</td><td>–</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.</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</td><td rowspan="2">Fixed value</td><td rowspan="2">This is the fixed value for this driver.
(it should not be changed)</td><td>–</td></tr>
<tr><td>Undefined No.21</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.

8. Operations explanation

8.1 Return to origin

After entering the setting data, it is necessary to perform a return to origin operation before starting the positioning or pushing operation. (To ensure the position of origin)
There are two types of return to origin operation.

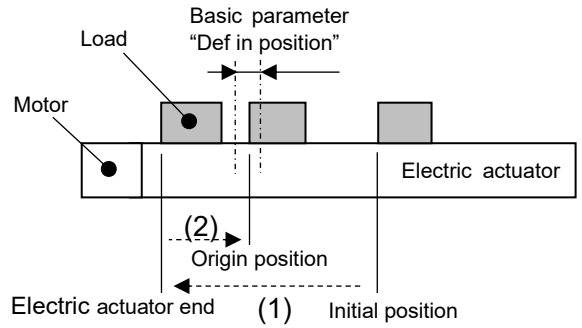
(1) Return to origin mode using LECPA SETUP signal

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: See (1) in the diagram below.

When the electric actuator reaches the end of travel limit it pauses for a short time. The driver 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: See (2) in the diagram below.

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.

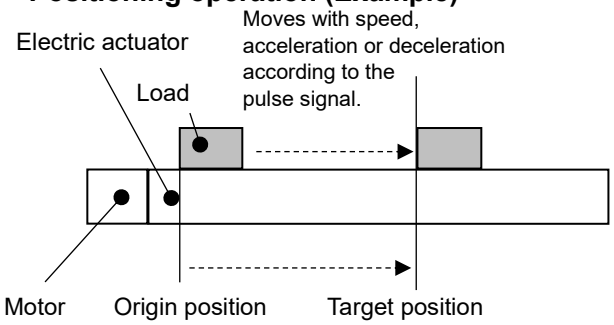
(2) Return-to-origin function of PLC (such as a positioning unit)

Refer to the PLC operation manual (such as a positioning unit). When using the return-to-origin function of the PLC (such as a positioning unit), the LECPA's SETON is always turned OFF.

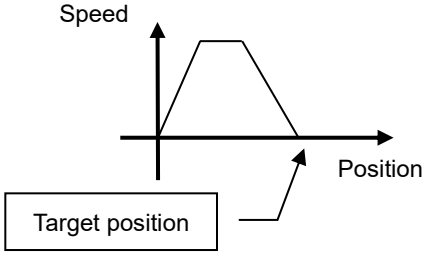
8.2 Positioning operation

Positioning according to the input pulse signal.

● **Positioning operation (Example)**



● **Positioning operation [Speed/ Position] (Example)**



⚠ Caution

The travel distance from the positioning unit, the speed and the command of acceleration/ deceleration shall not exceed the specifications of the electric actuator. Operation exceeding the specification leads to the generation of the alarm and malfunction.

8.3 Pushing operation

1. During operation at "Pushing speed" of Step Data No.0 or less, or the electric actuator is stopping.
2. TL input turns on

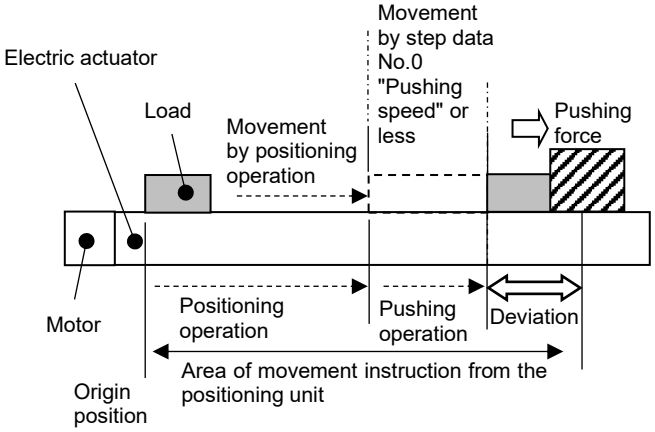
When above two conditions are satisfied, operation is switched to pushing operation (pushing force). The electric actuator pushes the load with the force no more than the maximum pushing force set in the “Pushing force” of the step data No.0. TLOUT is turned ON during pushing operation.

However, after switching to the pushing operation (TLOUT output is ON), the actuator operates at the "Pushing speed" set in Step Data No.0 even if pulse signals exceeding the "Pushing speed" of Step Data No.0 are input.

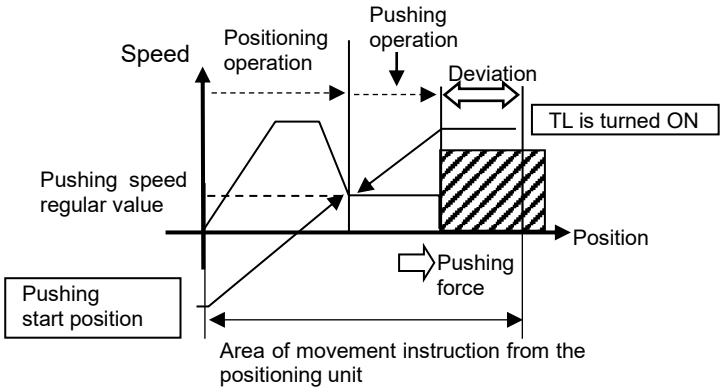
(1) Pushing operation is successfully performed

During the pushing operation, if the pushing force is kept higher than the value specified by “Trigger LV” of the step data No.0 for a certain time, the INP output will be turned ON. Set thrust continues to be generated even after the pushing is completed.

● Pushing operation(e.x.)

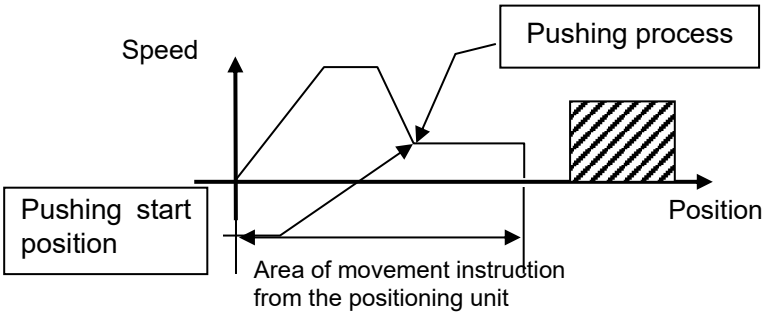


● Pushing operation(e.x)【Speed/Position】



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

When the electric actuator does not complete the pushing even when it moves from the start position of the pushing to the operation range commanded by the pulse signals coming from the positioning unit, the operation is stopped. In such case, the INP output and BUSY output will be turned OFF.

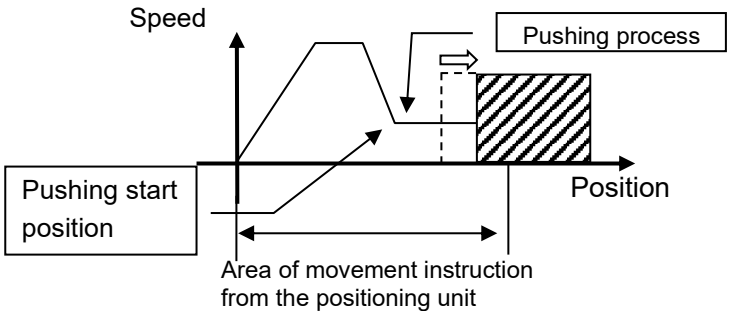


(3) Movement of the work piece after the completion of the pushing process

(i) The workpiece moves in the pushing direction.

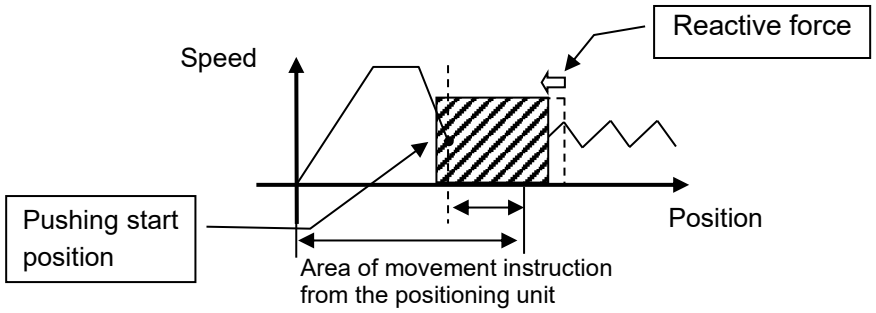
After completion of the pushing operation, if the reaction force from the workpiece becomes smaller, the electric actuator may move with a force smaller than that specified in the “Trigger LV” of the step data. In such case, the BUSY output will be turned ON and the INP output will be turned OFF and the electric actuator moves within the positioning range according to the balance of the force.

During the pushing operation, if the pushing force is kept higher than the value specified by “Trigger LV” of the step data No.0 for a certain time again, the INP output will be turned ON and BUSY output will be turned OFF.



(ii)When the electric actuator moves in the opposite direction of pushing direction

When the electric actuator is pushed back after the pushing move is completed, the electric actuator is pushed until the reaction force and pushing force are balanced, the BUSY output stays ON and INP output stays ON.



8.4 Response time for the driver input signal

Response delay due to the input signal other than pulse signal contains the following factors.

(1) Driver input signal scan delay

(2) Delay due to input signal analysis

(3) Delay of command analysis

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 driver scaning delays can occur.

8.5 Methods of interrupting operation

It is possible to stop the electric actuator by interrupting the movement of a positioning operation or pushing operation.

[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.)

Pulse signal input is ignored while EMG signal is OFF because the servo is OFF.

9. Operation (example)

9.1 Positioning operation

Calculation example of the travel amount (pulse) and travel speed (pulse frequency) when the electronic gear ratio is 1/1 (Recommended value) which are set with basic parameter "Undefined No. 11" "Undefined No.12".

■ Setting example of pulse signal

Actuator lead: 10[mm/rotation], electronic gear (denominator): 1, electronic gear (numerator): 1
2 pulse mode (Pulse input for each direction)

Target position1: Travel amount 100mm Travel speed 30mm/s
Acceleration 3000mm/s^2 Deceleration 3000mm/s^2
Target position2: Travel amount 60mm Travel speed 100mm/s
Acceleration 2000mm/s^2 Deceleration 2000mm/s^2

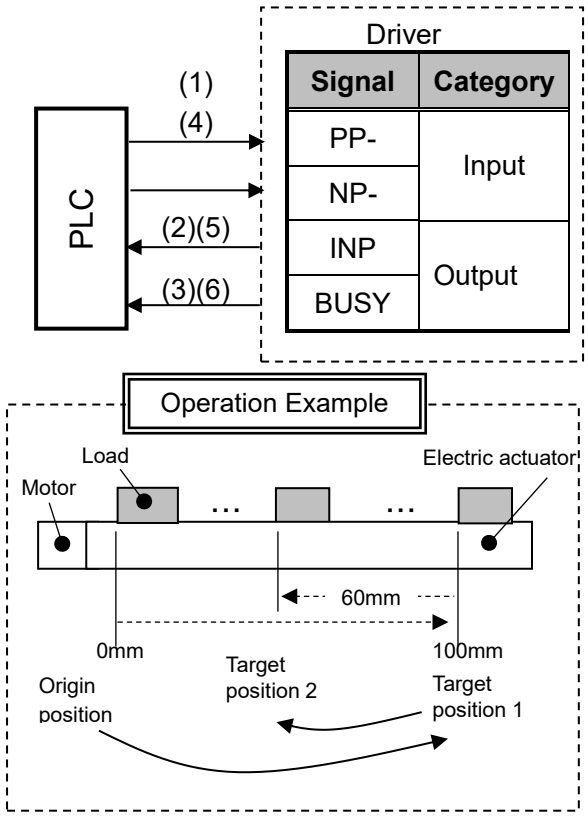
■ Calculation example

Travel amount (Pulse amount[Pulse])
= Encoder resolution [Pulse/ rotation] x electronic gear [1/1] / Actuator lead[mm/ rotation] x travel amount [mm]

Travel speed (pulse frequency [pulse/sec])
= (Encoder resolution [Pulse/ rotation] x electronic gear [1/1] / Actuator lead[mm/ rotation]) x travel speed [mm/s]

Acceleration / deceleration time [s]
= Travel speed[mm/s] / Deceleration or acceleration speed [mm/s ^{2}]

<Calculation example of target position 1>
Travel amount: 800 x 1 / 10 x 100 = 8000[pulse]
Travel speed: 800 x 1 / 10 x 30 = 2400 [pulse/sec]
Acceleration / deceleration time: 30 / 3000 = 0.01 [s]



(1) Direct positioning operation to target position 1.
Input a pulse quantity of 8000 [pulse], a pulse frequency of 2400 [pulse/s], acceleration of 0.01 [s],

↓

Travels to target position 1

↓

When the travel is completed, "INP" output is ON.

↓

(3) BUSY output is OFF

↓

Travel to target position 1 is completed

↓

(4) Target position 2 is commanded
Pulse; 4800, Pulse frequency: 8000 [pulse/sec])
Acceleration time 0.05[s], deceleration time 0.05[s] This pulse is input to “NP-”

↓

Travels to target position 2

↓

(5) When the travel is completed, "INP" output is ON.

↓

(6) "BUSY" output is OFF

↓

Travel to target position 2 is completed.

9.2 Pushing operation

Calculation example of the travel amount (pulse) and travel speed (pulse frequency) when the electronic gear ratio is 1/1 (Recommended value) which are set with basic parameter "Undefined No. 11" "Undefined No.12".

Example) Perform pushing from the home position to the start position for pushing 100mm away at 100mm/sec.
From the point of 100mm, pushing starts at 30mm/s for 30mm with 50% of pushing force.

■ Setting example of pulse signal

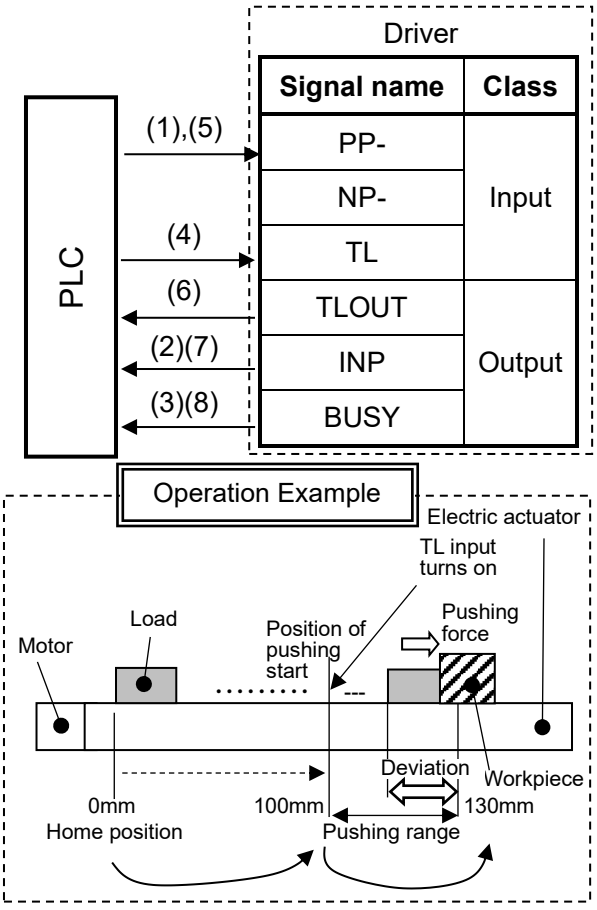
Actuator lead: 10[mm/rotation], electronic gear (denominator): 1, electronic gear (numerator): 1
2 pulse mode (Pulse input for each direction)
Positioning operation: Travel amount 100mm Travel speed 100mm/s
Acceleration 3000mm/s^2 Deceleration 3000mm/s^2
Pushing operation: Travel amount 30mm Travel speed 30mm/s
Acceleration 3000mm/s^2 Deceleration 3000mm/s^2

■ Calculation example

Travel amount (Pulse amount [Pulse])
= Encoder resolution [Pulse/Rotation] x Electronic gear[1/1] / Actuator lead [mm/rotation] x Travel distance [mm]
Travel amount (Pulse frequency [Pulse/sec])
= Encoder resolution [Pulse/Rotation] x Electronic gear[1/1] / Actuator lead [mm/rotation] x Travel distance [mm/s]
Acceleration / deceleration time [s]
=Travel speed[mm/s] / Deceleration or acceleration speed [mm/s ^{2}]

<Calculation example of positioning operation>
Travel amount: 800 x 1 / 10 x 100 = 8000[pulse]
Travel speed: 800 x 1 / 10 x 100 = 8000 [pulse/sec]
Acceleration / deceleration time: 100 / 3000 = 0.1 [s]

<Calculation example of pushing operation>
Travel amount: 800 x 1 / 10 x 30 = 2400[pulse]
Travel speed: 800 x 1 / 10 x 30 = 2400 [pulse/sec]
Acceleration / deceleration time: 30 / 3000 = 0.01 [s]

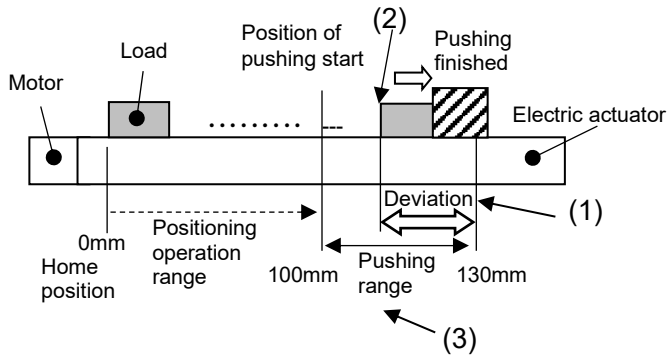


(1) Positioning operation starts until the start position for the pushing operation.Input pulse amount 8000[pulse], pulse frequency 8000[pulse/sec], acceleration 0.1[s], deceleration 0.1[s] to "PP-"
↓
Travels to the start position of pushing
↓
(2) When the travel is completed, "INP" output is ON.
↓
(3) BUSY output is OFF
↓
Complete the movement to the start position of pushing.
↓
(4) TL input is turned ON.
↓
(5) Starts pushing
Input pulse amount 2400[pulse], pulse frequency 2400[pulse/sec], acceleration 0.01[s], deceleration 0.01[s] to "PP-"
↓
Starts pushing
↓
(6) TLOUT is turned ON when pushing starts
↓
Push the workpiece with the specified pushing force
↓
(7) INP turns ON when pushing force stays larger than Trigger LV for specific period of time or longer.
↓
(8) "BUSY" output turns off
↓
Pushing completes

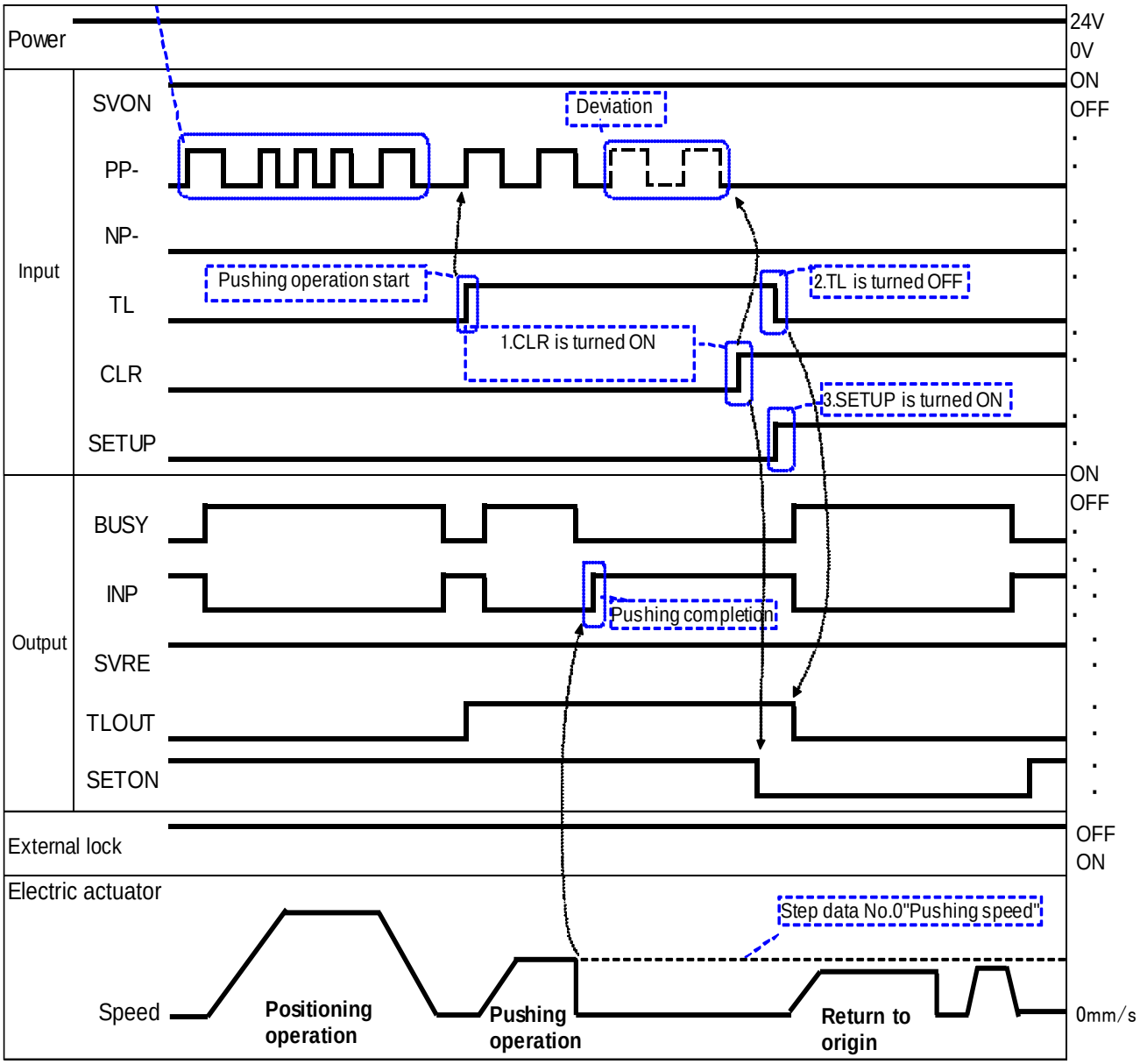
9.3 Actions after pushing operation

Example1) Clear the deviation. Return to origin from the finish position of pushing.

1. After pushing finishes, CLR turns on and the deviation is cleared.
2. TL input turns OFF.
3. Perform returning to origin by turning ON the SETUP input to establish the home position.

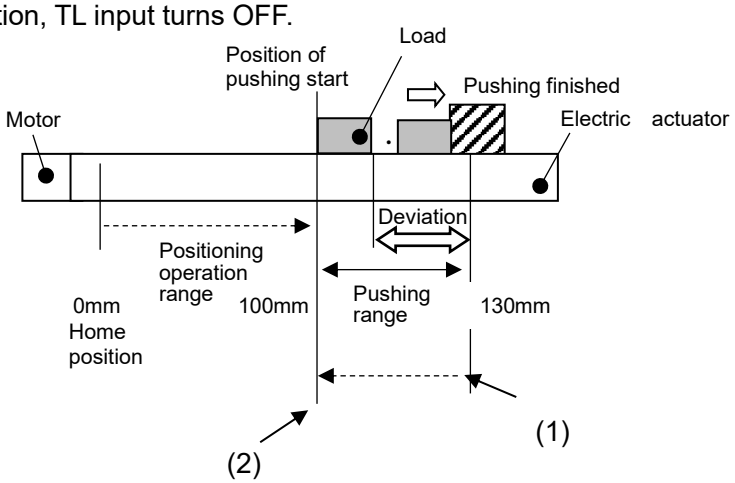


- Timing chart-

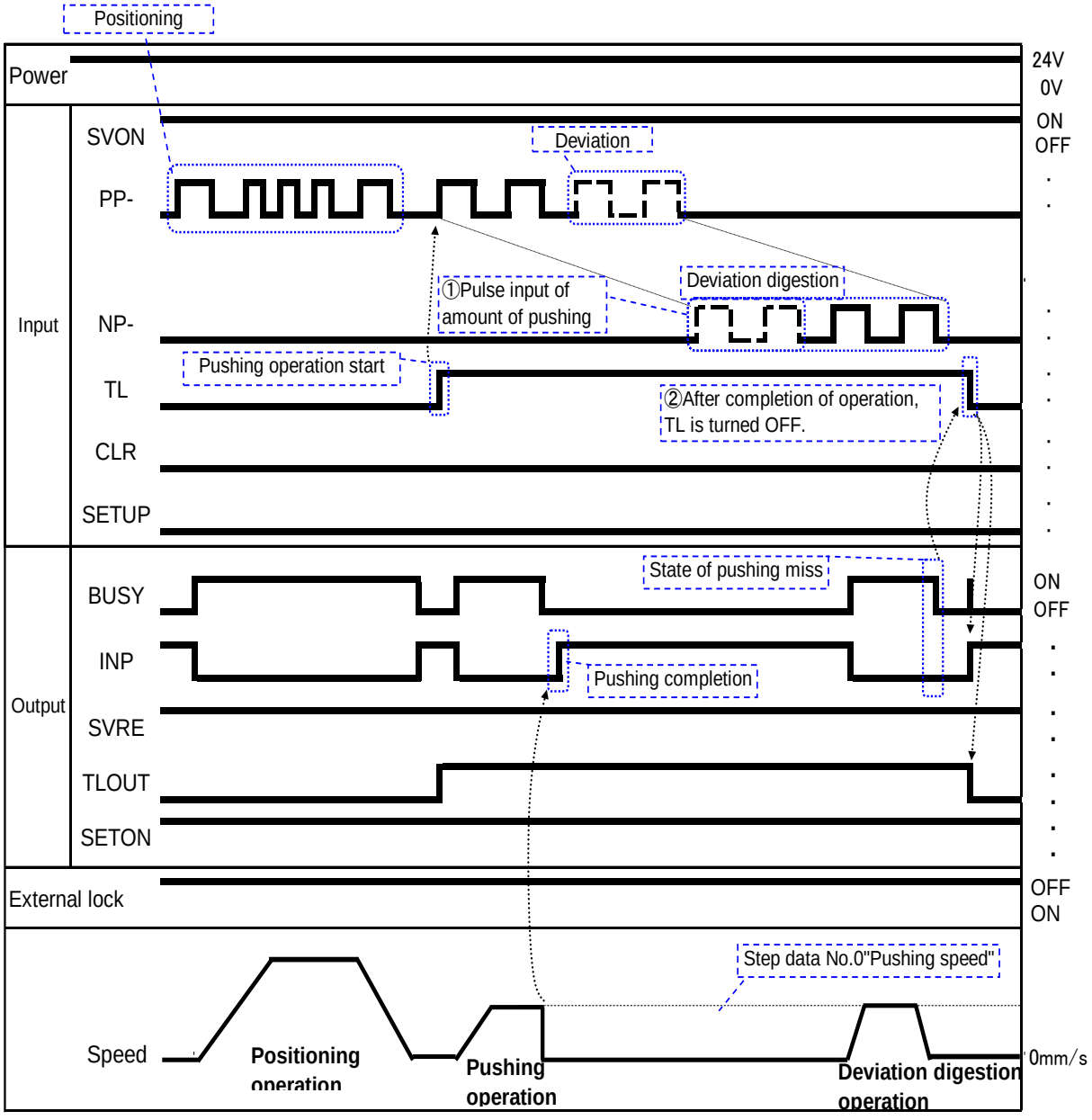


Example2) Not clear the deviation. Input the pulse for the distance of pushed electric actuator but in the opposite direction with TL input ON.

1. After finishing the pushing, input the pulse for the distance of the pushed electric actuator in the opposite direction of the pushing. With pushing speed as operating speed.
2. After the operation, TL input turns OFF.



- Timing chart-



10. Operation instruction

The operation of the driver can be achieved by input / output signals and pulse signals.

These operating conditions are shown below.

(1) Power on → Return to origin

- Procedures-

1) Apply the power.

↓

2) *ALARM is turned ON.

*ESTOP is turned ON.

↓

3) SVON is turned ON.

↓

4) SVRE is turned ON.

The time taken for SVRE output to turn on depends on the electric actuator type and the operating conditions.

(When power is applied, it may take up to 10 seconds (max. 20 sec.) depending on the position of the electric actuator).

The electric actuator with lock is unlocked.

↓

5) SETUP is turned ON.

↓

(The electric actuator moves.)

↓

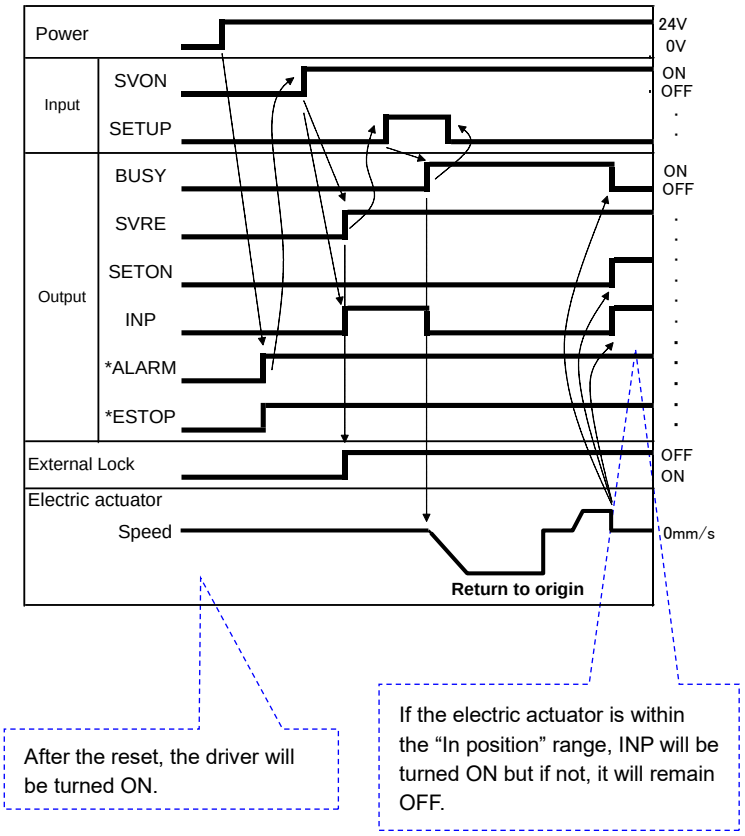
6) BUSY is turned ON.

↓

7) SETON and INP are turned ON.

When the BUSY output is turned OFF, the return to origin operation has been completed.

- Timing chart



The “*ALARM” and “*ESTOP” are expressed as negative-logic circuit.

(2) Positioning operation

-Timing chart Positioning operation-

- Procedures-

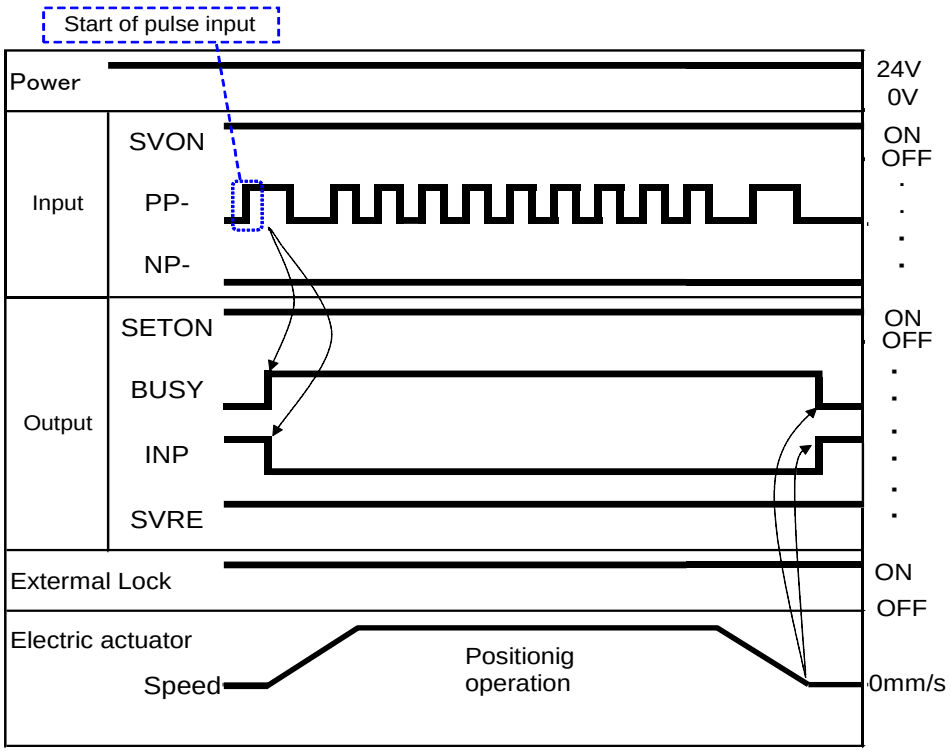
(1) Input pulse signal

↓

(2) BUSY output turns ON
INP output is OFF
(Positioning starts)

↓

(3) If pulse signal is not input for 10ms or longer, INP signal is ON when the difference becomes smaller than "positioning width" BUSY signal is OFF when the electric actuator completes its operation.



⚠ Caution

. Do not input normal (CW) and reversed (CCW) pulse signal simultaneously.
Keep 10ms or more interval to input reversed pulse signal when changing the electric actuator direction (motor direction). Minimum interval depends on the operating speed and load.
It should not be shortened more than necessary.

(3) Pushing operation

- Procedures-

(1) Input pulse signal

↓

(2) TL input is turned ON.

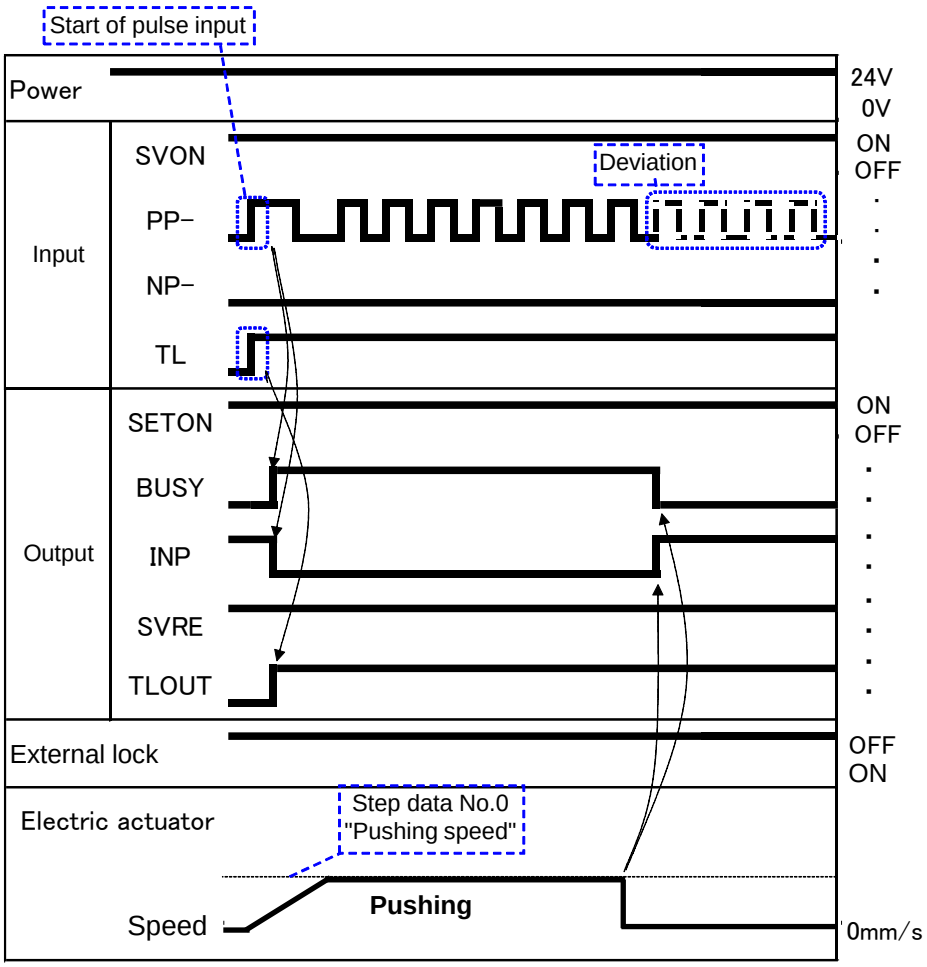
↓

(3) BUSY output turns ON
INP output is OFF
TLOUT output is turned on.
(Starts pushing)

↓

(4) Pushing is completed when INP output is ON and BUSY output is OFF.
(Thrust more than step data No.0 "Trigger LV" is generated)

- Timing chart Pushing operation -



(4) Alarm reset

-Procedures-

(1) Alarm generated
(SETON output and SVRE output are OFF when alarm is generated)

↓

(2) RESET is turned ON.

↓

(3) ALARM is turned ON and the output SVRE turned ON (the alarm is deactivated).

(5) Deviation reset

-Procedures-

(1) The CLR input is turned ON during the stop (when BUSY is OFF)

↓

(2)The deviation is cleared.
SETON is turned OFF

(6) Stop (EMG)

-Procedures-

(1) The stop [EMG] input is turned OFF during the operation (when BUSY is ON).
[stop command]
Turn off the pulse signal input at the same time

↓

(2) ESTOP is turned OFF.
SETON is turned ON.

↓

(3) BUSY is turned OFF
(the electric actuator stops).
SVRE is turned OFF
The electric actuator with lock is locked.

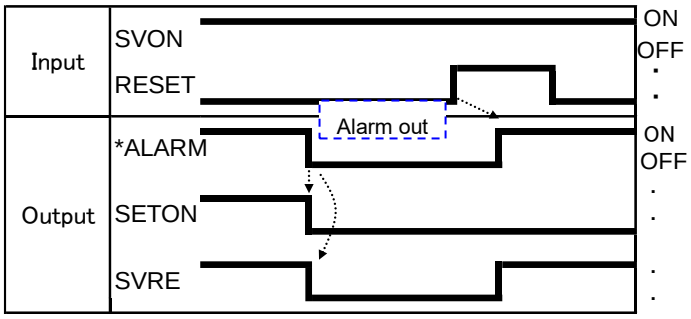
↓

(4) The stop [EMG] input is turned ON.
[The stop release command]

↓

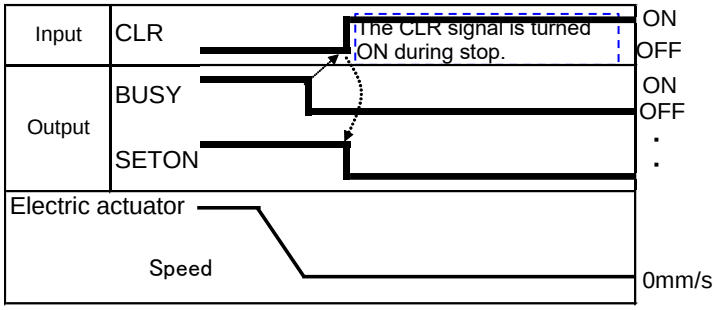
(5) STOP is turned ON.
*SVRE is turned ON.
The electric actuator with lock is unlocked.

--Timing chart- Alarm reset

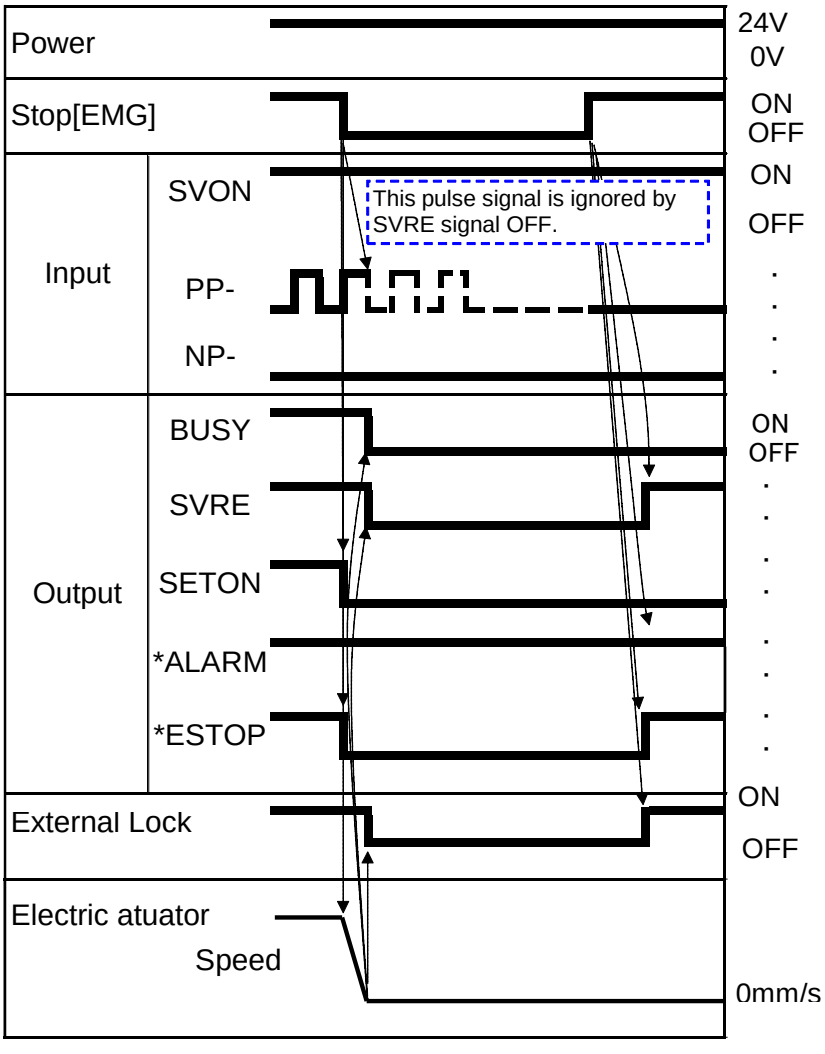


* The “ALARM” is expressed as negative-logic circuit.
* It is necessary to reenter the controlled source for reset of the alarm when alarm group E is generated.

-Timing chart- Deviation reset



--Timing chart- Alarm reset



(7) Area output

--Procedures-

Operation 1

(1) Input pulse signal

↓

(2) BUSY output turns ON
INP output is OFF

↓

(3) AREA output turns ON
(at 50mm)

↓

(4)AREA output is OFF.
(at 80mm)

↓

(5) BUSY output is turned OFF
INP output turns ON

↓

Operation 2

(6) Input pulse signal

↓

(7) BUSY output turns ON
INP output is OFF

↓

(8) WAREA output turns ON
(at 130mm)

↓

(9) WAREA output is turned OFF(at 160mm)

↓

(10) BUSY output is OFF. INP output turns ON

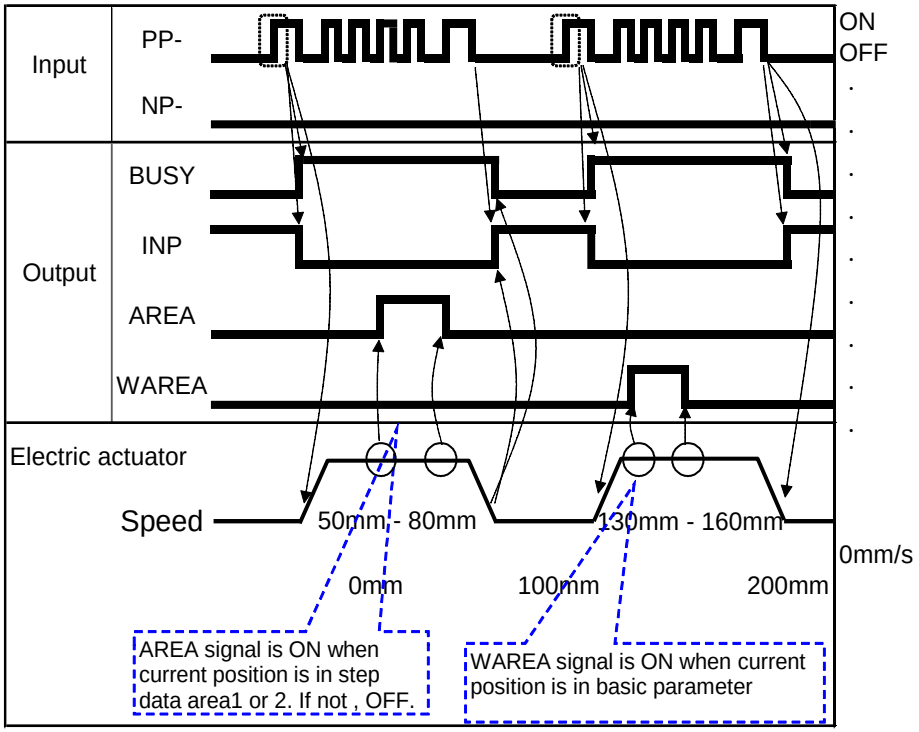
-Timing chart

Example)

The initial position: 0mm

Operation 1: Position: 100mm, Area1 – Area2: 50-80mm

Operation 2: Position: 200mm, W-AREA1 – W-AREA2: 130-160mm



11. Automatic pulse reference detection

11.1 The meaning of automatic pulse reference detection

This function checks the state of no pulse inputs when the first SVON input is ON, and then detects the state of the pulse input circuit (photo coupler ON/OFF). This takes priority over the set value determined by the parameter (Option set 1) to set the pulse-signal input method.

(This detection is "H/L reference " only. "Pulse Input Method" cannot be detected.)

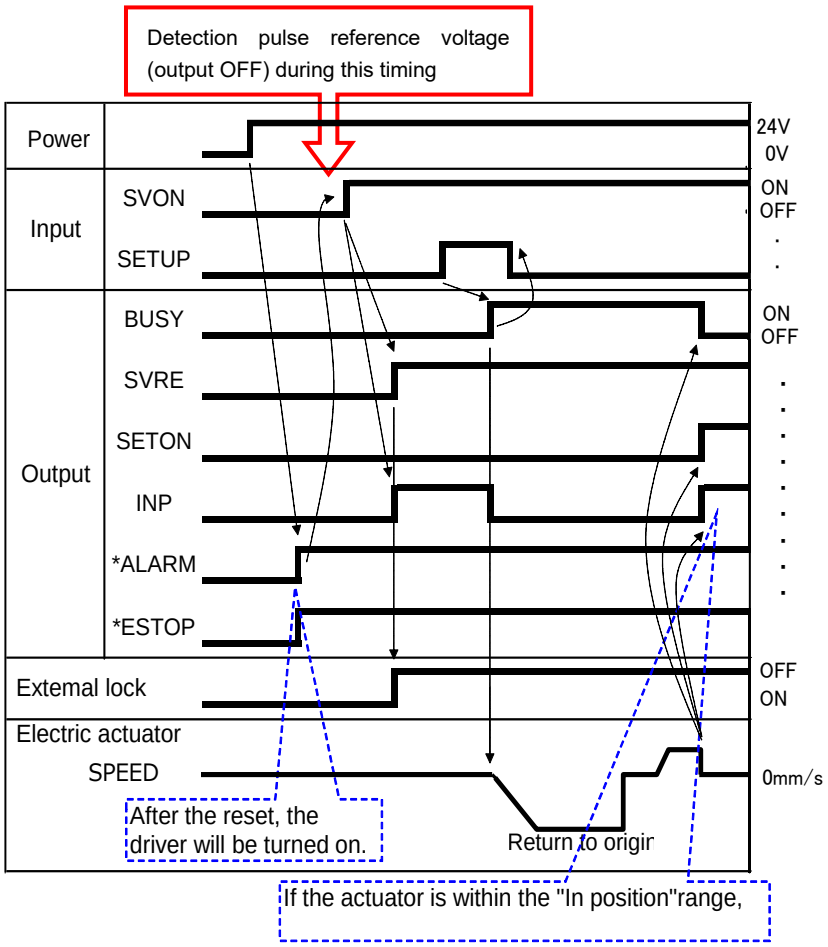
When the first SVON input is ON during the pulse inputting, the H/L reference cannot be detected.

If the H/L reference cannot be detected correctly, please refer to "11.3 Automatic pulse reference detection OFF"

11.2 Operation procedure using automatic detection function

Refer to the operation procedure for parallel IO and timing chart below.

- Timing chart -



- Procedures -

(1) Apply the power (Driver and PLC).

↓

(2) *ALARM output is turned ON.
*ESTOP is turned ON
Turn off the PLC pulse output.

↓

(3) The SVON input is turned ON.
Detect pulse reference.

↓

(4) The SVRE output is turned ON.
The time taken for SVRE output to turn on depends on the electric actuator type and the operating conditions. (When power is applied, it may take about 10 seconds (up to 20 s) depending on the position of the electric actuator.)

The electric actuator with lock is unlocked

↓

(5) SETUP is turned ON.

↓

(6) BUSY is turned ON.
(The electric actuator moves.)

↓

(7) SETON and INP are turned ON.
When the BUSY output is turned OFF, the return to origin has been completed.

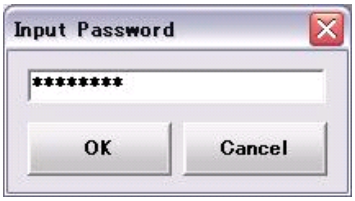
11.3 Automatic pulse reference detection OFF

The following steps comprise the procedure to turn OFF the automatic pulse reference detection with the controller setting kit (LEC-W2).

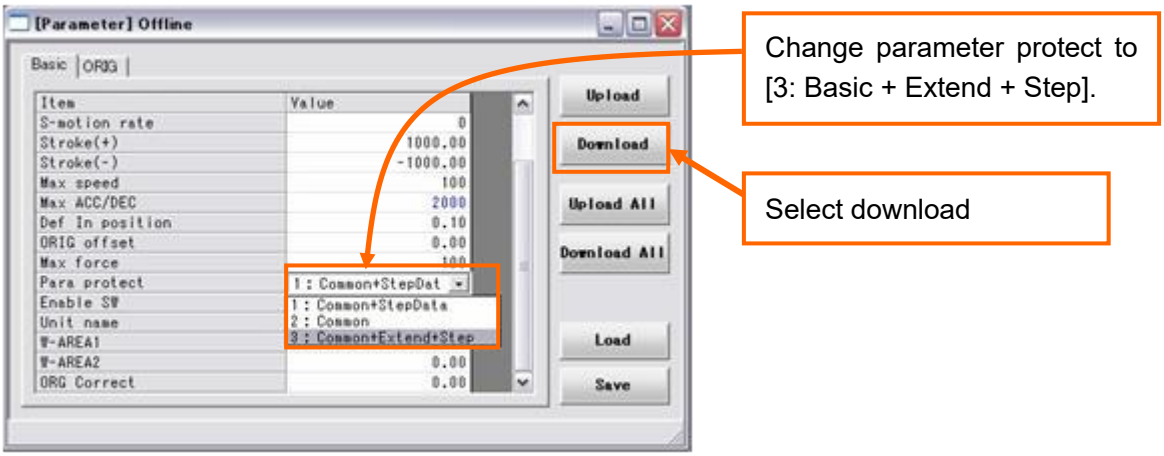
- Setting procedure -

(1) With the driver power ON, start the controller setting software in Normal mode to communicate (be online) with the driver.
During Offline status, "Offline" is displayed in the upper left corner of the setup software screen.

(2) After starting the controller setting software in Normal mode, select “Help” > “Password" from the menu. Enter the "password" in the password field shown below.

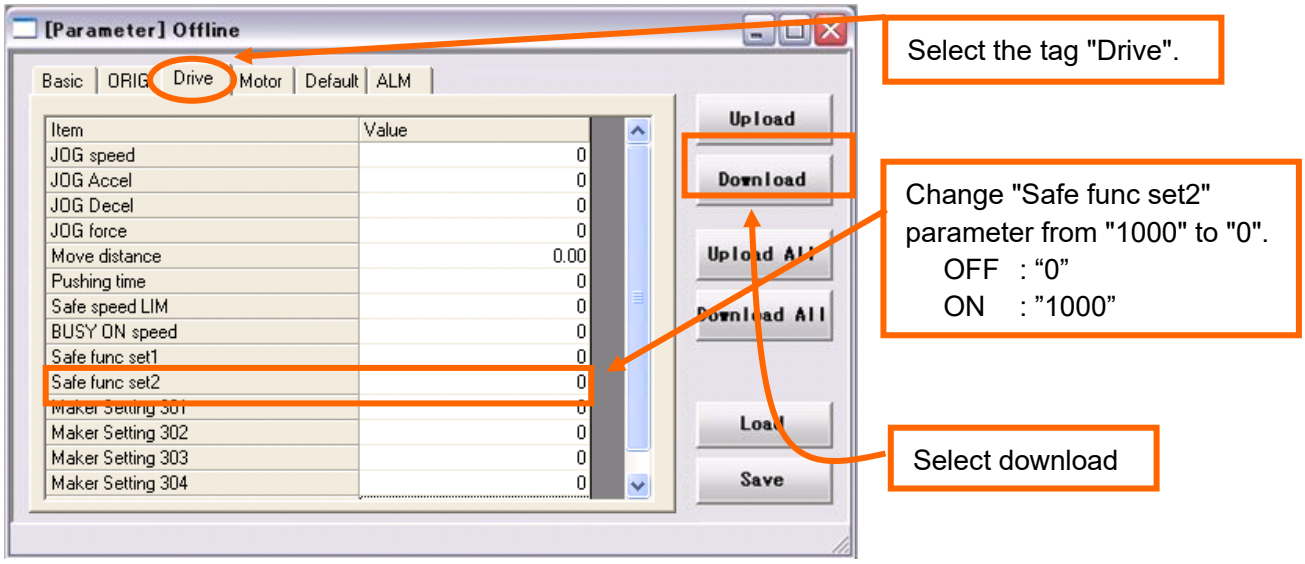


(3) Change the "Parameter protect" setting to allow the "Safety function setting 2" parameter to be changed.



Change the parameter window "Basic"-"Parameter protect" to "3: Basic + Extension + Step"
Select “Download” button. The modified data is transmitted to the driver. Once downloaded, the parameter set value which was displayed in blue will now be displayed in black.

(4) Select "Drive" on the Parameter window. Change "Safe func set2" from "1000" to "0".



Select the "Download" button. The modified data is transmitted to the driver. Once downloaded, the parameter set value for "Safe func set2" which was displayed in blue will now be displayed in black.

(5) Change Parameter protect to [1: Basic + Step data] on the screen, and then click on Download.

(6) Terminate the controller setting kit (LEC-W2), and then turn the driver power OFF. When the driver power is turned ON next time, the automatic pulse reference detection will be OFF.

⚠ Caution
Do not set any values to "Safe func set2"other than those specified above. Otherwise, malfunction can result. Do not modify any parameters other than "Drive parameter (Safe func set2)", "Basic parameter", and "ORIG". Otherwise, malfunction can result.

12. Alarm Detection

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 **"12.2 Alarm details"** of this manual on how to, deactivate the alarm.
There are 2 ways to turn off the alarm.

- Input RESET as a parallel signal.
- Shut off the control power supply (C24V)

12.1 Parallel output for the alarm group

After generation of the alarm, SVRE or SETON are output according to the contents of the alarm as below.

Alarm group	Parallel output		Procedure of restart
	SVRE	SETON	
Alarm group B	OFF	OFF	RESET SVON input
Alarm group C			
Alarm group D			
Alarm group E			Power off ⇒Turn on the power again

12.2 Alarm details

Alarm (code)	Group	How to deactivate	Alarm contents/ Countermeasure
Step data ALM1 (1-048)	B	RESET SVON 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 (When the pushing force is 0, the alarm will not sound even if Pushing force < Trigger LV) (3) Minimum speed of the 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 (8) Pushing force ≠ 0 **<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 SVON 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 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.
Step data ALM2 （1-051）	B	RESET SVON input	**<Contents>** Generated when test operation is performed by the teaching box or Controllersetting kit. **<Countermeasure>** (1) Check if "Operation" of the step data is "Blank (Invalid data)". (2) This product cannot perform test operation by the teaching box or Controller setting kit. Refer to **“7.1 Step data”.**

<table>
<tr><td>Stroke limit
(1-052)</td><td>B</td><td>RESET
SVON
input</td><td><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)
This occurs only when the SETON output is ON.
<Countermeasure>
Make sure that the basic parameter, “Stroke (+)” and “Stroke (-)” are consistent with the distance of electric actuator movement specified in the step data.</td></tr>
<tr><td>ORIG ALM
(1-097)</td><td>C</td><td>RESET
SVON
input</td><td><Contents>
1. Return to origin is not completed within the set time.
2. Return to origin parameter has the conditions shown below.
<table><tr><td colspan="2">Parameter setting content</td></tr><tr><td>ORIG mode</td><td>ORIG sensor</td></tr><tr><td>Limit switch origin [Sensor]</td><td>Sensor N.C. [N.C.]</td></tr></table>Alarm is generated with condition above when the sensor is not mounted to the electric actuator.
<Countermeasure>
(1) Check that the electric actuator’s movement is not interrupted.
(2) Check that the return-to-origin parameter is set correctly.</td></tr>
<tr><td>Servo off ALM
(1-098)</td><td>C</td><td>RESET
SVON
input</td><td><Contents>
While the servo motor is off (when EMG terminal is not energized), the return to origin operation, JOG operation or MOVE operation is requested.
<Countermeasure>
Command operation while the servo motor is on (SVRE output is on).
Apply 24 VDC to the EMG terminal.</td></tr>
<tr><td>ORIG Sens ALM
(1-103)</td><td>C</td><td>RESET
SVON
input</td><td><Contents>
Return to origin parameter has the conditions shown below.
<table><tr><td rowspan="2">Setting value</td><td colspan="2">Return to origin parameter setting</td></tr><tr><td>ORIG mode</td><td>ORIG sensor</td></tr><tr><td>1</td><td>Pushing origin operation [Stop]</td><td>Sensor N.O type [N.O]</td></tr><tr><td>2</td><td>Limit switch origin [Sensor]</td><td>The origin sensor is not effective. [Disabled]
or Sensor N.O type [N.O]</td></tr></table>Alarm is generated with condition above when the sensor is not mounted to the electric actuator.
<Countermeasure>
Sensor installation and return to origin parameter and motor and sensor type is setting to have confirmed.</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 driver ciruit and the absolute ciruit is not normal. (This driver 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>

Overflow ALM [6C] （1-108）	C	RESET SVON input	**<Contents>** Position deviation counter in the driver has overflowed during the operation by pulse signals. **<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.
Over speed （1-144）	D	RESET SVON input	**<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	**<Contents>** The motor power-supply voltage detected in the driver is outside the specified range. The driver checks the lower limit of the motor power supply voltage only when the servo ON is commanded. **<Countermeasure>** Make sure that the voltage supplied to the motor power (M24V) of the driver is within specification. **⚠ Caution** If the power supply is “inrush current control type”, a voltage drop may cause an alarm during acceleration/ deceleration.
Over motor Vol （1-145）	D	RESET SVON input	**<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	**<Contents>** The temperature around the power element of the driver is too high. **<Countermeasure>** Make improvements so that the temperature around the driver is kept appropriate.

<table>
<tr><td rowspan="4">Over Crtl Vol
(1-147)</td><td rowspan="4">D</td><td rowspan="4">RESET
SVON
Input</td><td><Contents>
The control power supply voltage within the driver is out of a range.</td></tr>
<tr><td><Countermeasure>
Make sure that the voltage supplied to the control power (C24V) of the driver 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.</td></tr>
<tr><td><Contents>
Also, a regenerative electric power may be generated to cause an alarm due to the method of operation of the electric actuator.</td></tr>
<tr><td><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</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</td><td><Contents>
Failed to reach to the set position within the set time limit during origin operation, Move operation or JOG operation. This alarm is not generated by operation triggered by pulse signal.
<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</td><td><Contents>
This occurs when communication is interrupted while operating with the controller setting kit or the teaching box.
<Countermeasures>
Do not remove the cable during operation by the controller setting kit or 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>
<tr><td>Phase Det ALM
（1-193）</td><td>E</td><td>Power off</td><td><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.)</td></tr>
</table>

			<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 driver.
I sens ALM (1-195)	E	Power off	**<Contents>** An abnormality is detected by the current sensor that is checked when the driver is reset. **<Countermeasure>** Make sure that the electric actuator conforms to the driver. Even after this measure, if the alarm regenerates when the power is reapplied, please contact SMC.
Err overflow (1-196)	E	Power off	**<Contents>** Position deviation counter in the driver has overflowed during JOG or MOVE operation. **<Countermeasure>** Check if the travel of the electric actuator is interrupted. Check if the load of the electric actuator is within the specification range.
Memory ALM (1-197)	E	Power off	**<Contents>** An error of the EEPROM is occurred. **<Countermeasure>** Please contact SMC (The EEPROM can be re-written up to approximately 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

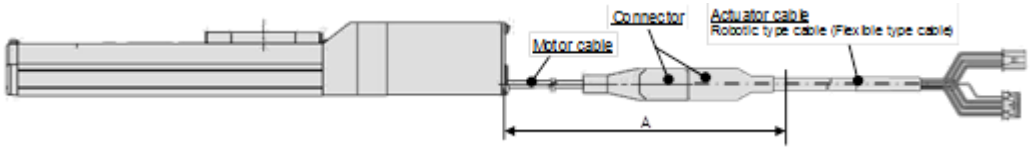
13. Wiring of cables/Common precautions

⚠Warning

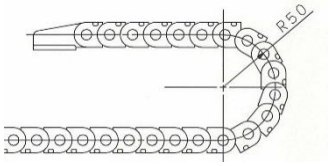
1. **Adjusting, mounting or wiring change should never be done before shutting off the power supply to the product.**
   Electrical shock, malfunction and damaged can result.
2. **Never disassemble the cable. Use only specified cables.**
3. **Never connect or disconnect the cable or connector with power on.**

⚠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, high voltage and low voltage cables should be separated, and keep wiring lengths short, etc.
4. **Do not route wires and cables together with power or high voltage cables.**
   The product can malfunction due to interference and surge voltage cables. Route the wires to the product separately from power or high voltage cables.
5. **Take care that electric actuator movement does not damage cables.**
6. **Fix cables securely so that they do not move easily. Avoid bending cables at sharp angles where the cables 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 lost 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” when deflecting actuator-cables repeatedly. Do not put cables into a flexible moving tube with a radius smaller than the specified value (minimum 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.**
    Insulation failure (interference with other circuit, poor insulation between terminals, etc.) could introduce excessive voltage or current to the driver or its peripheral devices and damage them.
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 the cable length is 15m: Maximum 20% reduction.)

[Transportation]

⚠Caution

1. Do not carry or swing the product by the motor or the cable

14. Electric actuators/ Common precautions

14.1 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 product failure.

Any damage attributed to 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 supply failure.

6. Consider the behavior of an emergency stop of the 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 the whole system.

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

Design the system so that human injury or equipment damage will not occur upon restart of operation of the 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 driver and stop switch on the teaching box as the emergency stop of system.

The stop signal, "EMG" of driver 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 to the 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 the 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 reciprocating the actuator repeatedly with tiny strokes, operate it with full strokes at least once a day or every 1,000 cycles. Otherwise, lubrication can be lost.**
3. **Do not use the product in applications where excessive external force or impact force is applied.**
   The product can be damaged. Each component that includes motor is made with accurate tolerances. Even slightly deformed or misaligned of components may lead to product failure.
4. **Return-to-origin does not work while in operation.**
   This function does not work during a positioning operation or a pushing operation.
5. **Refer to a common auto switch (Best Pneumatics No 2), when an auto switch is built and used within the system.**
6. **When conformity to UL is required, the electric actuator and driver should be used with a UL1310 Class 2 power supply.**

14.2 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 them with other objects. Components are manufactured to precise tolerances, so the slightest deformation may cause faulty operation.
6. **Prevent the seizure of rotating parts.**
   Prevent the seizure of rotating parts (pins, etc.) by applying lubricating 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 will damage the electric actuator when moving at high speed.
   The metal support fittings which suppress the vibration of the main body of the electric actuator are installed.
   Reduce the speed to the condition where the electric actuator does not 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 above 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.

14.3 Handling

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.**
   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, driver 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 driver 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 driver and product combined as delivered for use.**
   The product parameters are set before shipment. If the driver is combined with a different electric actuator, 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 driver/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 the "Return to Origin" operation.**
   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. **An operation test should be carried out using a low speed. Start operation using the predefined speed after confirming there is no problems.**

[Ground]

⚠ **Warning**

1. **Please give the earth of the electric actuator.**
2. **Please make it to the earth of the exclusive use. The earth construction is D seed.**
   (Below earth resistance 100Ω)
3. **The earth cable length should be as short as possible.**

[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.

14.4 Operating environment

⚠Warning

1. Avoid use in the following environments.

a. Locations where a large amount of dust or 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 or oil drops.
h. Areas exposed to direct sunlight (ultraviolet light).
i. Environment at an altitude of 1000 meters or higher
Heat dissapation and withstand voltage will decrease. Contact your SMC representative 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. Provide a protective cover if the product is used in direct sunlight.

5. Protect the product from radiated heat generated by nearby heat sources.

When there is a heat source surrounding the product, the radiated heat from the heat source can increase the temperature of the product beyond the operating temperature range.

6. Grease oil can be reduced due to the external environment and operating conditions. The lubrication performance may deteriorate and shorten the life of the product.

[Storage]

⚠Warning

1. Do not store the product in direct contact with rain or water drops, or exposed to harmful gas or liquids.

2. Store in an area that is shaded from direct sunlight and has a temperature and humidity within the specified range (-10ºC to 60ºC and 90% or less No condensation or freezing.

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

14.5 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.

Electric 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, 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. **Remove the actuator cable when manually operating the actuator slider.**
   If the slider is moved manually while the electric actuator is connected to the driver, a motor-induced voltage will enter the driver to prevent the slider from moving smoothly. If the slider is frequently moved manually, the driver may be damaged due to this induced voltage.

[Lubrication]

⚠Caution

1. **The product has been lubricated for life at the manufacturer's and does not require lubrication in service.**
   Contact SMC if lubrication will be applied.

14.6 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 drop 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 VDC to the [BK RLS] terminal of the power supply connector.**
   If the product is operated without releasing the lock, wear of the lock sliding surface will be accelerated, causing a reduction in the holding force and the life of the locking mechanism.
8. **Do not supply 24 VDC continuously to the [BK RLS(Lock release)] terminal.**
   Stop supplying 24 VDC 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 workpieces may be dropped at stop (EMG).

15. Driver and its peripheral devices /Specific product precautions

15.1 Design and Selection

⚠ Warning

1. **Be sure to apply the specified voltage.**
   Otherwise, a malfunction and breakage of the driver 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.**
6. **Moving element of the electric actuator might pulsate when stopping without deviation of pulse in the pushing in operation.**

15.2 Handling

⚠ Warning

1. **The inside of the driver and its connector should not be touched.**
   It may cause an electric shock or damage to the driver.
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 driver and electric actuator.**
   It may cause damage to the driver or the electric actuator.
5. **Be careful not to be caught or hit by the workpiece 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 minutes 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. **Radiant heat from strong heat supplys such as a furnace, direct sunlight, etc. should not be applied to the product.**
    It will cause failure of the driver or its peripheral devices.
13. **Do not use the product in an environment subject to a temperature cycle.**
    It will cause failure of the driver 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.**

15.3 Installation

⚠Warning

1. **The driver 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 driver and its peripheral devices are within the range of the specifications. Also, this driver 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 driver and its peripheral devices and a fire.
4. **Do not mount this driver 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 driver and its peripheral devices away from such a vibration supply.**
5. **This driver 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.

15.4 Wiring of cables

⚠ **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 driver or its peripheral devices depending on the seriousness.
3. **Do not connect wires while the power is supplied.**
   It can break the driver 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.**
   Te wires to the driver 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 driver 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 driver or its peripheral devices and damage them.

15.5 Power supply

⚠ **Caution**

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 driver 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 driver and its peripheral devices.**

15.6 Grounding

⚠ **Warning**

1. **Be sure to carry out grounding in order to ensure the noise tolerance of the driver.**
   It may cause an electric shock or fire.
2. **Dedicated grounding should be used.**
   Grounding should be to a D-class ground (Ground resistance of 100 Ω or less.)
3. **Grounding should be performed near the unit as much as possible to shorten the grounding distance.**
4. **In the unlikely event that malfunction is caused by the ground, it may be disconnected.**

15.7 Maintenance

⚠ **Warning**

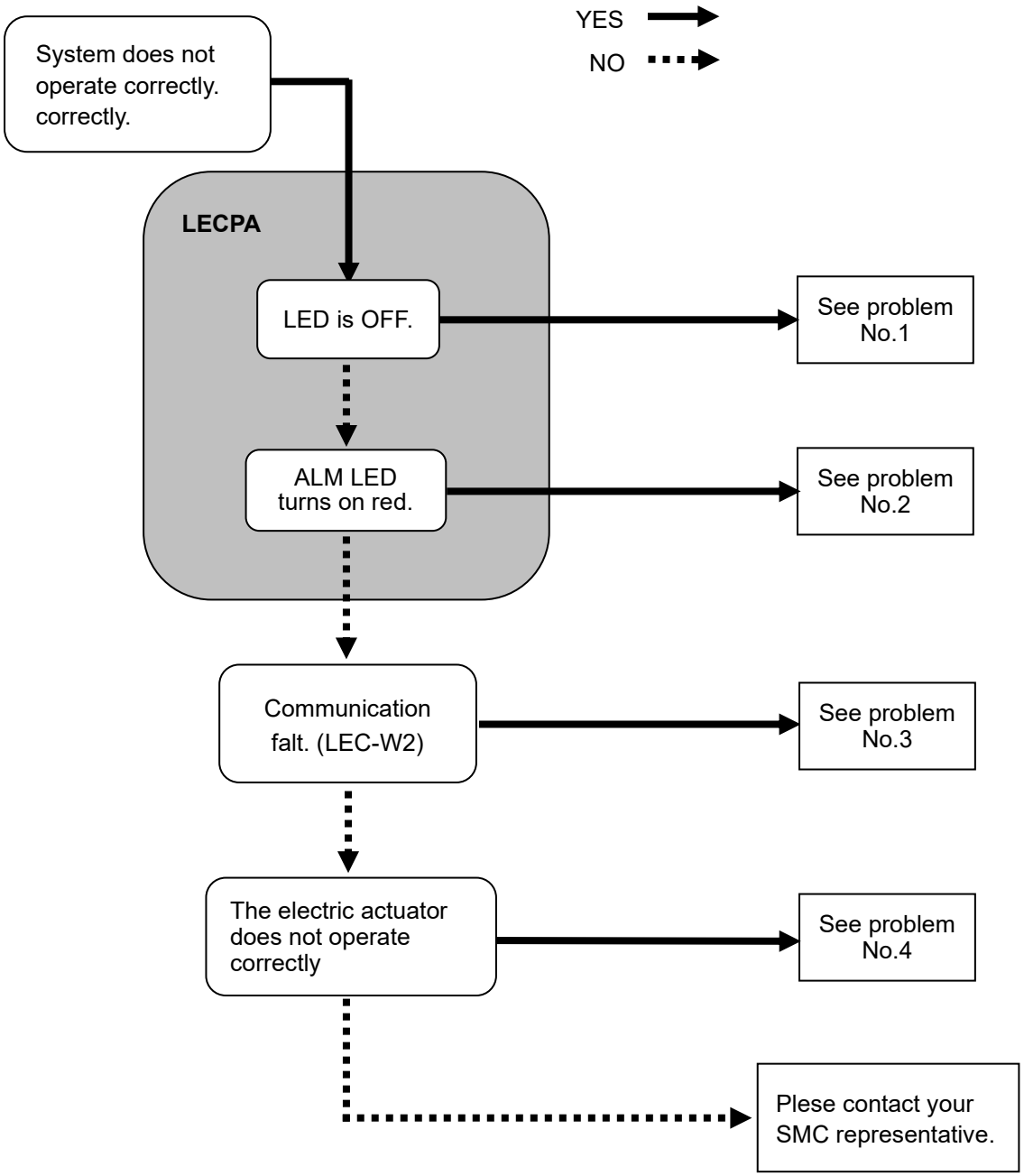
1. **Perform a maintenance check periodically**
   Confirm wiring and screws are not loose.
   Loose screws or wires may cause unintentional malfunction.

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 driver and the peripheral equipment.**
4. **Do not put anything conductive or flammable inside of this driver.**
   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.

16.Troubleshooting

Refer to the table below for troubleshooting. When the causes in the troubleshooting table cannot be identified and normal operation can be recovered only by replacing the product, the product itself is probably out of order.

The product failure may be due to the operating conditions (application). Please contact SMC for assistance.



Trouble No.	Problem	Possible cause	How to diagnose the trouble	Solutions
1	LED is OFF	Power fault	Check if the LED (green) of the driver is lit.	The power supply, voltage or current should be modified to an appropriate one. → 4. External Wiring Diagram. → 5. CN1: Power supply plug.
		Wiring falt	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 CN1driver and the CN5 I/O signal power supply. →4. External Wiring Diagram →6.4 Parallel I/O wiring Example
2	ALM is ON	Alarm condition	Check if the driver is in the alarm condition.	Refer to the driver operation manual, and take appropriate measures. Take appropriate measures based on the operation manual. → 12. Alarm Detection
3	Communication falt(LEC－W2)	Communication fault.(LEC-W2)	USB driver is not 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 driver = 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 driverer has been turned on. The communication is not made if the Power supply is off. If the equipments (PLC and measurement hardware) except motor driver is connected with PC. (There is a possibility that the communication with other equipment interferes in PC.)
		Incorrect display	Check that the controller setting kit is of the latest version.	If the controller setting kit is old, update it. You can download the latest kit from the SMC website (Manuals page). http://www.smcworld.com/

4	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 driver operates correctly.	Check that it operates with a test run of the driver alone. If it is operated, a signal output from the PLC is suspected. Take appropriate measures by referring to the Operation Manual for the driver. →6.3 Parallel I/O signal is detailed
		Inappropriate specifications	Check that the combination of the electric actuator and driver is correct?	Check if the product number of the used electric actuator matches with the electric actuator which is applicable to the driver. → 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.
		Incorrect signal input	Check that the driver is ready to operate with the pulse signal.	If the pulse signal cannot operate the driver, the cause may be one of the following. 1. Servo is OFF: Turn ON the servo. 2. CLR input is ON : Turn OFF the CLR input. 3. Returning-to-origin : Do not input the pulse signal. 4. Test run from the controller setting software/teaching box : Do not input the pulse signal.
		Incorrect parameters	Confirm that the pulse input signal input method is correct.	Make sure that the pulse signal input method is correct. → 7.2 Basic parameter
	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 CN1driver and the CN5 I/O signal power supply. → 4. External Wiring Diagram → 6.4 Parallel I/O Wiring Example
		Electric noise	Check that the Grounding is connected correctly? Are power cables for other equipment and driver 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 driver. → 3.4 How to install
		Inappropriate parameter	Check that the parameter values are correct.	Check the combination of the electric actuator and driver. Modify the parameters accordingly and check the operation. → 7. Setting Data Entry

4	Move occasionally	Voltage drop	Check for a temporary voltage drop in the power supply. (When a voltage dropoccurs, the EMG terminal of the CN1 power connector will turn OFF and the electric actuator will stop. However, this stop will be released when the voltage recovers).	A momentary voltage drop may have occurred because the power supply capacity is inadequate or the power supply is an inrush current suppressor type. → 3. Product Specifications
		Inappropriate specifications	Check that the combination of the electric actuator and driver is correct?	Check if the product number of the used electric actuator matches with the electric actuator which is applicable to the driver. → 3. Product Specifications
		Signal timing	Check the timing of the signal from the PLC to the driver.	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 driver scanning delays can occur. → 8.4 Response time for the driver input signal
		Pushing operation	Check that the TLOUT output is ON during a pushing operation.	In any of the following conditions, the TLOUT signal is turned OFF. 1. Alarm sounds: When an alarm sounds, turn OFF the TL input, and then turn it ON again. 2. Return to origin command: During return to origin, do not turn ON the TL input. Also, if you command a return-to-origin during pushing, turn OFF the TL input and then turn it ON again. 3. Do not turn on TL input while the servo is OFF (SVRE output is OFF). Signal is not recognized.
		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 driver alarm generated?	Refer to the driver operation manual, and take appropriate measures. Take appropriate measures based on the operation manual. → 12. Alarm Detection

4	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. → 7. Setting Data Entry
		Signal timing	For the single-pulse mode, check whether the pulse is input simultaneously with operational direction	Input the pulse after 15 ms or more (30 ms is recommended) has passed after the direction is switched.
		Incorrect pulse input	Check that the number of input pulses recognized by the LECPA is the same as the number of pulses output from the controller setting kit or the teaching box. ⇒ 2.5 Procedure (until operating the electric actuator)	<When the number of pulses match> Correct the calculation method for the number of pulses and electric gear setting. <When the number of pulses do not match> Correct the pulse counts, frequency, and output mode of the pulses output from the controller setting kit/teaching box to make them compatible with the LECPA parameter settings and specifications.
		Incorrect pulse detection	Check for equipment which generates strong electrical noise around the product.	Reduce the amount of noise generated from the surrounding equipment. Route the LECPA I/O cable separately from the noise source (surrounding equipment and their cables).
	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 CN1driver and the CN5 I/O signal power supply. → 4. External Wiring Diagram → 6.4 Parallel I/O Wiring Example
		Inappropriate specifications	Check that the combination of the electric actuator and driver is correct?	Check if the product number of the used electric actuator matches with the electric actuator which is applicable to the driver. → 3. Product Specifications
		Signal timing	Check the timing of the signal from the PLC to the driver.	PLC processing delay and drver scan delay are generated. Please ensure an interval of 15ms (30 ms if possible) or more between input signals, and maintain the signal state. → 8.4 Response time for the driver input signal

4	The electric actuator does not move correctly.	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 driver input power supply ・Disconnected/ connected cables. Input correct data (step data, parameter) again and confirm operation. → 3.2 Parts description → 7. Setting Data Entry
		Inappropriate basic parameters	Check that the parameter values are appropriate and the program is correct.	Check the maximum speed, maximum acceleration speed, and maximum deceleration speed of the electric actuator again, and then be sure to enter the correct parameters to check for correct operation. In particular, check that optional setting 1 is correct. → 7. Setting Data Entry
		Incorrect pulse input	Check that the number of input pulses recognized by the LECPA is the same as the number of pulses output from the controller setting kit or the teaching box. → 2.5 Procedure (until operating the electric actuator)	<When the number of pulses match> Correct the calculation method for the number of pulses and electric gear setting. <When the number of pulses do not match> Correct the pulse counts, frequency, and output mode of the pulses output from the controller setting kit/teaching box to make them compatible with the LECPA parameter settings and specifications.
	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. → 7. Setting Data Entry
		Inappropriate step data	Is the operation pattern trapezoidal?	In case of such operation, the actuator may start slowing down before it reaches the maximum speed. Modify the setting to make the moving distance longer or the acceleration larger. → 7. Setting Data Entry
		Inappropriate specifications	Check that the combination of the electric actuator and driver 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 driver. 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 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
		Incorrect pulse input	Check that the input pulse frequency is correct.	Input the correct pulse signal to check that it operates correctly. → 9. Operation (example)

Appendix 1. Default setting value per actuator

Appendix 1.1 LEY/LEYG series setting value

LEY/LEYG Step data default

Model		LEY16 / LEYG16			LEY25 / LEYG25			LEY32 / LEYG32			LEY40 / LEYG40		
Lead [mm]		10	5	2.5	12	6	3	16	8	4	16	8	4
Step data default	No.	0			0			0			0		
	Movement MOD	ABS			ABS			ABS			ABS		
	Speed	500	250	125	500	250	125	500	250	125	300	150	75
	Position	0.00			0.00			0.00			0.00		
	Acceleration	3000			3000			3000			3000		
	Deceleration	3000			3000			3000			3000		
	Pushing force	85			65			85			65		
	Trigger LV	85			65			85			65		
	Pushing speed	50			35			30			30		
	Moving force	100			100			100			100		
	Area1	0.00			0.00			0.00			0.00		
	Area2	0.00			0.00			0.00			0.00		
	In position	0.50			0.50			0.50			0.50		

LEY/LEYG Basic parameter default

Model		LEY16 / LEYG16			LEY25 / LEYG25			LEY3 2/ LEYG32			LEY40 / LEYG40		
Lead[mm]		10	5	2.5	12	6	3	16	8	4	16	8	4
Basic parameter default	Controller ID	1			1			1			1		
	IO pattern	1			1			1			1		
	Acceleration/ Deceleration pattern	1			1			1			1		
	S-motion ratio	0			0			0			0		
	Storoke(+)	1000.00			1000.00			1000.00			1000.00		
	Storoke(-)	-1000.00			-1000.00			-1000.00			-1000.00		
	Maximum speed	500	250	125	500	250	125	500	250	125	300	150	75
	Maximum acceleration/ deceleration	3000			3000			3000			3000		
	Default In position	0.50			0.50			0.50			0.50		
	ORIG offset	0.00			0.00			0.00			0.00		
	Max force	85			65			85			65		
	Para protect	1			1			1			1		
	Enable SW	2			2			2			2		
	Unit name	Part no. of each product											
	W-AREA1	0.00			0.00			0.00			0.00		
	W-AREA2	0.00			0.00			0.00			0.00		
	ORG Correct	0.00			0.00			0.00			0.00		
	Sensor type	1			1			1			1		
	Option set1	1			1			1			1		
	Undefined parameter11	1			1			1			1		
	Undefined parameter12	1			1			1			1		

LEY/LEYG Return to origin parameter default

Model		LEY16 / LEYG16	LEY25 / LEYG25	LEY32 / LEYG32	LEY40 / LEYG40
Return to origin parameter default	ORIG direction	2	2	2	2
	ORIG mode	1	1	1	1
	ORIG limit	100	100	100	100
	ORIG time	100	100	100	100
	ORIG speed	20	20	20	20
	ORIG ACC/DEC	1000	1000	1000	1000
	Creep speed	10	10	10	10
	ORIG sensor	0	0	0	0
	ORIG SW Dir	0	0	0	0
	Undefined parameter21	0	0	0	0

Appendix 1.2 LEF series setting value

LEFS Step data default

Model				LEFS16		LEFS25			LEFS32			LEFS40		
Lead [mm]				10	5	20	12	6	24	16	8	30	20	10
Step data default	No.			0		0			0			0		
	Movement MOD			ABS		ABS			ABS			ABS		
	Speed	Strok	to 500	500	250	1000	500	250	1200	500	250	500	500	250
			501-600	-	-	900	500	250	1200	500	250	500	500	250
			601-700	-	-	630	420	230	930	500	250	500	500	250
			701-800	-	-	550	330	180	750	500	250	500	500	250
			801-900	-	-	-	-	-	610	410	200	500	500	250
			901-1000	-	-	-	-	-	500	340	170	500	500	250
			1001-1100	-	-	-	-	-	-	-	-	500	440	220
			1101-1200	-	-	-	-	-	-	-	-	500	380	190
	Position			0.00		0.00			0.00			0.00		
	Acceleration			3000		3000			3000			3000		
	Deceleration			3000		3000			3000			3000		
	Pushing force			100		100			100			100		
	Trigger LV			100		100			100			100		
	Pushing speed			30		30			30			30		
	Moving force			100		100			100			100		
	Area1			0.00		0.00			0.00			0.00		
	Area2			0.00		0.00			0.00			0.00		
	In position			0.50		0.50			0.50			0.50		

LEFS Basic parameter default

Model		LEFS16		LEFS25			LEFS32			LEFS40		
Lead[mm]		10	5	20	12	6	24	16	8	30	20	10
Basic parameter default	Controller ID	1		1			1			1		
	IO pattern	1		1			1			1		
	Acceleration/ Deceleration pattern	1		1			1			1		
	S-motion ratio	0		0			0			0		
	Storoke(+)	Storoke +2		Storoke +2			Storoke +2			Storoke +2		
	Storoke(-)	-2		-2			-2			-2		
	Maximum speed	500	250	1000*	500	250	1200*	500	250	500	500	250
	Maximum acceleration/ deceleration	3000		3000			3000			3000		
	Default In position	0.50		0.50			0.50			0.50		
	ORIG offset	0.00		0.00			0.00			0.00		
	Max force	100		100			100			100		
	Para protect	1		1			1			1		
	Enable SW	2		2			2			2		
	Unit name	Part no. of each product										
	W-AREA1	0.00		0.00			0.00			0.00		
	W-AREA2	0.00		0.00			0.00			0.00		
	ORG Correct	0.00		0.00			0.00			0.00		
	Sensor type	1		1			1			1		
	Option set1	1		1			1			1		
	Undefined parameter11	1		1			1			1		
	Undefined parameter12	1		1			1			1		

The maximum speed varies depending on the stroke.
For details, refer to "LEFS step data initial values" in Appendix 1.2 "Setting values for the LEF series."

REFS Return to origin parameter default

Model		LEFS16	LEFS25	LEFS32	LEFS40
Return to origin parameter default	ORIG direction	2	2	2	2
	ORIG mode	1	1	1	1
	ORIG limit	100	100	100	100
	ORIG time	100	100	100	100
	ORIG speed	30	30	30	30
	ORIG ACC/DEC	1000	1000	1000	1000
	Creep speed	10	10	10	10
	ORIG sensor	0	0	0	0
	ORIG SW Dir	0	0	0	0
	Undefined parameter21	0	0	0	0

LEFB Step data default

Model		LEFB16	LEFB25	LEFB32
Lead [mm]		48	48	48
Step data default	No.	0	0	0
	Movement MOD	ABS	ABS	ABS
	Speed	1100	1400	1500
	Position	0.00	0.00	0.00
	Acceleration	3000	3000	3000
	Deceleration	3000	3000	3000
	Pushing force	100	100	100
	Trigger LV	100	100	100
	Pushing speed	60	60	60
	Moving force	100	100	100
	Area1	0.00	0.00	0.00
	Area2	0.00	0.00	0.00
	In position	1.00	1.00	1.00

LEFB Basic parameter default

Model		LEFB16	LEFB25	LEFB32
Lead[mm]		48	48	48
Basic parameter default	Controller ID	1	1	1
	IO pattern	1	1	1
	Acceleration/ Deceleration pattern	1	1	1
	S-motion ratio	0	0	0
	Storoke(+)	Storoke +2	Storoke +2	Storoke +2
	Storoke(-)	-2	-2	-2
	Maximum speed	1100	1400	1500
	Maximum acceleration/ deceleration	3000	3000	3000
	Default In position	1.00	1.00	1.00
	ORIG offset	0.00	0.00	0.00
	Max force	100	100	100
	Para protect	1	1	1
	Enable SW	2	2	2
	Unit name	Part no. of each product		
	W-AREA1	0.00	0.00	0.00
	W-AREA2	0.00	0.00	0.00
	ORG Correct	0.00	0.00	0.00
	Sensor type	1	1	1
	Option set1	1	1	1
	Undefined parameter11	1	1	1
	Undefined parameter12	1	1	1

LEFB Return to origin parameter default

Model		LEFB16	LEFB25	LEFB32
Return to origin parameter default	ORIG direction	2	2	2
	ORIG mode	1	1	1
	ORIG limit	100	100	100
	ORIG time	200	200	200
	ORIG speed	60	60	60
	ORIG ACC/DEC	1000	1000	1000
	Creep speed	10	10	10
	ORIG sensor	0	0	0
	ORIG SW Dir	0	0	0
	Undefined parameter21	0	0	0

Appendix 1.3 LES series setting value

LES Step data default

Model		LES8		LES16		LES25	
Lead[mm]		4	8	5	10	8	16
Step data default	No.	0		0		0	
	Movement MOD	ABS		ABS		ABS	
	Speed	200	400	200	400	200	400
	Position	0.00		0.00		0.00	
	Acceleration	5000		5000		5000	
	Deceleration	5000		5000		5000	
	Pushing force	70		70		70	
	Trigger LV	70		70		70	
	Pushing speed	20		20		20	
	Moving force	100		100		100	
	Area1	0.00		0.00		0.00	
	Area2	0.00		0.00		0.00	
	In position	0.50		0.50		0.50	

LES Basic parameter default

Model		LES8		LES16		LES25	
Lead[mm]		4	8	5	10	8	16
Basic parameter default	Controller ID	1		1		1	
	IO pattern	1		1		1	
	Acceleration/ Deceleration pattern	1		1		1	
	S-motion ratio	0		0		0	
	Storoke(+)	Storoke +1		Storoke +1		Storoke +1	
	Storoke(-)	-1.00		-1.00		-1.00	
	Maximum speed	200	400	200	400	200	400
	Maximum acceleration/ deceleration	5000		5000		5000	
	Default In position	0.50		0.50		0.50	
	ORIG offset	0.00		0.00		0.00	
	Max force	70		70		70	
	Para protect	1		1		1	
	Enable SW	2		2		2	
	Unit name	Part no. of each product					
	W-AREA1	0.00		0.00		0.00	
	W-AREA2	0.00		0.00		0.00	
	ORG Correct	0.00		0.00		0.00	
	Sensor type	1		1		1	
	Option set1	1		1		1	
	Undefined parameter11	1		1		1	
	Undefined parameter12	1		1		1	

LES Return to origin parameter default

Model		LES8	LES16	LES25
Return to origin parameter default	ORIG direction	2	2	2
	ORIG mode	1	1	1
	ORIG limit	100	100	100
	ORIG time	100	100	100
	ORIG speed	20	20	20
	ORIG ACC/DEC	100	100	100
	Creep speed	10	10	10
	ORIG sensor	0	0	0
	ORIG SW Dir	0	0	0
	Undefined parameter21	0	0	0

LESH Step data default

Model		LESH8		LESH16		LESH25	
Lead[mm]		4	8	5	10	8	16
Step data default	No.	0		0		0	
	Movement MOD	ABS		ABS		ABS	
	Speed	200	400	200	400	150	400
	Position	0.00		0.00		0.00	
	Acceleration	5000		5000		5000	
	Deceleration	5000		5000		5000	
	Pushing force	70		70		70	
	Trigger LV	70		70		70	
	Pushing speed	20		20		20	
	Moving force	100		100		100	
	Area1	0.00		0.00		0.00	
	Area2	0.00		0.00		0.00	
	In position	0.50		0.50		0.50	

LESH Basic parameter default

Model		LESH8		LESH16		LESH25	
Lead[mm]		4	8	5	10	8	16
Basic parameter default	Controller ID	1		1		1	
	IO pattern	1		1		1	
	Acceleration / Deceleration pattern	1		1		1	
	S-motion ratio	0		0		0	
	Storoke (+)	Storoke +1		Storoke +1		Storoke +1	
	Storoke (-)	-1.00		-1.00		-1.00	
	Maximum speed	200	400	200	400	150	400
	Maximum acceleration/ deceleration	5000		5000		5000	
	Default In position	0.50		0.50		0.50	
	ORIG offset	0.00		0.00		0.00	
	Max force	70		70		70	
	Para protect	1		1		1	
	Enable SW	2		2		2	
	Unit name	Part no. of each product					
	W-AREA1	0.00		0.00		0.00	
	W-AREA2	0.00		0.00		0.00	
	ORG Correct	0.00		0.00		0.00	
	Sensor type	1		1		1	
	Option set1	1		1		1	
	Undefined parameter11	1		1		1	
	Undefined parameter12	1		1		1	

LESH Return to origin parameter default

Model		LESH8	LESH16	LESH25
Return to origin parameter default	ORIG direction	2	2	2
	ORIG mode	1	1	1
	ORIG limit	100	100	100
	ORIG time	100	100	100
	ORIG speed	20	20	20
	ORIG ACC / DEC	100	100	100
	Creep speed	10	10	10
	ORIG sensor	0	0	0
	ORIG SW Dir	0	0	0
	Undefined parameter21	0	0	0

Appendix 1.4 LEHZ series setting value

LEHZ Step data default

Model		LEHZ10	LEHZ16	LEHZ20	LEHZ25	LEHZ32	LEHZ40
Lead [mm]		251 / 73	249 / 77	246 / 53	243 / 48	242 / 39	254 / 43
Step data default	No.	0		0		0	
	Movement MOD	ABS		ABS		ABS	
	Speed	80		100		120	
	Position	0.00		0.00		0.00	
	Acceleration	2000		2000		2000	
	Deceleration	2000		2000		2000	
	Pushing force	100		100		100	
	Trigger LV	100		100		100	
	Pushing speed	50		50		50	
	Moving force	150		150		150	
	Area1	0.00		0.00		0.00	
	Area2	0.00		0.00		0.00	
	In position	0.50		0.50		0.50	

LEHZ Basic parameter default

Model		LEHZ10	LEHZ16	LEHZ20	LEHZ25	LEHZ32	LEHZ40
Lead [mm]		251 / 73	249 / 77	246 / 53	243 / 48	242 / 39	254 / 43
Basic parameter default	Controller ID	1		1		1	
	IO pattern	1		1		1	
	Acceleration / Deceleration pattern	1		1		1	
	S-motion ratio	0		0		0	
	Storoke (+)	1000.00		1000.00		1000.00	
	Storoke (-)	-1000.00		-1000.00		-1000.00	
	Maximum speed	80		100		120	
	Maximum acceleration/ deceleration	2000		2000		2000	
	Default In position	0.50		0.50		0.50	
	ORIG offset	1.00		1.00		1.00	
	Max force	100		100		100	
	Para protect	1		1		1	
	Enable SW	2		2		2	
	Unit name	Part no. of each product					
	W-AREA1	0.00		0.00		0.00	
	W-AREA2	0.00		0.00		0.00	
	ORG Correct	0.00		0.00		0.00	
	Sensor type	1		1		1	
	Option set1	1		1		1	
	Undefined parameter11	1		1		1	
	Undefined parameter12	1		1		1	

L LEHZ Return to origin parameter default

Model		LEHZ10	LEHZ16	LEHZ20	LEHZ25	LEHZ32	LEHZ40
Return to origin parameter default	ORIG direction	2		2		2	
	ORIG mode	1		1		1	
	ORIG limit	100		100		100	
	ORIG time	100		100		100	
	ORIG speed	10		10		10	
	ORIG ACC / DEC	1000		1000		1000	
	Creep speed	10		10		10	
	ORIG sensor	0		0		0	
	ORIG SW Dir	0		0		0	
	Undefined parameter21	0		0		0	

LEHF Step data default

Model		LEHF10	LEHF20	LEHF32	LEHF40
Lead [mm]		40 / 15	50 / 15	70 / 16	70 / 16
Step data default	No.	0	0	0	0
	Movement MOD	ABS	ABS	ABS	ABS
	Speed	80	100	100	100
	Position	0.00	0.00	0.00	0.00
	Acceleration	2000	2000	2000	2000
	Deceleration	2000	2000	2000	2000
	Pushing force	100	100	100	100
	Trigger LV	100	100	100	100
	Pushing speed	20	30	30	30
	Moving force	150	150	150	150
	Area1	0.00	0.00	0.00	0.00
	Area2	0.00	0.00	0.00	0.00
	In position	0.50	0.50	0.50	0.50

LEHF Basic parameter default

Model		LEHF10	LEHF20	LEHF32	LEHF40
Lead [mm]		40 / 15	50 / 15	70 / 16	70 / 16
Basic parameter default	Controller ID	1	1	1	1
	IO pattern	1	1	1	1
	Acceleration/ Deceleration pattern	1	1	1	1
	S-motion ratio	0	0	0	0
	Storoke (+)	1000.00	1000.00	1000.00	1000.00
	Storoke (-)	-1000.00	-1000.00	-1000.00	-1000.00
	Maximum speed	80	100	100	100
	Maximum acceleration/ deceleration	2000	2000	2000	2000
	Default In position	0.50	0.50	0.50	0.50
	ORIG offset	1.00	1.00	1.00	1.00
	Max force	100	100	100	100
	Para protect	1	1	1	1
	Enable SW	2	2	2	2
	Unit name	Part no. of each product			
	W-AREA1	0.00	0.00	0.00	0.00
	W-AREA2	0.00	0.00	0.00	0.00
	ORG Correct	0.00	0.00	0.00	0.00
	Sensor type	1	1	1	1
	Option set1	1	1	1	1
	Undefined parameter11	1	1	1	1
	Undefined parameter12	1	1	1	1

LEHF Return to origin parameter default

Model		LEHF10	LEHF20	LEHF32	LEHF40
Return to origin parameter default	ORIG direction	2	2	2	2
	ORIG mode	1	1	1	1
	ORIG limit	100	100	100	100
	ORIG time	100	100	100	100
	ORIG speed	10	10	10	10
	ORIG ACC/DEC	1000	1000	1000	1000
	Creep speed	10	10	10	10
	ORIG sensor	0	0	0	0
	ORIG SW Dir	0	0	0	0
	Undefined parameter21	0	0	0	0

LEHS Step data default

Model		LEHS10	LEHS20	LEHS32	LEHS40
Lead[mm]		255 / 76	235 / 56	235 / 40	235 / 40
Step data default	No.	0	0	0	0
	Movement MOD	ABS	ABS	ABS	ABS
	Speed	70	80	100	120
	Position	0.00	0.00	0.00	0.00
	Acceleration	2000	2000	2000	2000
	Deceleration	2000	2000	2000	2000
	Pushing force	100	100	100	100
	Trigger LV	100	100	100	100
	Pushing speed	50	50	50	50
	Moving force	100	100	100	100
	Area1	0.00	0.00	0.00	0.00
	Area2	0.00	0.00	0.00	0.00
	In position	0.50	0.50	0.50	0.50

LEHS Basic parameter default

Model		LEHS10	LEHS20	LEHS32	LEHS40
Lead [mm]		255 / 76	235 / 56	235 / 40	235 / 40
Basic parameter default	Controller ID	1	1	1	1
	IO pattern	1	1	1	1
	Acceleration/ Deceleration pattern	1	1	1	1
	S-motion ratio	0	0	0	0
	Storoke (+)	1000.00	1000.00	1000.00	1000.00
	Storoke (-)	-1000.00	-1000.00	-1000.00	-1000.00
	Maximum speed	70	80	100	120
	Maximum acceleration / deceleration	2000	2000	2000	2000
	Default In position	0.50	0.50	0.50	0.50
	ORIG offset	1.00	1.00	1.00	1.00
	Max force	100	100	100	100
	Para protect	1	1	1	1
	Enable SW	2	2	2	2
	Unit name	Part no. of each product			
	W-AREA1	0.00	0.00	0.00	0.00
	W-AREA2	0.00	0.00	0.00	0.00
	ORG Correct	0.00	0.00	0.00	0.00
	Sensor type	1	1	1	1
	Option set1	1	1	1	1
	Undefined parameter11	1	1	1	1
	Undefined parameter12	1	1	1	1

LEHS Return to origin parameter default

Model		LEHS10	LEHS20	LEHS32	LEHS40
Return to origin parameter default	ORIG direction	2	2	2	2
	ORIG mode	1	1	1	1
	ORIG limit	100	100	100	100
	ORIG time	100	100	100	100
	ORIG speed	10	10	10	10
	ORIG ACC/DEC	1000	1000	1000	1000
	Creep speed	10	10	10	10
	ORIG sensor	0	0	0	0
	ORIG SW Dir	0	0	0	0
	Undefined parameter21	0	0	0	0

Appendix 1.5 LER series setting value

LER Step data default

Model		LER10K	LER10J	LER30K	LER30J	LER50K	LER50J
Gear Ratio [°]		8	12	8	12	7.5	12
Step data default	No.	0	0	0	0	0	0
	Movement MOD	ABS	ABS	ABS	ABS	ABS	ABS
	Speed	280	420	280	420	280	420
	Position	0.00	0.00	0.00	0.00	0.00	0.00
	Acceleration	3000	3000	3000	3000	3000	3000
	Deceleration	3000	3000	3000	3000	3000	3000
	Pushing force	50	50	50	50	50	50
	Trigger LV	50	50	50	50	50	50
	Pushing speed	20	30	20	30	20	30
	Moving force	100	100	100	100	100	100
	Area1	0.00	0.00	0.00	0.00	0.00	0.00
	Area2	0.00	0.00	0.00	0.00	0.00	0.00
	In position	0.50	0.50	0.50	0.50	0.50	0.50

LER Basic parameter default

Model		LER10K	LER10J	LER30K	LER30J	LER50K	LER50J
Gear Ratio [°]		8	12	8	12	7.5	12
Basic parameter default	Controller ID	1		1		1	
	IO pattern	1		1		1	
	Acceleration/ Deceleration pattern	1		1		1	
	S-motion ratio	0		0		0	
	Storoke (+)	1000.00		1000.00		1000.00	
	Storoke (-)	-1000.00		-1000.00		-1000.00	
	Maximum speed	280	420	280	420	280	420
	Maximum acceleration/ deceleration	3000		3000		3000	
	Default In position	0.50		0.50		0.50	
	ORIG offset	0.00/Basic 5.00/External stopper(-2、3)					
	Max force	50		50		50	
	Para protect	1		1		1	
	Enable SW	2		2		2	
	Unit name	Part no. of each product					
	W-AREA1	0.00		0.00		0.00	
	W-AREA2	0.00		0.00		0.00	
	ORG Correct	0.00		0.00		0.00	
	Sensor type	1		1		1	
	Option set1	1		1		1	
	Undefined parameter11	1		1		1	
	Undefined parameter12	1		1		1	

LER Return to origin parameter default

Model		LER10K	LER10J	LER30K	LER30J	LER50K	LER50J
Return to origin parameter default	ORIG direction	2		2		2	
	ORIG mode	1		1		1	
	ORIG limit	50		50		50	
	ORIG time	100		100		100	
	ORIG speed	20	30	20	30	20	30
	ORIG ACC / DEC	1000		1000		1000	
	Creep speed	20	30	20	30	20	30
	ORIG sensor	0		0		0	
	ORIG SW Dir	0		0		0	
	Undefined parameter21	0		0		0	

Appendix 1.6 LEP series setting value

LEPY Step data default

Model		LEPY6		LEPY10	
Lead [mm]		4	8	5	10
Step data default	No.	0		0	
	Movement MOD	ABS		ABS	
	Speed	150	300∗	200	350∗
	Position	0.00		0.00	
	Acceleration	3000		3000	
	Deceleration	3000		3000	
	Pushing force	100	100	100	100
	Trigger LV	100	100	100	100
	Pushing speed	10	20	10	20
	Moving force	150		150	
	Area1	0.00		0.00	
	Area2	0.00		0.00	
	In position	0.50		0.50	

∗When the stroke is 25mm, the initial value becomes “250”.

LEPY Basic parameter default

Model		LEPY6		LEPY10	
Lead [mm]		4	8	5	10
Basic parameter default	Controller ID	1		1	
	IO pattern	1		1	
	Acceleration / Deceleration pattern	1		1	
	S-motion ratio	0		0	
	Storoke (+)	1000.00		1000.00	
	Storoke (-)	-1000.00		-1000.00	
	Maximum speed	150	300	200	350
	Maximum acceleration / deceleration	3000		3000	
	Default In position	0.50		0.50	
	ORIG offset	0.00		0.00	
	Max force	100		100	
	Para protect	1		1	
	Enable SW	2		2	
	Unit name	Part no. of each product			
	W-AREA1	0.00		0.00	
	W-AREA2	0.00		0.00	
	ORG Correct	0.00		0.00	
	Sensor type	1		1	
	Option set1	1		1	
	Undefined parameter11	1		1	
	Undefined parameter12	1		1	

LEPY Return to origin parameter default

Model		LEPY6	LEPY10
Return to origin parameter default	ORIG direction	2	2
	ORIG mode	1	1
	ORIG limit	150	150
	ORIG time	100	100
	ORIG speed	LEP□□J:20 LEP□□K:10	LEP□□J:20 LEP□□K:10
	ORIG ACC / DEC	3000	3000
	Creep speed	20	20
	ORIG sensor	0	0
	ORIG SW Dir	0	0
	Undefined parameter21	0	0

LEPS Step data default

Model		LEPS6		LEPS10	
Lead [mm]		4	8	5	10
Step data default	No.	0		0	
	Movement MOD	ABS		ABS	
	Speed	150	300*	200	350*
	Position	0.00		0.00	
	Acceleration	3000		3000	
	Deceleration	3000		3000	
	Pushing force	100	100	100	100
	Trigger LV	100	100	100	100
	Pushing speed	10	20	10	20
	Moving force	150		150	
	Area1	0.00		0.00	
	Area2	0.00		0.00	
	In position	0.50		0.50	

∗When the stroke is 25mm, the initial value becomes “250”.

LEPS Basic parameter default

Model		LEPS6		LEPS10	
Lead [mm]		4	8	5	10
Basic parameter default	Controller ID	1		1	
	IO pattern	1		1	
	Acceleration / Deceleration pattern	1		1	
	S-motion ratio	0		0	
	Storoke (+)	1000.00		1000.00	
	Storoke (-)	-1000.00		-1000.00	
	Maximum speed	150	300	200	350
	Maximum acceleration / deceleration	3000		3000	
	Default In position	0.50		0.50	
	ORIG offset	0.00		0.00	
	Max force	100		100	
	Para protect	1		1	
	Enable SW	2		2	
	Unit name	Part no. of each product			
	W-AREA1	0.00		0.00	
	W-AREA2	0.00		0.00	
	ORG Correct	0.00		0.00	
	Sensor type	1		1	
	Option set1	1		1	
	Undefined parameter11	1		1	
	Undefined parameter12	1		1	

LEPS Return to origin parameter default

Model		LEPS6	LEPS10
Return to origin parameter default	ORIG direction	2	2
	ORIG mode	1	1
	ORIG limit	150	150
	ORIG time	100	100
	ORIG speed	LEP□□J:20 LEP□□K:10	LEP□□J:20 LEP□□K:10
	ORIG ACC / DEC	3000	3000
	Creep speed	20	20
	ORIG sensor	0	0
	ORIG SW Dir	0	0

Revision history
No.LEC-OM04501 Jan/2012 1st printing No.LEC-OM04502 March/2012 Revision - Pushing operation addition - Addition to notes about UL recognition No.LEC-OM04503 April/2014 Revision - Addition to notes about Automatic pulse reference detection No.LEC-OM04504 March /2015 Revision - Corrected and explanation added to Basic parameter "Option set1", EMG terminal, electrical wiring specifications, return to origin, parallel I/O signal, operating environment, troubleshooting and parameter default. - Corrected erroneous descriptions. No.LEC-OM04505 August/2015 Revision - Addition to Pulse input / PNP open collector input circuit -Addition to LES setting value No.JXC※-OMT0042-A Mar/2018 Complete revision No.JXC※-OMT0042-B Mar/2023 Corrected erroneous descriptions. No.JXC※-OMT0042-C Feb/2025 Revision of Safety Instructions

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