Doc. no. LEC-OM05803

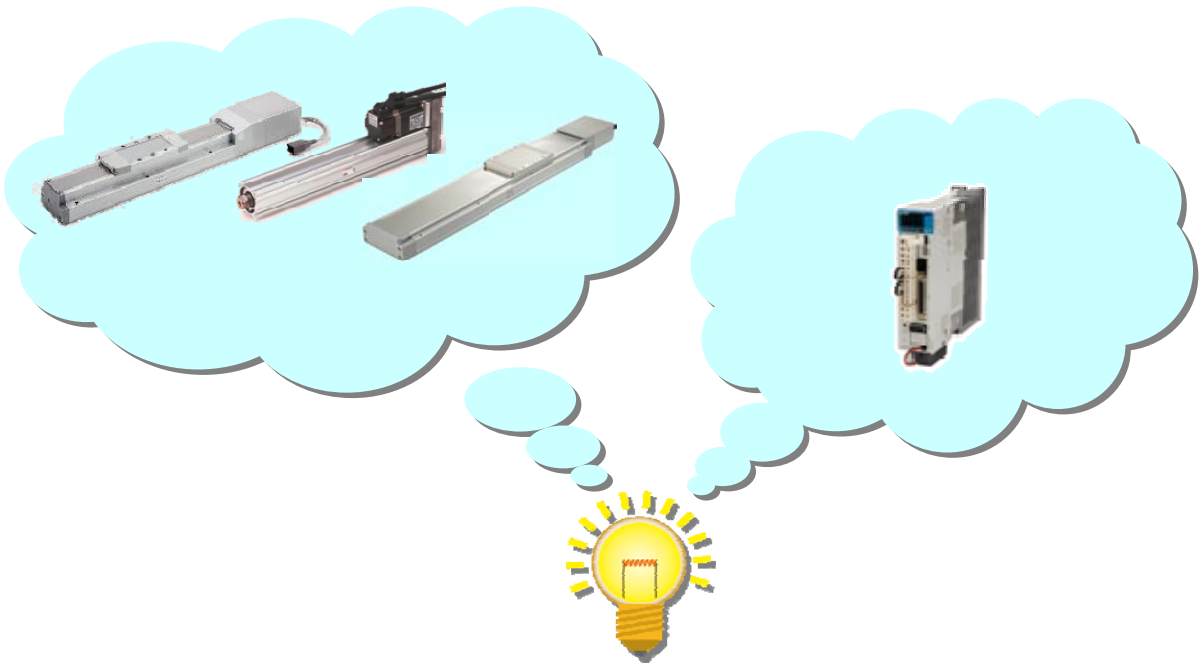
Operation Manual
(Simplified edition)

PRODUCT NAME

AC Servo Motor Driver
(Pulse input type)

MODEL / Series / Product Number

LECSB Series



SMC Corporation

CONTENTS

LECSB Series / Driver 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), Japan Industrial Standards (JIS)*1) and other safety regulations*2).

*1) ISO 4414: Pneumatic fluid power -- General rules relating to systems
ISO 4413: Hydraulic fluid power -- General rules relating to systems
IEC 60204-1: Safety of machinery -- Electrical equipment of machines (Part 1: General requirements)
ISO 10218-1992: Manipulating industrial robots -- Safety
JIS B 8370: General rules for pneumatic equipment.
JIS B 8361: General rules for hydraulic equipment.
JIS B 9960-1: Safety of machinery – Electrical equipment for machines. (Part 1: General requirements)
JIS B 8433-1993: Manipulating industrial robots - Safety. etc.

*2) Labor Safety and Sanitation Law, etc.

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

Warning

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

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

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

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

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

The product specified here may become unsafe if handled incorrectly.

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

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

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.

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.

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

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

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

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

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

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

Note that the ⚠CAUTION level may lead to a serious consequence according to conditions. Please follow the instructions of both levels because they are important to personnel safety.

LECSB Series / Driver
Safety Instructions

⚠ Caution

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

Limited warranty and Disclaimer/Compliance Requirements

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

Limited warranty and Disclaimer

The warranty period of the product is 1 year in service or 1.5 years after the product is delivered.*3) Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.

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.

Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

***3) 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

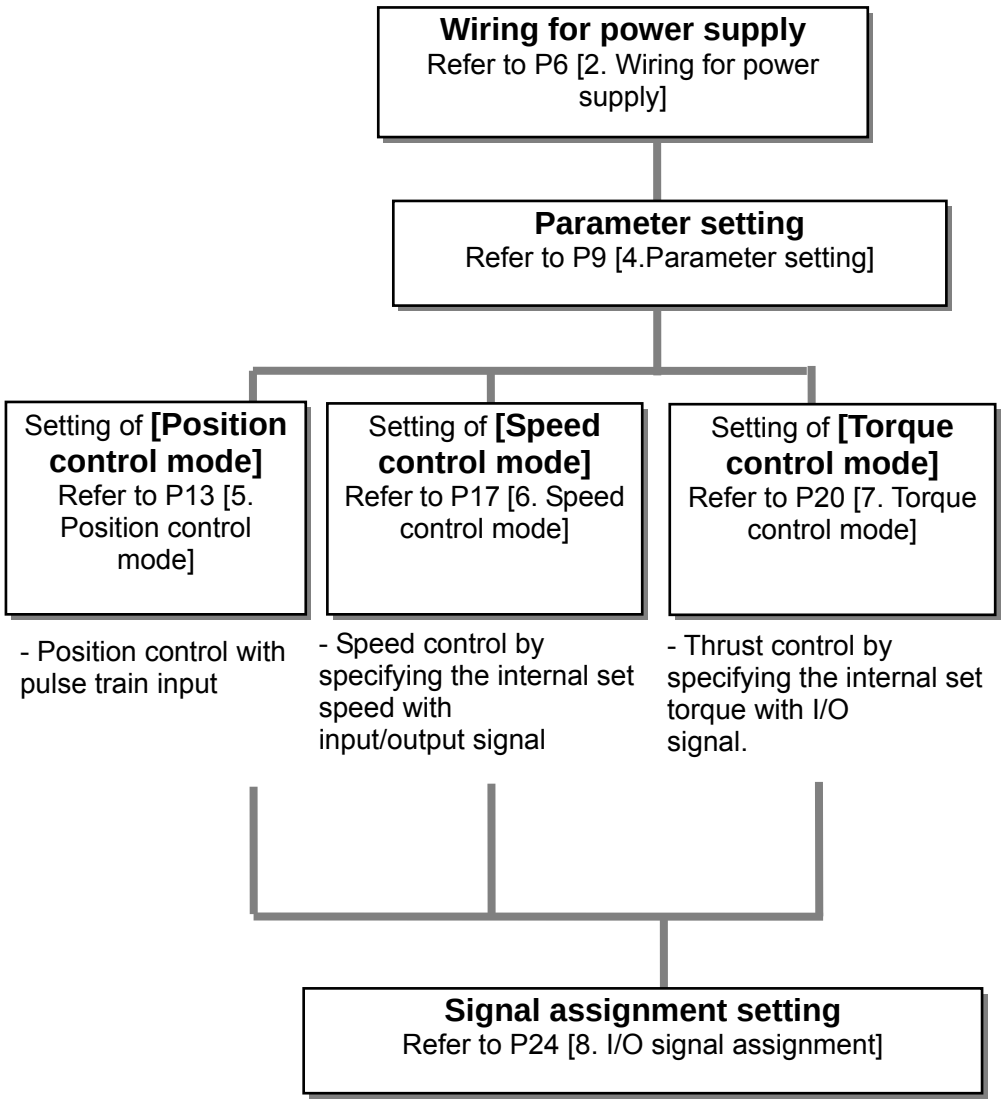
When the product is exported, strictly follow the laws required by the Ministry of Economy, Trade and Industry (Foreign Exchange and Foreign Trade Control Law).

Introduction

It is recommended that the operator read the operation manual for LECSB prior to use.
For the handling and details of other equipment, please refer to the operation manual for used equipment.

1. Procedure before operation

1.1 Flow chart



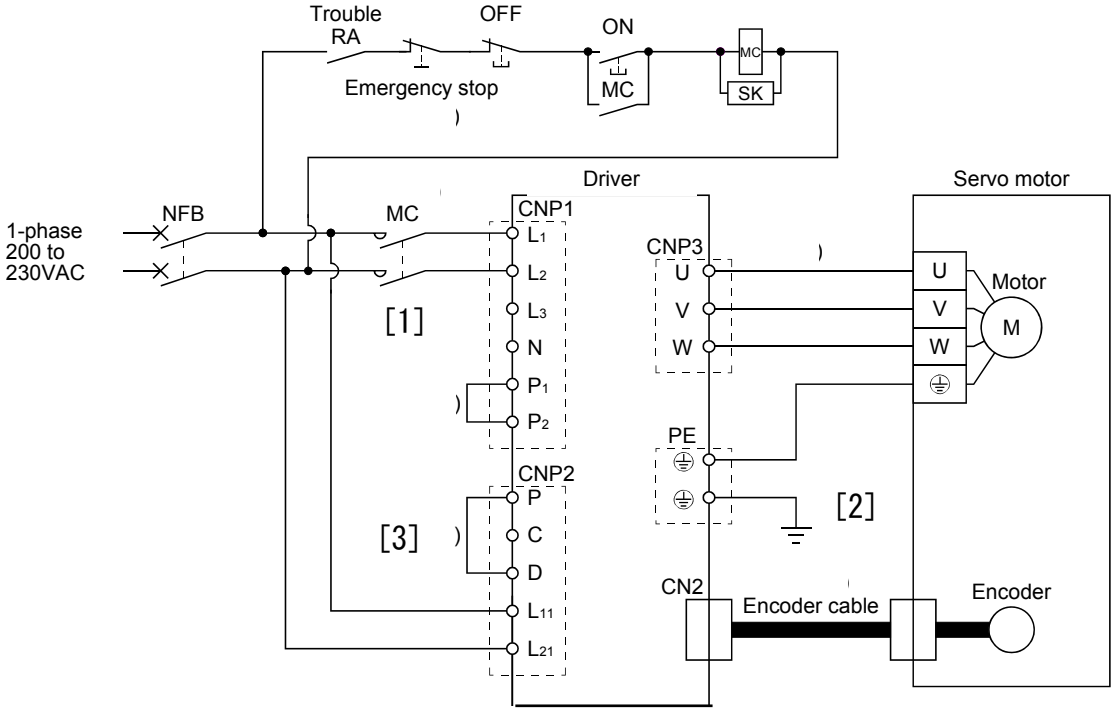
2. Wiring for power supply

2.1 Wiring for power supply

Connect the actuator and driver power supply. This wiring diagram is common for each mode.

(1) LECSB (Absolute encoder)

EX.) Power supply voltage is 200VAC single phase



[1] Power supply input terminal L_1, L_2: Provide specified power supply to input terminals L_1 and L_2.

[2] - Connect the motor power supply input terminal (U, V, W) to the driver power terminal (U, V, W)
- Connect the motor ground terminal to the driver ground terminal.
- Connect the cable for detector.

[3] Connect the 24VDC external power supply to the power supply for the control circuit.

Refer to “LECSB Operation Manual“, Chapter 3 when the power supply voltage is 100VAC.

3. Parameter list for each mode

These parameters require setting in each control mode. Please set the parameters if necessary.
Refer to “4. Parameter setting“ and “LECSB Operation Manual“,Chapter 5 for details.
Refer to “LECSC Operation Manual“,Chapter 5 for parameters which are not mentioned in this clause.

3.1 Parameters common to each mode

(1) [Basic setting parameters (No.PA□□)]

No.	Symbol	Name	Initial value	Unit
PA01	STY	Control mode	0000h	

(2) [I/O setting parameters (No. PD□□)]

These parameters are set when changing the assignment of the input/output signal and selecting the input signal automatic ON.
Refer to “8. Assignment of input/output signal“ and “LECSB Operation Manual“,5.4 for details.

3.2 Position control mode

(1)[Basic setting parameters (No.PA□□)]

No.	Symbol	Name	Initial value	Unit
PA05	FBP	Number of command input pulses per revolution	0	
PA06	CMX	Electronic gear numerator (Command pulse multiplying factor numerator)	1	
PA07	CDV	Electronic gear denominator (Command pulse multiplying factor denominator)	1	
PA08	ATU	Auto tuning mode	0001h	
PA09	RSP	Auto tuning response	12	
PA10	INP	In-position range	100	pulse
PA13	PLSS	Command pulse input form	0000h	
PA14	POL	Rotation direction selection	0	

3.3 Speed control mode

(1)[Basic setting parameters (No.PA□□)]

No.	Symbol	Name	Initial value	Unit
PA08	ATU	Auto tuning mode	0001h	
PA09	RSP	Auto tuning response	12	

(2)[Extension setting parameters (No. PC□□)]

No.	Symbol	Name	Initial value	Unit
PC01	STA	Acceleration time constant	0	ms
PC02	STB	Deceleration time constant	0	ms
PC05	SC1	Internal speed command 1	100	r/min
PC06	SC2	Internal speed command 2	500	r/min
PC07	SC3	Internal speed command 3	1000	r/min
PC08	SC4	Internal speed command 4	200	r/min
PC09	SC5	Internal speed command 5	300	r/min
PC10	SC6	Internal speed command 6	500	r/min
PC11	SC7	Internal speed command 7	800	r/min

3.4 Torque control mode

(1)[Extension setting parameters (No. PC□□)]

No.	Symbol	Name	Initial value	Unit
PC01	STA	Acceleration time constant	0	ms
PC02	STB	Deceleration time constant	0	ms
PC05	SC1	Internal speed limit 1	100	r/min
PC06	SC2	Internal speed limit 2	500	r/min
PC07	SC3	Internal speed limit 3	1000	r/min
PC08	SC4	Internal speed limit 4	200	r/min
PC09	SC5	Internal speed limit 5	300	r/min
PC10	SC6	Internal speed limit 6	500	r/min
PC11	SC7	Internal speed limit 7	800	r/min

4. Parameter setting

Applicable parameters are described below. Refer to “LECSB Operation Manual“, Chapter 5 for details.

4.1 Control mode

Select the control mode.

(1) Selection of LECSB control mode

Set parameter: [PA01]

Setting of the control mode

Parameter			Initial value	Unit	Setting range	Control mode		
No.	Symbol	Name				Position	Speed	Torque
PA01	STY	Control mode	0000h		Refer to the text.	○	○	○

POINT

・Turn off the power and then on again after setting the parameter to validate the parameter value.

Select the control mode of the driver.

Parameter No.PA01

0	0	0	

Selection of control mode
0: Position control mode
1: Position control mode and speed control mode
2: Speed control mode
3: Speed control mode and torque control mode
4: Torque control mode
5: Torque control mode and position control mode

EX.) To set the control mode to the position control mode

[PA01] = 0000

4.2 Number of command input pulses and electronic gear

It is necessary to adjust the electric gear to convert from the command pulse sent from position unit to the travel amount of electrical actuator.

(1) Set the parameter: [PA05], [PA06], [PA07] of LECSB driver.

Parameter			Initial value	Unit	Setting range	Control mode		
No.	Symbol	Name				Position	Speed	Torque
PA05	FBP	Number of command input pulses per revolution	0		0・1000 to 50000	○		
PA06	CMX	Electronic gear numerator (command pulse multiplying factor numerator)	1		1 to 1048576	○		
PA07	CDV	Electronic gear denominator (command pulse multiplying factor denominator)	1		1 to 1048576	○		

Set the value [PA05] to [PA07] are as follows.

*[PA05] = 0(Initial value)
Initial value 0 correspond to "Nomber of command input pulses per revolution." 262144 [pulses/rev].

* [PA06] = [Number of command input pulses per revolution]×P×$\frac{1}{1000}$

* [PA07] = Actuator lead L [mm]

P: Travel amount per 1 command pulse [μm]*

Ex.) To Travel amount per 1 command pulse (P=10μm) by actuator lead (L = 6mm)

[PA05] = 0(Initial value)

$$\frac{[PA06]}{[PA07]} = \frac{262144\times10\times\frac{1}{1000}}{6}$$

$$\frac{[PA06]}{[PA07]} = \frac{262144\times10}{6\times1000}$$

$$\frac{[PA06]}{[PA07]} = \frac{32768}{75}$$

[PA05] = 0
[PA06] = 32768
[PA07] = 75

4.2.1 List of the electronic gear setting for each actuator

The recommended the electronic gear for each actuator.
Please change the electronic gear by use of the customer.

Series		Lead symbol	Lead	Travel amount per command 1 pulse [μm / pulse]		
				10		
				PA05	PA06	PA07
LEY	LEY25/LEYG25 LEY25D/LEYG25D	A	12	0	32768	150
		B	6		32768	75
		C	3		65536	75
	LEY32/LEYG32 LEY63D	A	20		32768	250
		B	10		32768	125
		C	5		65536	125
	LEY32D/LEYG32D	A	16		32768	200
		B	8		32768	100
		C	4		32768	50
	LEY63	A	20		32768	250
		B	10		32768	125
		C	5		65536	125
		L	2.86		114688	125
LEF	LEFS25	H	20		32768	250
		A	12			150
		B	6			75
	LEFS32	H	24			300
		A	16			200
		B	8			100
	LEFS40	H	30			375
		A	20			250
		B	10			125
	LEFB25	S	54			675
	LEFB32	S				
	LEFB40	S				
LEJ	LEJB40	T	27		65536	675
	LEJB63	T	42		32768	525
	LEJS40	H	24		32768	300
		A	16			200
		B	8			100
	LEJS63	H	30			375
		A	20			250
		B	10			125

4.3 Command input pulse form

Set the input pulse configuration in the position control mode.

(2) Set the input configuration of the LECSB pulse train input signal.

Set parameter: [PA13]

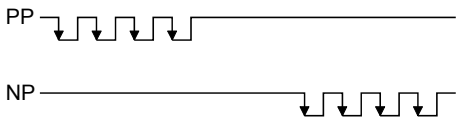
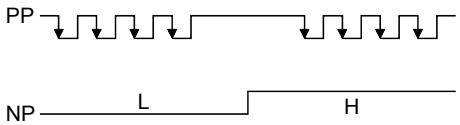
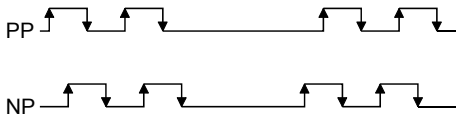
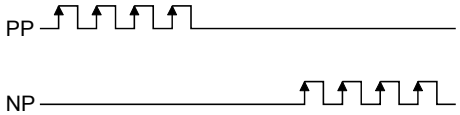
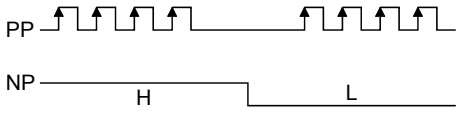
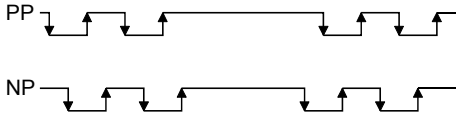
Parameter			Initial value	Unit	Setting range	Control mode		
No.	Symbol	Name				Position	Speed	Torque
PA13	PLSS	Command pulse input form	0000h		Refer to the text.	○		

Select the input form of the pulse train input signal. Command pulses may be input in any of three different forms, for which positive or negative logic can be chosen.

Arrow ⌐↑ or ⌐↓ in the table indicates the timing of importing a pulse train.

A- and B-phase pulse trains are imported after they have been multiplied by 4.

Selection of command pulse input form

Setting	Pulse train form		Forward rotation command / Reverse rotation command
0010h	Negative logic	Forward rotation pulse train Reverse rotation pulse train	
0011h		Signed pulse train	
0012h		A-phase pulse train B-phase pulse train	
0000h	Positive logic	Forward rotation pulse train Reverse rotation pulse train	
0001h		Signed pulse train	
0002h		A-phase pulse train B-phase pulse train	

EX.) To set the command pulse input configuration to pulse train + Symbol in a positive logic.
[PA13]=0001

4.4 Input signal automatic ON selection

To start the motor, the input signals listed below must be on.
Select automatic ON for the following parameter [PD01], or connect wire of I/O signal.
□If the product is used with I/O signal, set the parameter [PD01] to "0000".

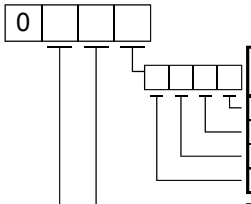
Input signals which must be ON: SON, LSP, LSN

(1) LECSB **Automatic ON setting**

* To set [PD**], set parameter write inhibit [PA19] to "00F".

Set parameter: [PD01]

No.	Symbol	Name and function	Initial value	Unit	Setting range	Control mode		
						Position	Speed	Torque
PD01	DIA1	Input signal automatic ON selection 1 Select the input devices to be automatically turned ON.	0000h		Refer to name and function column.	○	○	○



Signal name	Initial value BIN	Initial value HEX
	0	0
	0	
Servo-on (SON)	0	
	0	

Signal name	Initial value BIN	Initial value HEX
Proportion control (PC)	0	0
External torque limit selection (TL)	0	
	0	
	0	

Signal name	Initial value BIN	Initial value HEX
	0	0
	0	
Forward rotation stroke end (LSP)	0	
Reverse rotation stroke end (LSN)	0	

BIN 0: Used as external input signal
BIN 1: Automatic ON

EX.) To automatically turn on LSP, LSN, TL, and SON, the parameter should be [PD01]=0C24.

5. Position control mode

Control the motor rotation speed and direction with pulse train and perform position control.

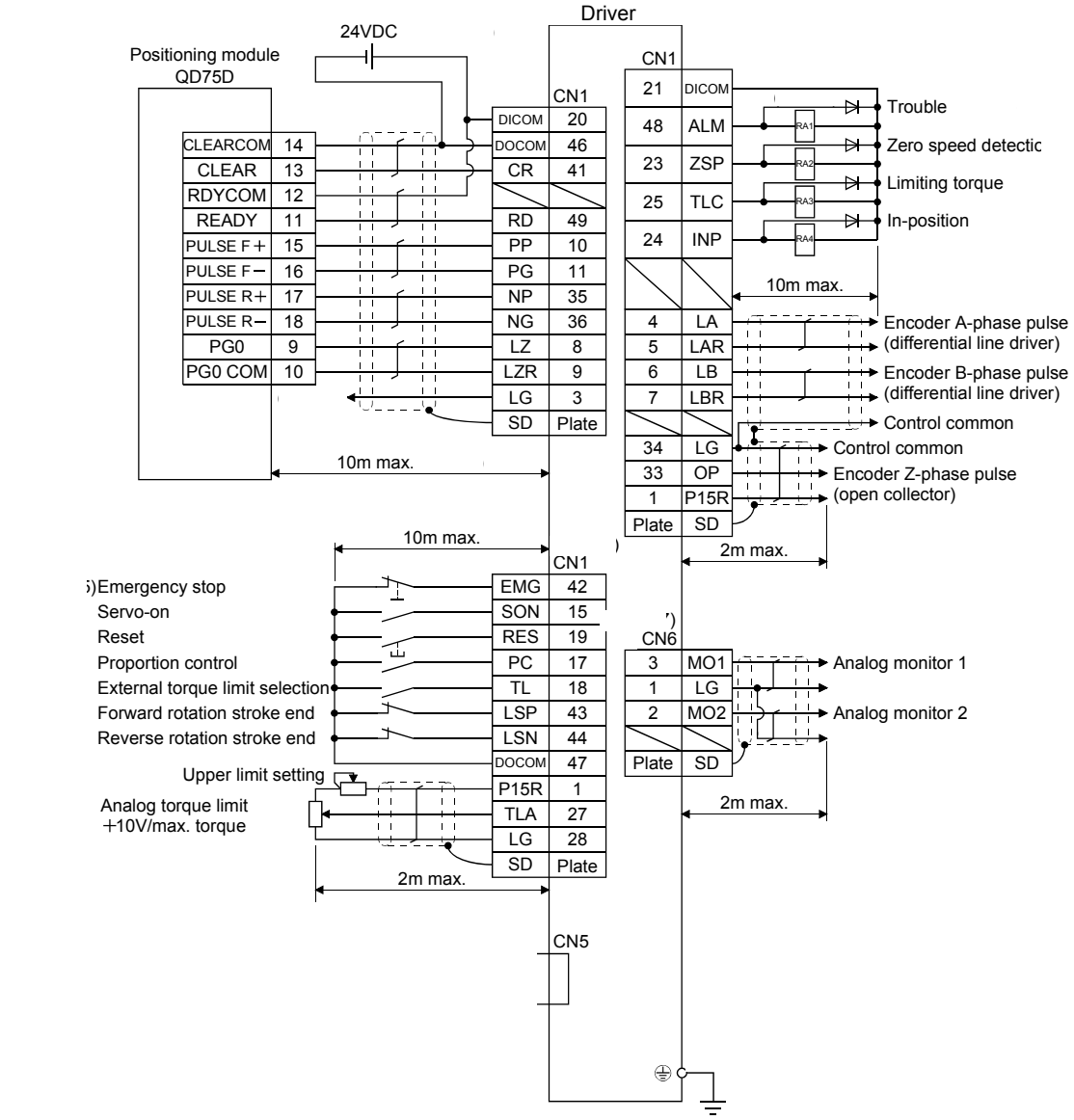
5.1 Input/output signal connection example in position control mode

(1) Connection example

A connection example of the position control mode is shown below. Connect wires if necessary.

This is the wiring example using PLC of Mitsubishi Electric (QD75D) used for position control mode.

Refer to the operation manual of LECSB and the technical data and the operation manual of PLC and positioning unit.



Refer to 5.1 (2) and (3) on the next page for details of input/output signal.

(2) Input signal

Position control mode: P, Speed control mode: S, Torque control mode: T

●: Automatic ON can be set, ○: Initial setting, □: Assignment is available with parameter,

－: Assignment is not available

Device name	Symbol	Automatic ON	P	S	T	Function
PP	Forward rotation pulse train	-	○	-	-	In the open collector system (max. input frequency 200kpps) Forward rotation pulse train across PP-DOCOM Reverse rotation pulse train across NP-DOCOM
NP	Reverse rotation pulse train	-	○	-	-	
PG	Differential forward rotation pulse train	-	○	-	-	In the differential receiver system (max. input frequency 1Mpps) Forward rotation pulse train across PG-PP Reverse rotation pulse train across NG-NP
NG	Differential reverse rotation pulse train	-	○	-	-	
SON	Servo-on	●	○	○	○	Operation is available when SON is turned ON.
RES	Reset	-	○	○	○	Alarm can be reset.
LSP	Forward rotation stroke end	●	○	○	-	Turn this signal on before operation. When this signal turns off, the product is stopped suddenly and servo lock is enabled.
LSN	Reverse rotation stroke end	●	○	○	-	Turn this signal on before operation. When this signal turns off, the product is stopped suddenly and servo lock is enabled.
TL	External torque limit selection	●	○	□	-	Analog torque limit (TLA) is enabled when it is turned ON.
TL1	Internal torque limit selection	-	□	□	□	When this signal turns on, the torque will be lower than the set parameter torque.
ST1	Forward rotation start	-	-	○	-	Start the servo motor.
ST2	Reverse rotation start	-	-	○	-	Start the servo motor.
RS1	Forward rotation selection	-	-	-	○	Servo motor torque generating direction is selected.
RS2	Reverse rotation selection	-	-	-	○	Servo motor torque generating direction is selected.
SP1	Speed selection 1	-	-	○	○	The Commanded rotation speed during operation or analog mode is selected.
SP2	Speed selection 2	-	-	○	○	
SP3	Speed selection 3	-	-	□	□	
PC	Proportion control	●	○	□	-	When it is turned ON, the speed amplifier will be changed from the proportional integral (IP) type to proportional type.
EM1	Forced stop	-	○	○	○	When this signal turns on, forced stop can be released.
CR	Clear	-	○	-	-	When this is turned ON, droop pulse is eliminated.
LOP	Control change	-	○	○	○	When operating in two modes, the control mode will be changed.

(3) Output signal

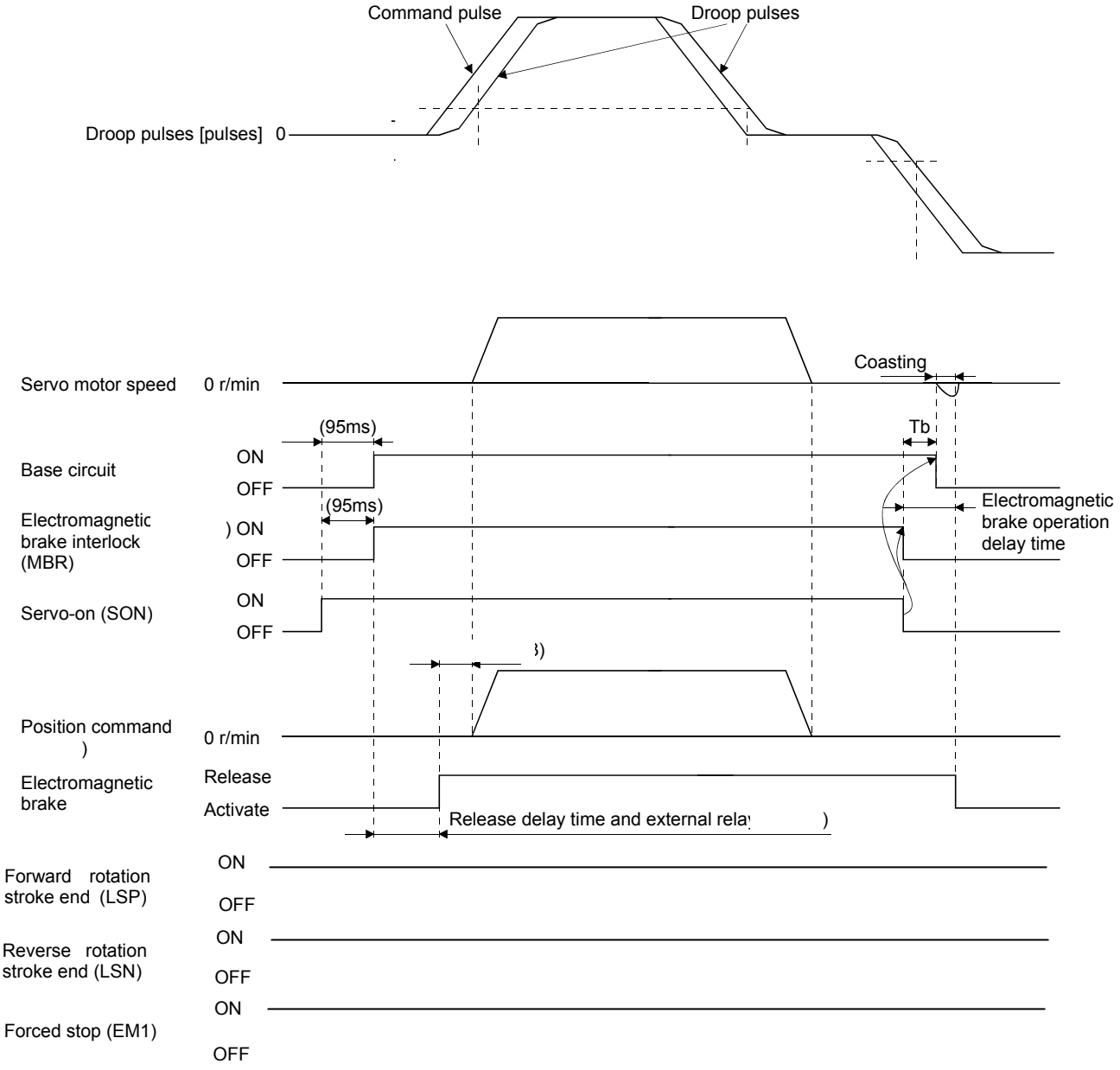
Position control mode: P, Speed control mode: S, Torque control mode: T

○: Initial setting, □: Assignment is available with parameter, －: Assignment is not available

Device name	Symbol	P	S	T	Function
ALM	Problem	○	○	○	This signal turns off while alarm is generated.
DB	Dynamic brake interlock	○	○	○	This device is necessary to use an external dynamic brake. This can be used by setting parameters.
RD	Ready	○	○	○	When servo-on turns on and operation is available, this signal turns on.
INP	In-position	○	-	-	This signal turns on when the accumulated pulse is within the setting range.
SA	Speed reached	-	○	-	When the servo motor rotation speed reaches the set speed, this signal turns on.
VLC	Limiting speed	-	-	○	This signal turns on when reaching the speed restricted by parameter.
TLC	Limiting torque	○	○	-	This signal turns on when reaching the torque set by parameter while torque is generated. .

5.2 Position Control Mode Operation Instruction

Command pulse is an input to the driver from the positioning unit. The driver operates the actuator in accordance with the command pulse. The command pulse and driver operation examples are shown below.



6. Speed control mode

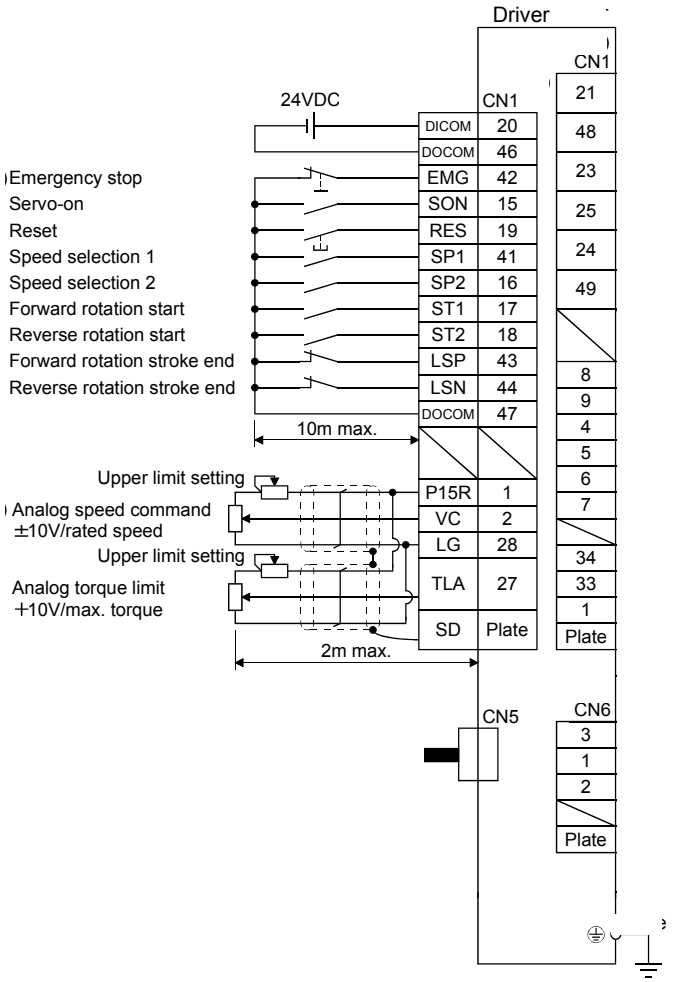
This mode allows for accurate, smooth control of the rotation speed and direction of the servo motor. Analog speed can be commanded with LECSB.

* To set [PC**], set parameter write inhibit [PA19] to "000C".

6.1 Input/output signal connection example of speed control mode

(2) Signal connection example of LECSB

A connection example of the speed control mode is shown below. Connect wires if necessary.



Refer to 5.1 (2) and (3) for details of input/output signal.

6.2 Speed Control Mode Operation Instruction

When the signals ST1 and ST2 turn on, the servo motor rotates.
An operation example of the speed control mode is shown below.

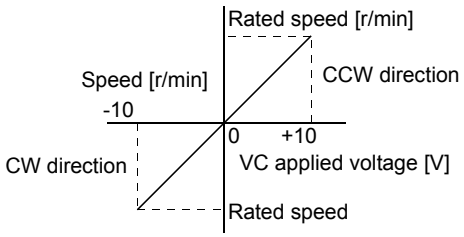
Speed setting

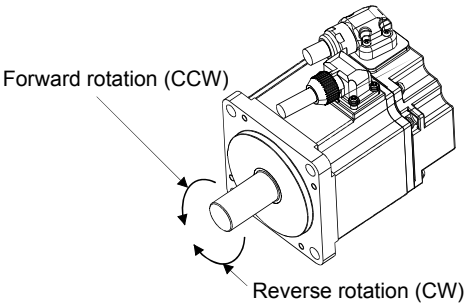
Speed command and speed

The servo motor is run at the speeds set in the parameters or at the speed set in the applied voltage of the analog speed command (VC).

A relationship between the analog speed command (VC) applied voltage and the servo motor speed is shown below.

Rated speed is achieved at ±10V with initial setting. The speed at ±10V can be changed using parameter No.PC12.



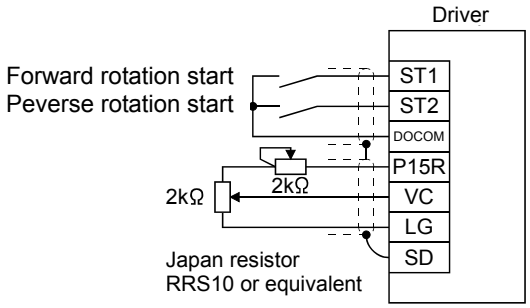


The following table indicates the rotation direction according to forward rotation start (ST1) and reverse rotation start (ST2) combination.

(Note 1) Input device		(Note 2) Rotation direction			
ST2	ST1	Analog speed command (VC)			Internal speed commands
		+ Polarity	0V	−Polarity	
0	0	Stop (Servo lock)	Stop (Servo lock)	Stop (Servo lock)	Stop (Servo lock)
0	1	CCW	Stop (No servo lock)	CW	CCW
1	0	CW		CCW	CW
1	1	Stop (Servo lock)	Stop (Servo lock)	Stop (Servo lock)	Stop (Servo lock)

Note 1. 0: off
1: on
2. If the torque limit is canceled during servo lock, the servo motor may suddenly rotate according to position deviation in respect to the command position.

Generally, make connection as shown below.



Refer to “8. Assignment of input/output signal” for assignment of signal.

LECSB speed command parameter setting

(Note) Input device			Speed command value	
SP3	SP2	SP1		
0	0	0	Analog speed command (VC)	Initial phase
0	0	1	Internal speed command 1 (parameter No.PC05)	
0	1	0	Internal speed command 2 (parameter No.PC06)	
0	1	1	Internal speed command 3 (parameter No.PC07)	
1	0	0	Internal speed command 4 (parameter No.PC08)	
1	0	1	Internal speed command 5 (parameter No.PC09)	
1	1	0	Internal speed command 6 (parameter No.PC10)	
1	1	1	Internal speed command 7 (parameter No.PC11)	

Note. 0: off
1: on

For LECSB, analog speed command and speed from 7 patters can be set.
Signals assigned at the initial setting are SP1 and SP2.
Assign signals of speed selection 3 (SP3) when the driver is used to [Internal speed command 7].

Refer to “LECSB Operation Manual“,Chapter 3 for details on analog speed command.

7. Torque control mode

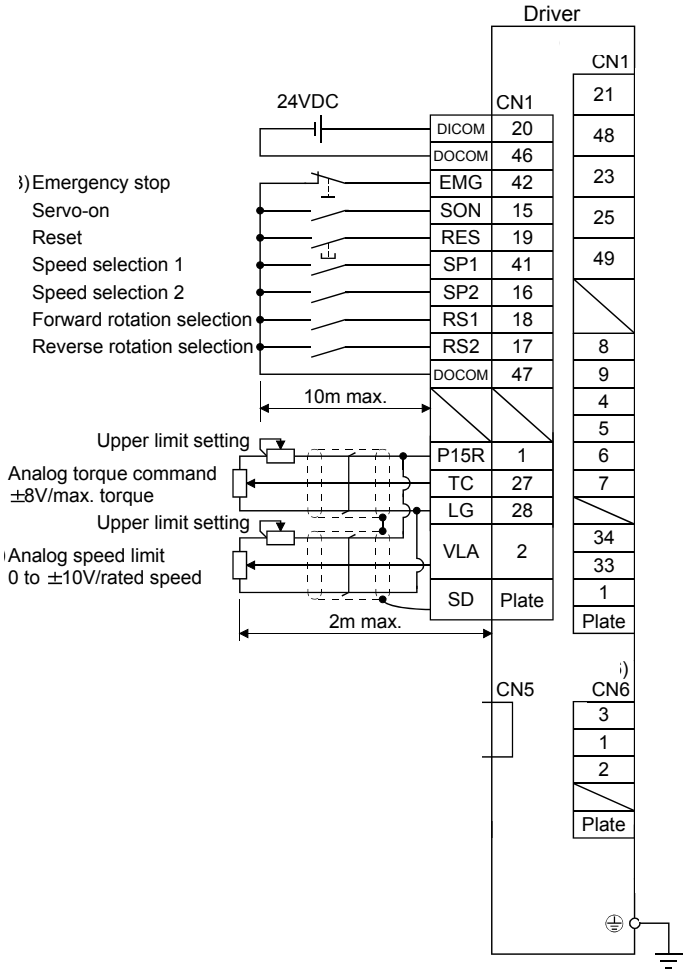
Servo motor output torque is controlled. Speed control function is also available.
Analog torque can be commanded with LECSB.

* To set [PC**], set parameter write inhibit [PA19] to "000C".

7.1 Input/output signal connection example of torque control mode

(1) Signal connection example of LECSB

A connection example of the torque control mode is shown below. Connect wires if necessary.



Refer to 5.1 (2) and (3) for details of input/output signal.

7.2 Torque Control Mode Operation Instruction

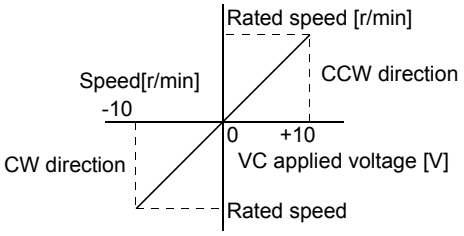
When the signals RS1 and RS2 turn on, the servo motor rotates.
An operation example of the torque control mode is shown below.

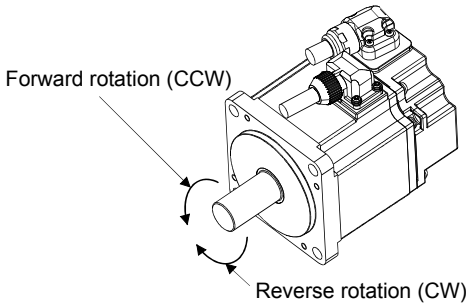
(1) Torque control

(a) Torque command and torque

A relationship between the applied voltage of the analog torque command (TC) and the torque by the servo motor is shown below.

The maximum torque is generated at ±8V. Note that the torque at ±8V input can be changed with parameter No.PC13.



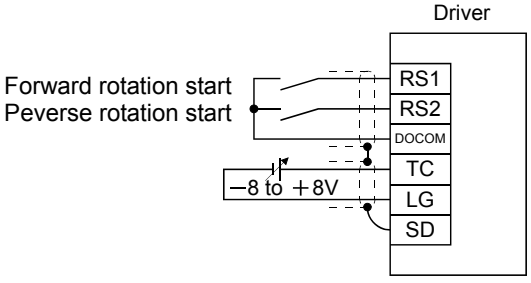


The following table indicates the torque generation directions determined by the forward rotation selection (RS1) and reverse rotation selection (RS2) when the analog torque command (TC) is used.

(Note) Input device		Rotation direction		
RS2	RS1	Torque control command (TC)		
		+Polarity	0V	−Polarity
0	0	Torque is not generated.	Torque is not generated.	Torque is not generated.
0	1	CCW (reverse rotation in driving mode/forward rotation in regenerative mode)		CW (forward rotation in driving mode/reverse rotation in regenerative mode)
1	0	CW (forward rotation in driving mode/reverse rotation in regenerative mode)		CCW (reverse rotation in driving mode/forward rotation in regenerative mode)
1	1	Torque is not generated.		Torque is not generated.

Note. 0: off
1: on

Generally, make connection as shown below.



Refer to “8. Assignment of input/output signal” for assignment of signal.

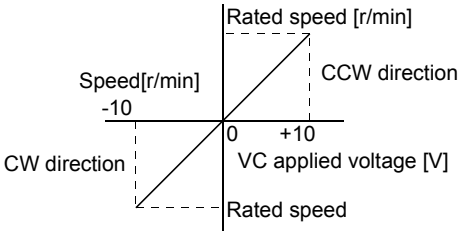
(2) Speed limit

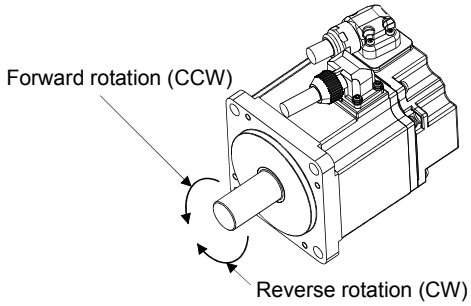
Speed limit value and speed

The speed is limited to the values set in parameters No.PC05 to PC11 (internal speed limits 1 to 7) or the value set in the applied voltage of the analog speed limit (VLA).

A relationship between the analog speed limit (VLA) applied voltage and the servo motor speed is shown below.

When the servo motor speed reaches the speed limit value, torque control may become unstable. Make the set value more than 100r/min greater than the desired speed limit value.



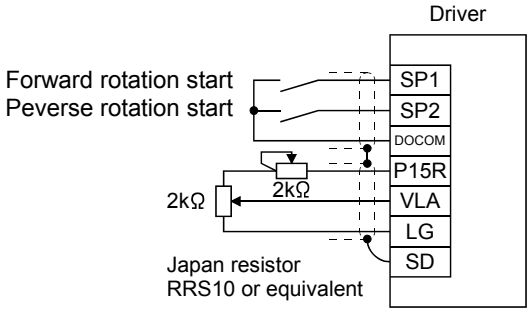


The following table indicates the limit direction according to forward rotation selection (RS1) and reverse rotation selection (RS2) combination.

(Note) Input device		Speed limit direction		
RS1	RS2	Analog speed limit (VLA)		Internal speed commands
		+Polarity	−Polarity	
1	0	CCW	CW	CCW
0	1	CW	CCW	CW

Note. 0: off
1: on

Generally, make connection as shown below.



Refer to “8. Assignment of input/output signal” for assignment of signal.

LECSB speed restricted parameter setting

(Note) Input device			Speed limit value	
SP3	SP2	SP1		
0	0	0	Analog speed limit (VLA)	Initial phase
0	0	1	Internal speed limit 1 (parameter No.PC05)	
0	1	0	Internal speed limit 2 (parameter No.PC06)	
0	1	1	Internal speed limit 3 (parameter No.PC07)	
1	0	0	Internal speed limit 4 (parameter No.PC08)	
1	0	1	Internal speed limit 5 (parameter No.PC09)	
1	1	0	Internal speed limit 6 (parameter No.PC10)	
1	1	1	Internal speed limit 7 (parameter No.PC11)	

Note. 0: off
1: on

For LECSB, analog speed limit and speed from 7 patters can be set.
Signals assigned at the initial setting are SP1 and SP2.
Assign signals of speed selection 3 (SP3) when the driver is used to [Internal speed command 7].

Refer to “LECSB Operation ManualChapter 3 for details on analog speed limit.

8. Assignment of input/output signal

Assignment of the input/ output signal can be changed from initial setting.
When the assignment is changed, signals for initial condition will be changed.
* To set [PD**], set parameter write inhibit [PA19] to "000C".

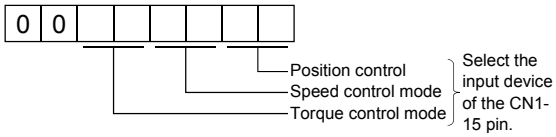
Refer to [LECSB Operation Manual] Chapter 5.4. for details.

(1) LECSB Input/ output signal assignment

Set parameter: [PD03] to [PD18]

PD03 to PD12 Input signal assignment（CN1-15 to CN1-19,CN1-41,CN1-43 to CN1-45）
PD13 to PD18 Output signal assignment（CN1-22 to CN1-25,CN1-49）

Input signal

No.	Symbol	Name and function	Initial value	Unit	Setting range	Control mode		
						Position	Speed	Torque
PD03	DI1	Input signal device selection 1 (CN1-15) Any input signal can be assigned to the CN1-15 pin. Note that the setting digits and the signal that can be assigned change depending on the control mode.  The devices that can be assigned in each control mode are those that have the symbols indicated in the following table. If any other device is set, it is invalid.	0002 0202h		Refer to name and function column.	○	○	○

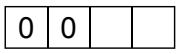
Setting	Control modes		
	P	S	T
00			
01	For manufacturer setting		
02	SON	SON	SON
03	RES	RES	RES
04	PC	PC	
05	TL	TL	
06	CR		
07		ST1	RS2
to			
24	CM1		
25	CM2		
26		STAB2	STAB2
27 to 3F	For manufacturer setting (Note 2)		

P: Position control mode
S: Internal speed control mode
T: Internal torque control mode

Do not set the manufacturer setting.

EX.) When CR is assigned to CN1-15 pin in the position control mode, [PD03]=00020206.

Output signal

<table>
<tr><th rowspan="2">No.</th><th rowspan="2">Symbol</th><th rowspan="2">Name and function</th><th rowspan="2">Initial value</th><th rowspan="2">Unit</th><th rowspan="2">Setting range</th><th colspan="3">Control mode</th></tr>
<tr><th>Position</th><th>Speed</th><th>Torque</th></tr>
<tr><td>PD13</td><td>DO1</td><td>Output signal device selection 1 (CN1-22)
Any output signal can be assigned to the CN1-22 pin.
In the initial setting, INP is assigned in the position control mode, and SA is assigned in the speed control mode.
Note that the device that can be assigned changes depending on the control mode.
 

The devices that can be assigned in each control mode are those that have the symbols indicated in the following table.
If any other device is set, it is invalid.
<table>
<tr><th rowspan="2">Setting</th><th colspan="3">Control modes</th></tr>
<tr><th>P</th><th>S</th><th>T</th></tr>
<tr><td>00</td><td>Always OFF</td><td>Always OFF</td><td>Always OFF</td></tr>
<tr><td>01</td><td colspan="3">For manufacturer setting</td></tr>
<tr><td>02</td><td>RD</td><td>RD</td><td>RD</td></tr>
<tr><td>03</td><td>ALM</td><td>ALM</td><td>ALM</td></tr>
<tr><td>04</td><td>INP</td><td>SA</td><td>Always OFF</td></tr>
<tr><td>05</td><td>MBR</td><td>MBR</td><td>MBR</td></tr>
<tr><td>06</td><td>DB</td><td>DB</td><td>DB</td></tr>
<tr><td>07</td><td>TLC</td><td>TLC</td><td>VLC</td></tr>
<tr><td colspan="4">to</td></tr>
<tr><td>0F</td><td>CDPS</td><td>Always OFF</td><td>Always OFF</td></tr>
<tr><td>10</td><td colspan="3">For manufacturer setting</td></tr>
<tr><td>11</td><td>ABSV</td><td>Always OFF</td><td>Always OFF</td></tr>
<tr><td>12 to 3F</td><td colspan="3">For manufacturer setting</td></tr>
</table>
P: Position control mode
S: Internal speed control mode
T: Internal torque control mode

Do not set the manufacturer setting.</td><td>0004h</td><td></td><td>Refer to name and function column.</td><td>○</td><td>○</td><td>○</td></tr>
</table>

EX.) When RD is assigned to CN1-22 pin, [PD13]=0002.

9. The recommended the parameter for each actuator

The recommended the parameter for each actuator.
Please change the parameter values by use of the customer.

Refer to “LECSB Operation Manual”, Section 5 for details.

9.1 The recommended value of the parameter [LEF]

Series			LEFS25			LEFS32			LEFS40		
	Lead symbol		H	A	B	H	A	B	H	A	B
	Lead		20	12	6	24	16	8	30	20	10
Parameter	Para. No.	Initial value	Recommended value								
Number of command input pulses per revolution *3	PA05	0	0								
Electronic gear numerator *3	PA06	1	**32768**								
Electronic gear denominator *3	PA07	1	**250**	**150**	**75**	**300**	**200**	**100**	**375**	**250**	**125**
Regenerative option	PA02	0000	**0000(Non) / 0002(LEC-MR-RB-032)**								
Rotation direction selection	PA14	0	**1(+:Counter motors side)**								
Adaptive tuning mode	PB01	0000	0000								
★Load to motor inertia moment ratio	PB06	7	**50**								
Machine resonance suppression filter 1	PB13	4500	4500								
Notch shape selection 1	PB14	0000	0000								

★Parameter should be changed.
Different from the initial value.

*1 Parameter is the recommended value. Please change the parameter to make appropriate value for your operating method.
*2 A mechanical resonance may occur depending on the configuration or the mounting orientation of the transferred object. Please change the parameter in the initial setting.
*3 The travel distance of the actuator per 1 pulse should be 10 [μm/pulse].

Series			LEFB25	LEFB25U	LEFB32	LEFB32U	LEFB40	LEFB40U
	Lead symbol		S					
	Lead		54					
Parameter	Para. No.	Initial value	Recommended value					
Number of command input pulses per revolution *3	PA05	0	0					
Electronic gear numerator *3	PA06	1	**32768**					
Electronic gear denominator *3	PA07	1	**675**					
Regenerative option	PA02	0000	**0000(Non) / 0002(LEC-MR-RB-032)**					
Rotation direction selection	PA14	0	**1(+: Counter motors side)**	0(+: Counter motors side)	**1(+: Counter motors side)**	0(+: Counter motors side)	**1(+: Counter motors side)**	0(+: Counter motors side)
★Adaptive tuning mode	PB01	0000	**0002**		0000			
★Load to motor inertia moment ratio	PB06	7	**50**					
★Machine resonance suppression filter 1	PB13	4500	**400**		4500			
★Notch shape selection 1	PB14	0000	**0030**		0000			

★Parameter should be changed.

Different from the initial value.

*1 Parameter is the recommended value. Please change the parameter to make appropriate value for your operating method.

*2 A mechanical resonance may occur depending on the configuration or the mounting orientation of the transferred object. Please change the parameter in the initial setting.

*3 The travel distance of the actuator per 1 pulse should be 10 [μm/pulse].

9.2 The recommended value of the parameter [LEJ]

Series			LEJS40			LEJS63			LEJB40	LEJB63
	Lead symbol		H	A	B	H	A	B	T	
	Lead		24	16	8	30	20	10	27	42
Parameter	Para. No.	Initial value	Recommended value							
Number of command input pulses per revolution *3	PA05	0	0							
Electronic gear numerator *3	PA06	1	**32768**						**65536**	**32768**
Electronic gear denominator *3	PA07	1	**300**	**200**	**100**	**375**	**250**	**125**	**675**	**525**
Regenerative option	PA02	0000	**0000(Non) / 0002(LEC-MR-RB-032) / 0003(LEC-MR-RB-12)**							
Rotation direction selection	PA14	0	**1 (+:Counter motors side)**						0 (+:Counter motors side)	
★Adaptive tuning mode	PB01	0000	0000						**0002**	0000
★Load to motor inertia moment ratio	PB06	7	7						**50**	
★Machine resonance suppression filter 1	PB13	4500	4500						**400**	4500
★Notch shape selection 1	PB14	0000	0000						**0030**	0000

★Parameter should be changed.
Different from the initial value.

*1 Parameter is the recommended value. Please change the parameter to make appropriate value for your operating method.
*2 A mechanical resonance may occur depending on the configuration or the mounting orientation of the transferred object. Please change the parameter in the initial setting.
*3 The travel distance of the actuator per 1 pulse should be 10 [μm/pulse].

9.3 The recommended value of the parameter [LEY]

Series			LEY25/LEYG25			LEY25D/LEYG25D			LEY32/LEYG32			LEY32D/LEYG32D		
	Lead symbol		A	B	C	A	B	C	A	B	C	A	B	C
	Lead		12	6	3	12	6	3	20	10	5	16	8	4
Parameter	Para. No	Initial value	Recommended value											
Number of command input pulses per revolution *3	PA05	0	0											
Electronic gear numerator *3	PA06	1	**32768**		**65536**	**32768**		**65536**	**32768**		**65536**	**32768**		
Electronic gear denominator *3	PA07	1	**150**	**75**	**75**	**150**	**75**	**75**	**250**	**125**	**125**	**200**	**100**	**50**
Regenerative option	PA02	0000	**0000 (Non)/ 0002 (LEC-MR-RB032)**											
Rotation direction selection	PA14	0	0 (+:Counter motors side)			**1 (+:Counter motors side)**			0 (+:Counter motors side)			**1 (+:Counter motors side)**		
Adaptive tuning mode	PB01	0000	0000											
Load to motor inertia moment ratio	PB06	7	7											
Machine resonance suppression filter 1	PB13	4500	4500											
Notch shape selection 1	PB14	0000	0000											

Series			LEY63				LEY63D		
	Lead symbol		A	B	C	L	A	B	C
	Lead		20	10	5	2.86	20	10	5
Parameter	Para. No	Initial value	Recommended value						
Number of command input pulses per revolution *3	PA05	0	0						
Electronic gear numerator *3	PA06	1	**32768**		**65536**	**114688**	**32768**		**65536**
Electronic gear denominator *3	PA07	1	**250**	**125**	**125**	**125**	**250**	**125**	**125**
Regenerative option	PA02	0000	**0000 (Non)/ 0002 (LEC-MR-RB032)/ 0003 (LEC-MR-RB12)**						
Rotation direction selection	PA14	0	0 (+:Counter motors side)				**1 (+:Counter motors side)**		
Adaptive tuning mode	PB01	0000	0000						
Load to motor inertia moment ratio	PB06	7	7						
Machine resonance suppression filter 1	PB13	4500	4500						
Notch shape selection 1	PB14	0000	0000						

Different from the initial value.

*1 Parameter is the recommended value. Please change the parameter to make appropriate value for your operating method.
*2 A mechanical resonance may occur depending on the configuration or the mounting orientation of the transferred object. Please change the parameter in the initial setting.
*3 The travel distance of the actuator per 1 pulse should be 10 [μm/pulse].

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