Doc. no. LEF-OM00213

Operation Manual

PRODUCT NAME

Electric Actuator ／Slider Type

《Step motor／Servo motor》

MODEL / Series

LEF Series

Applicable models: LEFS, LEFB



<Controller>

LEC Series

This manual describes the actuators operation in combination with the LEC*6 series controllers.
Refer to the manual relevant to the controller being used for full operating instructions.

SMC Corporation

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LEF Series / Slider type 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.

LEF Series / Slider type 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).

1. Procedure before operation/simple setting to use straight away

The controller is shipped with the parameters appropriate to the actuator.
With the simple setting “easy mode”, it can be operated and running parameters can be changed easily.

1.1 Preparation

(1) Items to be prepared

Please check on the label, and the quantity of accessories, to confirm that it is the product that was ordered.

Table 1. Components

No.	Part name	Qty
(1)	Electric actuator / Slider type	1
(2)	Controller	1
(3)	Power supply plug	1
(4)	Actuator cable	1
(5)	I/O cable (Not use in this section)	1
(6)	Teaching box	1
(7)	Controller setting kit [The controller setting software, The communication cable, USB cable and conversion unit are included.]	1

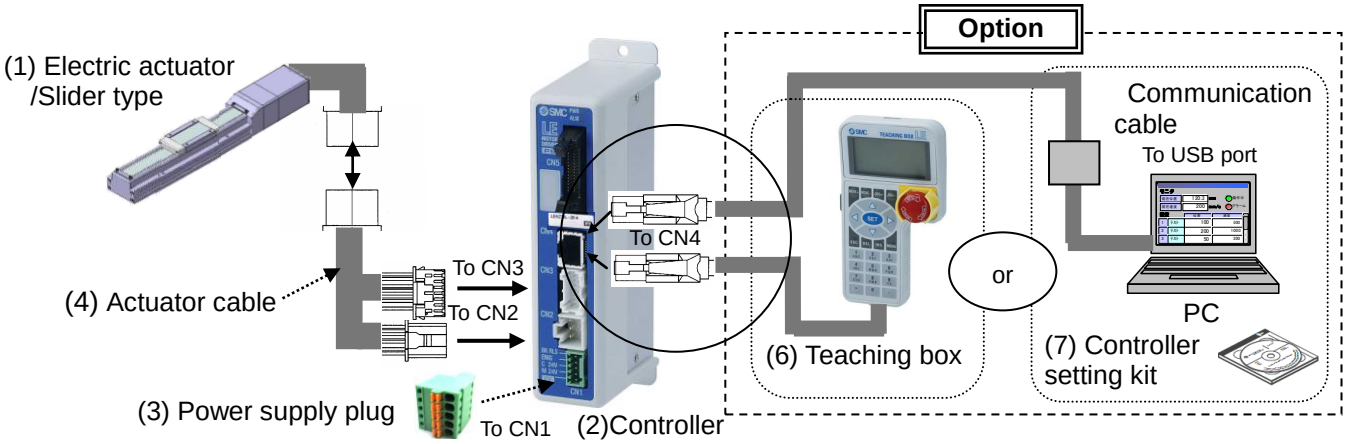


Table 2. Items to be prepared by the customer

Part name	Conditions
Power supply 24VDC Do not use the power supply with “Inruch-restraining type”	Refer to power consumption of each actuator / See 2.1Specification on p.9 (Prepare the power supply that has capacity of “Moment max. power consumption” or more.)
Wire AWG20 (0.5mm^2)	Stripped wire length 8mm
Power supply plug Wiring	Connect the plus side of 24VDC to the C24V, M24V and EMG terminals of the power supply plug, and the minus side to the 0V terminal. When conformity to UL is required,the electric actuator and controller should be used with a UL1310 Class2 power supply. Step motor（servo 24VDC） Electrical wire entry EMG C24V M24V 0V 24VDC power suppiy 24V 0V Push the open/close lever and insert the wire into the electrical wire entry Servo motor（24VDC） Electric wire entry EMG C24V M24V 0V 24VDC power suppiy 24V 0V

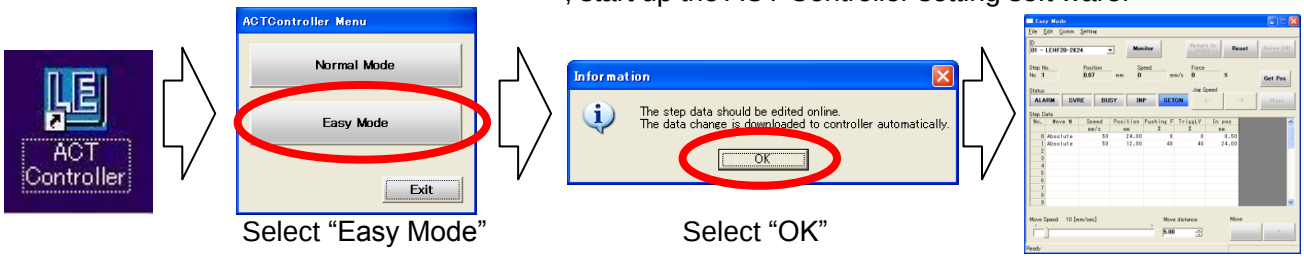
1.2 Controller setting software

1. Installation of software

With the controller setting software CD-ROM, install the communication unit software, following the “Software Installation procedure” (PDF)

2. Startup of software

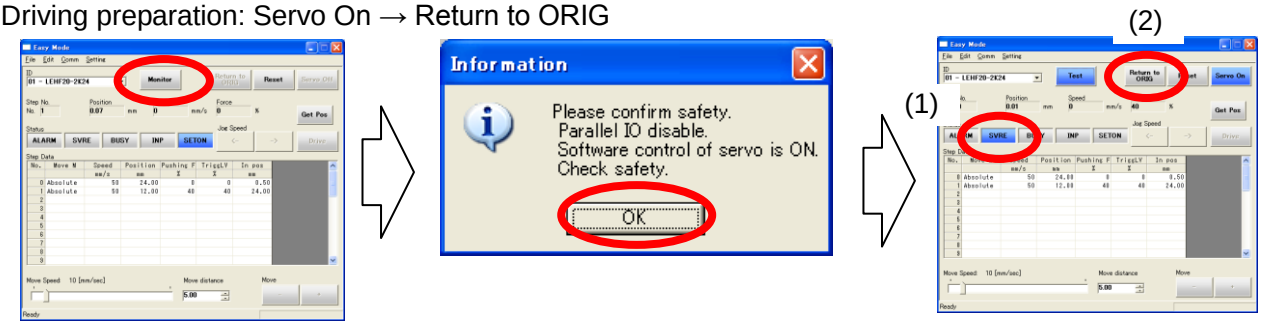
, start up the ACT Controller setting soft ware.



Select “Easy Mode” Select “OK”

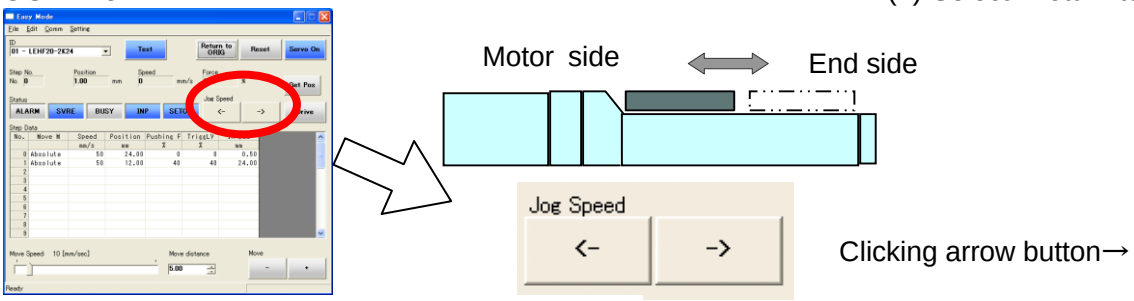
3. JOG Drive

a. Driving preparation: Servo On → Return to ORIG

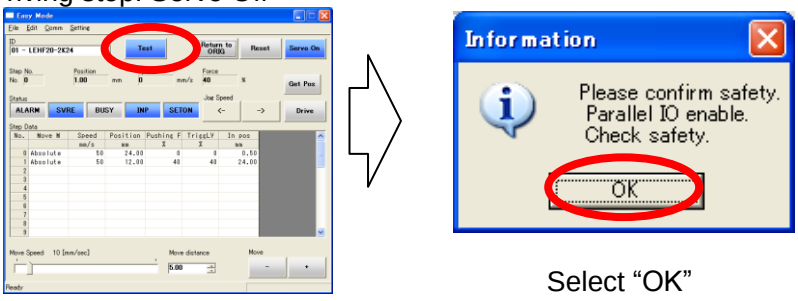


Select “Monitor” Select “OK” (1)”SVRE” lighting is confirmed
(2) Select “Return to ORIG”

b. JOG Drive



c. Driving stop: Servo Off

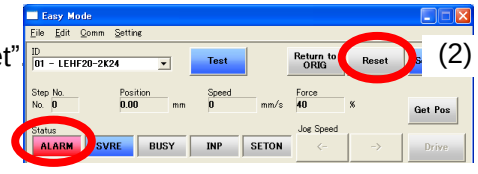


Select “test” Select “OK”

⚠ Caution

If an alarm is generated

(1) When ”ALARM” is generated, release it by selecting (2) “Reset”



In the case of an alarm code that cannot be released with “Reset”, turn the power supply OFF and ON again.

Note) For details of alarm codes, refer to the Controller Operation Manual.

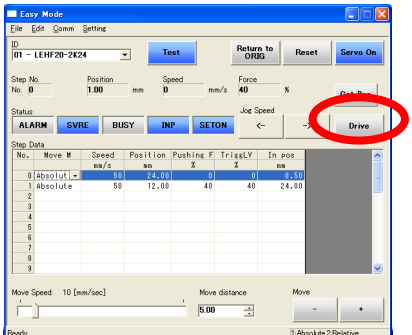
4. TEST Drive / Step No.0 → No.1 → No.0・・・

a. Driving preparation: Servo On → Return to ORIG / Refer to “3.JOG Drive”.

b. TEST Drive

“Step No.0” Operation

Procedure 1:
Select “Step No.0”
You can select anywhere in the row

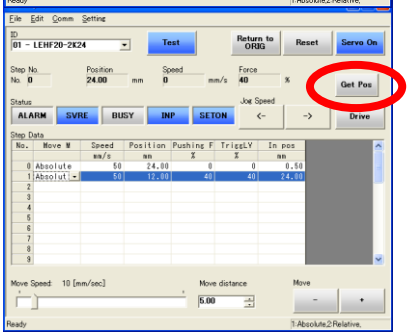


Procedure 2:
Select “Drive”

→ **Operation**

“Step No.1” Operation

Procedure 3:
Select “Step No.1”
You can select anywhere in the row



Procedure 4:
Select “Drive”

→ **Operation**

c. Driving stop : Servo Off / Refer to “3.JOG Drive”.

5. Step data change

<“Step No.0” / Positioning operation> At the time of shipment, Step No.0 is set to positioning operation

Step data

No.	Move M	Speed	Position	Pushing F	TriggLV	In pos
		mm/s	mm	%	%	mm
0	Absolute	250	50.00	0	0	0.50

Change of positioning stop position
Position: 50mm → 30mm

Input ”30”

Step data

No.	Move M	Speed	Position	Pushing F	TriggLV	In pos
		mm/s	mm	%	%	mm
0	Absolute	250	30.00	0	0	0.50

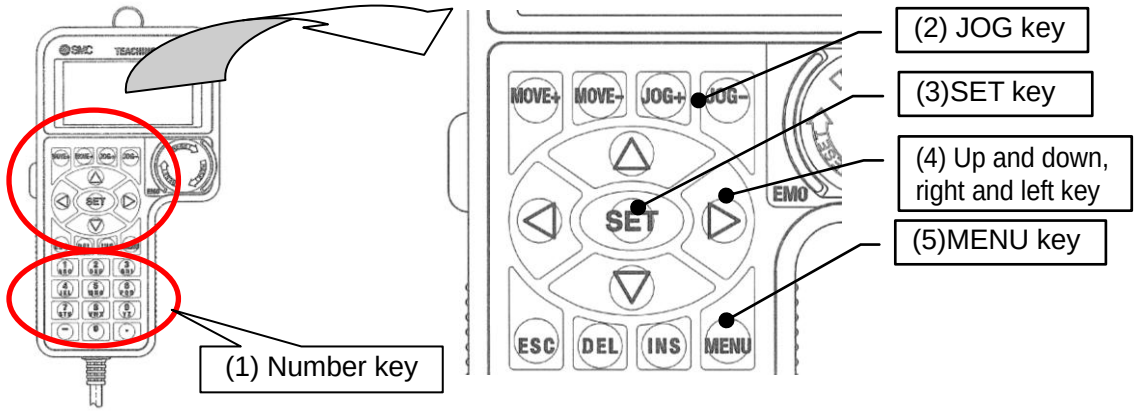
For details of operation, and relationship between operation procedure and input/ output signals, refer to “3.3 Step Data setting method” p. 23 to 26.

6. Controller setting software screen explanation

Refer to the “Help / Easy mode” menu in the “ACT Controller” setting software.

1.3 Teaching box

1. Name



2. JOG Drive

The power supply is turned on.

データ DATA / モニタ MONITOR / テスト TEST / アラーム ALARM / ジョグ JOG / 設定 SETTING

Select “JOG”

Press the (3)SET key

EXT Inp OFF:YES
Press the (3)SET key
↓
Servo ON,Ready?:YES
Press the (3)SET key
↓
RTN ORIG:Start
Press the (3)SET key
↓

JOG	AXIS. 1
RTN ORIG Done	
“JOG±”:Move	
Posn	123.45mm

Operates by (2) JOG key
JOG+: End side
JOG-: Motor side

Method of ending “JOG Drive”

Press the (5)MENU key
↓

Check	AXIS. 1
EXT Inp ON	
OK	

Press the (3)SET key

3. TEST Drive / Step No.0 → No.1 → No.0・・・

The power supply is turned on.

データ DATA / モニタ MONITOR / テスト TEST / アラーム ALARM / ジョグ JOG / 設定 SETTING

Select “TEST”

Press the (3)SET key

EXT Inp OFF:YES
Press the (3)SET key
↓
Servo ON,Ready?:YES
Press the (3)SET key
↓
RTN ORIG:Start
Press the (3)SET key
↓

Test	1
Step No.	0
Test	Start
Posn	50.00mm

< 1: Drive test>
Press the (4)Down key

Test	1
Step No.	0
Test	Start
Posn	50.00mm

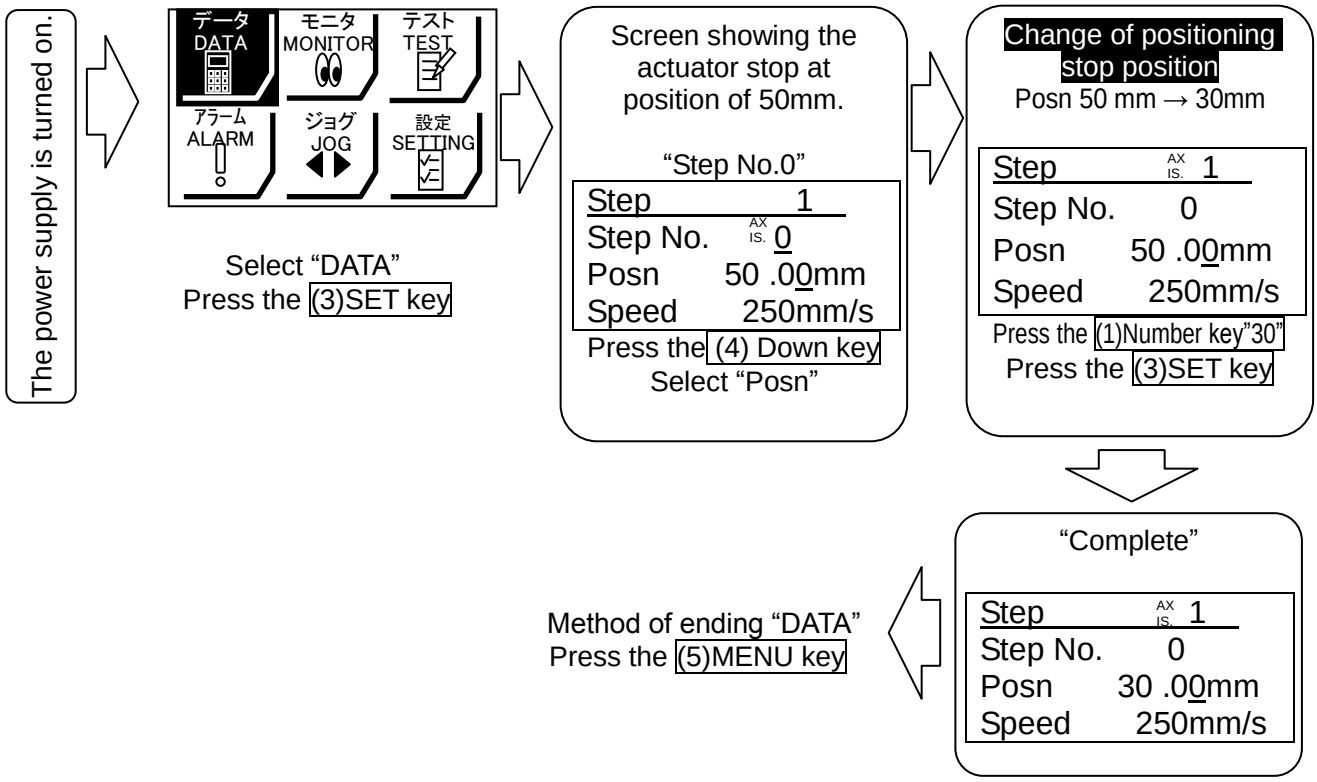
Press the (3)SET key
↓
Step No.0 move.
Test Complete
↓
< 2: Select Step No.>
Press the (4)Up key

Test	1
Step No.	1
Test	Start
Posn	0.00mm

Press the (1)Number key”1”
Press the (3)SET key
↓
Repeat <1: Drive test>

Method of ending “TEST Drive”
It is the same as the Method of ending “JOG Drive”

4. Step data change with positioning operation



For details of operation, and relationship between operation procedure and input/ output signals, refer to section 3.3 “Step Data setting method” p. 23 to 26.

5. Teaching box detailed explanation

Please refer to the teaching box manual.

2. Specification

2.1 Slider type LEF Series / Ball screw drive Specification

(1) Step motor (servo 24VDC) Ball screw drive

Model				LEFS16		LEFS25			LEFS32		
Actuator specification	Stroke [mm] Note1)			50 to 500		50 to 800			50 to 1000		
	Work load [kg] Note2)	Horizontal	LECP6/LECP1/LECPMJ/JXC91	14	15	12	25	30	20	45	50
			LECPA	9	10	10	20	20	15	40	45
		Vertical		2	4	0.5	7.5	15	4	10	20
	Controller type: LECP6 LECP1 LECPMJ JXC91	Note2) Speed [mm/s]	Stroke range ～500	10 to 700	5 to 360	20 to 1100	12 to 750	6 to 400	24 to 1200	16 to 800	8 to 520
			501～600	-	-	20 to 900	12 to 540	6 to 270	24 to 1200	16 to 800	8 to 400
			601～700	-	-	20 to 630	12 to 420	6 to 230	24 to 930	16 to 620	8 to 310
			701～800	-	-	20 to 550	12 to 330	6 to 180	24 to 750	16 to 500	8 to 250
			801～900	-	-	-	-	-	24 to 610	16 to 410	8 to 200
			901～1000	-	-	-	-	-	24 to 500	16 to 340	8 to 170
	Driver type LECPA	Note2) Speed [mm/s]	Stroke range ～500	10 to 500	5 to 250	20 to 1000	12 to 500	6 to 250	24 to 1200	16 to 500	8 to 250
			501～600	-	-	20 to 900	12 to 500	6 to 250	24 to 1200	16 to 500	8 to 250
			601～700	-	-	20 to 630	12 to 420	6 to 230	24 to 930	16 to 500	8 to 250
			701～800	-	-	20 to 550	12 to 330	6 to 180	24 to 750	16 to 500	8 to 250
			801～900	-	-	-	-	-	24 to 610	16 to 410	8 to 200
			901～1000	-	-	-	-	-	24 to 500	16 to 340	8 to 170
	Max.acceleration/deceleration [mm/s^2]			3,000							
	Positioning repeeatability [mm]		Basic type	±0.02							
			High precision type	±0.015（Lead H: ±0.02）							
	Lost motion[mm] note3)		Basic type	0.1or less							
			High precision type	0.05or less							
	lead [mm]			10	5	20	12	6	24	16	8
	Impact/Vibration resistanc [m/s^2] note4)			50 / 20							
	Actuation type			Ball screw(LEFS□)、Ball screw+Belt（LEFS□L/R）							
	Guide type			Linear Guide							
	Operating temperature range [℃]			5 to 40							
	Operating humidity range [%RH]			90 or less(No condensation)							
Electric specifications	Motor size			□28		□42			□56.4		
	Motor type			Step motor(Servo 24V DC)							
	Encoder			Incremental A/Bphase (800 pulse/rotation)							
	Rated voltage [V]			24 VDC±10%							
	Power consumption [W] note5)			22		38			50		
	Standby power consumption when operating			18		16			44		
	Max.instantaneous power consumption [W]			51		57			123		
Lock unit specifications	Type note8)			Non-magnetizing lock							
	Holding force [N]			20	39	47	78	157	72	108	216
	Power consumption [W] note9)			2.9		5			5		
	Rated voltage [V]			24 VDC±10%							

Note 1) The strokes shown in ( ) are produced upon receipt of order.
Note 2) The speed is dependent on the workload. Check the following “Speed-workload graphs” for the selected model.
Note 3) A reference value for correcting an error in reciprocal operation.
Note 4) Impact resistance: No malfunction occurred when the actuator was tested with a drop tester in both an axial direction and perpendicular direction to the lead screw. (The test was performed with the actuator in the initial state.)
Vibration resistance: No malfunction occurred in a test ranging between 45 to 2000 Hz, when the actuator was tested in both an axial direction and a perpendicular direction to the lead screw. (The test was performed with the actuator in the initial state.)
Note 5) The "Power consumption" (including the controller) is for when the actuator is operating.
Note 6) The “Standby power consumption when operating” (including the controller) is for when the actuator is stopped in the set position during operation.
Note 7) The "Momentary max. power consumption" (including the controller) is for when the actuator is operating.
This value can be used for the selection of the power supply.
Note 8) Only applies to actuators supplied with a lock.
Note 9) For the actuator with lock, please add the power consumption for the lock.

Weight

Model	LEFS16									
Stroke(mm)	50	100	150	200	250	300	350	400	450	500
Weight(kg)	0.83	0.90	0.98	1.05	1.13	1.20	1.28	1.35	1.43	1.50
Additional weight for lock(kg)	0.12									

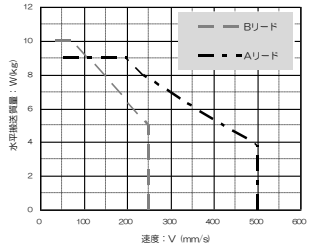
Model	LEFS25															
Stroke(mm)	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
Weight(kg)	1.70	1.84	1.98	2.12	2.26	2.40	2.54	2.68	2.82	2.96	3.10	3.24	3.38	3.52	3.66	3.80
Additional weight for lock(kg)	0.26															

Model	LEFS32																			
Stroke(mm)	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
Weight(kg)	3.15	3.35	3.55	3.75	3.95	4.15	4.35	4.55	4.75	4.95	5.15	5.35	5.55	5.75	5.95	6.15	6.35	6.55	6.75	6.95
Additional weight for lock(kg)	0.53																			

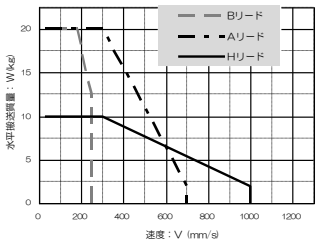
<Speed-Workload graph> LECP6/LECP1/LECPMJ/JXC91

Horizontal Transfer

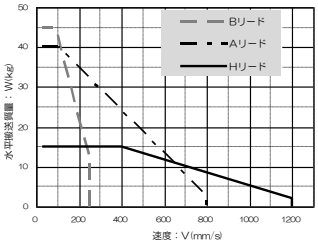
LEFS16



LEFS25

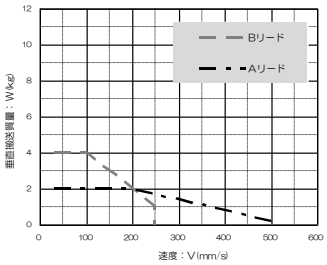


LEFS32

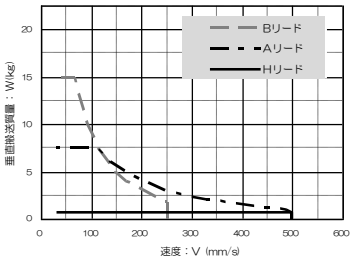


Vertical Transfer

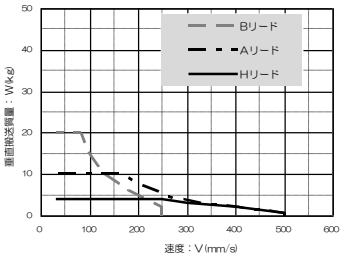
LEFS16



LEFS25



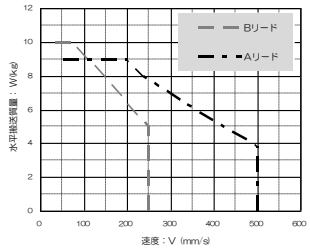
LEFS32



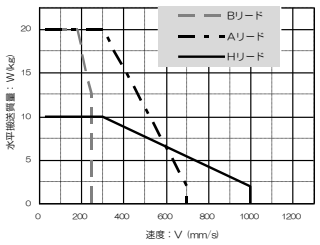
<Speed-Workload graph> LECPA

Horizontal Transfer

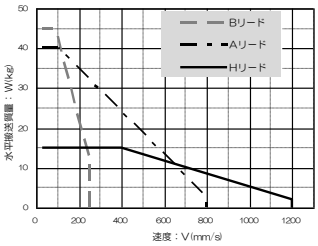
LEFS16



LEFS25

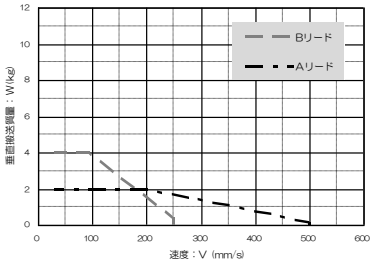


LEFS32

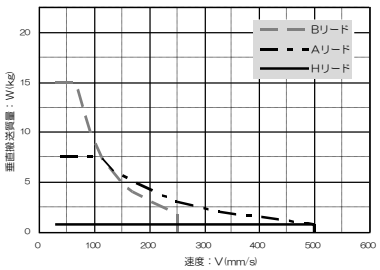


Vertical Transfer

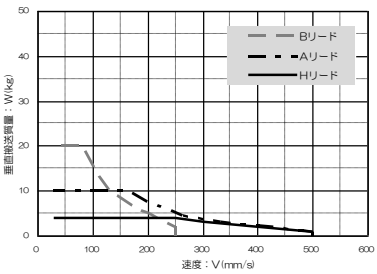
LEFS16



LEFS25



LEFS32



Step motor (servo 24VDC) Ball screw drive

Model				LEFS40		
Actuator specification	Stroke [mm] Note1)			150 to 1200		
	Work load [kg] Note2)	Horizontal	LECP6/LECP1/LECPMJ/JXC91	25	55	65
			LECPA	20	50	60
		Vertical		2	2	23
	Controller type: LECP6 LECP1 LECPMJ JXC91	Note2) Speed [mm/s]	Stroke range ～600	30 to 1200	20 to 1000	10 to 300
			601～700	30 to 1200	20 to 900	10 to 300
			701～800	30 to 1140	20 to 760	10 to 300
			801～900	30 to 930	20 to 620	10 to 300
			901～1000	30 to 780	20 to 520	10 to 250
			1001～1100	30 to 660	20 to 440	10 to 220
			1101～1200	30 to 570	20 to 380	10 to 190
	Driver type LECPA	Note2) Speed [mm/s]	Stroke range ～1000	30 to 500	20 to 500	10 to 250
			1001～1100	30 to 500	20 to 440	10 to 220
			1101～1200	30 to 500	20 to 380	10 to 190
	Max.acceleration/deceleration [mm/s2]			3,000		
	Positioning repeeatability [mm]		Basic type	±0.02		
			High	±0.015(Lead H:±0.02)		
	Lost motion[mm] note3)		Basic type	0.1 or less		
			High	0.05 or less		
	lead [mm]			30	20	10
	Impact/Vibration resistanc [m/s2] note4)			50 / 20		
	Actuation type			Ball screw(LEFS40)、Ball screw+Belt(LEFS40L/R)		
	Guide type			Linear Guide		
	Operating temperature range [℃]			5 to 40		
	Operating humidity range [%RH]			90 or less(No condensation)		
Electric specifications	Motor size			□56.4		
	Motor type			Step motor(Servo 24V DC)		
	Encoder			Incremental A/Bphase (800 pulse/rotation)		
	Rated voltage [V]			24 VDC±10%		
	Power consumption [W] note5)			100		
	Standby power consumption when operating [W]			43		
	Max.instantaneous power consumption [W]			141		
Lock unit specifications	Type note8)			Non-magnetizing lock		
	Holding force [N]			75	113	225
	Power consumption [W] note9)			5		
	Rated voltage [V]			24 VDC±10%		

Note 1) The strokes shown in ( ) are produced upon receipt of order.
Note 2) The speed is dependent on the workload. Check the following “Speed-workload graphs” for the selected model.
Note 3) A reference value for correcting an error in reciprocal operation.
Note 4) Impact resistance: No malfunction occurred when the actuator was tested with a drop tester in both an axial direction and perpendicular direction to the lead screw. (The test was performed with the actuator in the initial state.)
Vibration resistance: No malfunction occurred in a test ranging between 45 to 2000 Hz, when the actuator was tested in both an axial direction and a perpendicular direction to the lead screw. (The test was performed with the actuator in the initial state.)
Note 5) The "Power consumption" (including the controller) is for when the actuator is operating.
Note 6) The “Standby power consumption when operating” (including the controller) is for when the actuator is stopped in the set position during operation.
Note 7) The "Momentary max. power consumption" (including the controller) is for when the actuator is operating.
This value can be used for the selection of the power supply.
Note 8) Only applies to actuators supplied with a lock.
Note 9) For the actuator with lock, please add the power consumption for the lock.

Weight

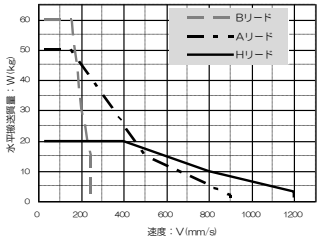
Model	LEFS40									
Stroke(mm)	150	200	250	300	350	400	450	500	550	600
Weight(kg)	5.37	5.65	5.93	6.21	6.49	6.77	7.15	7.33	7.61	7.89
Additional weight for lock(kg)	0.53									

Model	LEFS40									
Stroke(mm)	650	700	750	800	850	900	950	1000	1100	1200
Weight(kg)	8.17	8.45	8.73	9.01	9.29	9.57	9.85	10.13	10.69	11.25
Additional weight for lock(kg)	0.53									

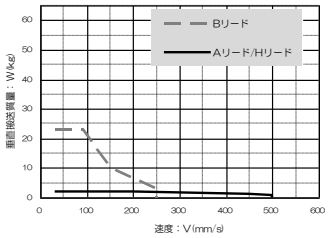
<Speed-Workload graph>

<Speed-Workload graph> LECP6/LECP1/LECPMJ/JXC91

LEFS40 Horizontal Transfer

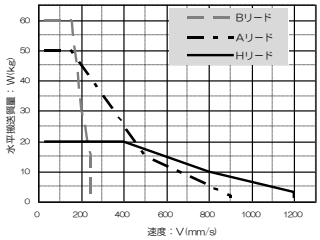


LEFS40 Vertical Transfer

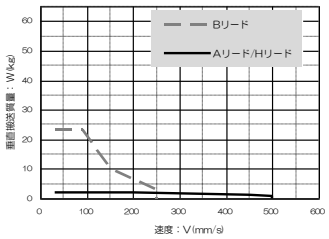


LECPA

LEFS40 Horizontal Transfer



LEFS40 Vertical Transfer



(2) Servo motor (24VDC) Ball screw drive

Model				LEFS16A		LEFS25A		
Actuator specification	Stroke [mm] Note1)			50～500		50～800		
	Work load [kg] note2)		Horizontal	7	10	5	11	18
			Vertical	2	4	1	2.5	5
	Note2)Speed [mm/s]	Stroke range	～500	1 to 500	1 to 250	2 to 800	2 to 500	1 to 250
			501～600	-	-	2 to 800	2 to 500	1 to 250
			601～700	-	-	2 to 630	2 to 420	1 to 230
			701～800	-	-	2 to 550	2 to 330	1 to 180
	Max.acceleration/deceleration [mm/s2]			3,000				
	Positioning repeeatability [mm]		Basic type	±0.02				
			High precision type	±0.015(Lead H: ±0.02)				
	Lost motion[mm] note3)		Basic type	0.1 or less				
			High precision type	0.05 or less				
	lead [mm]			10	5	20	12	6
	Impact/Vibration resistanc [m/s2] note4)			50 / 20				
	Actuation type			Ball screw(LEFS□)、Ball screw+Belt(LEFS□L/R)				
	Guide type			Linear Guide				
	Operating temperature range [℃]			5 to 40				
	Operating humidity range [%RH]			90 or less(No condensation)				
Electric specifications	Motor size			□28		□42		
	Motor output [W]			30		36		
	Motor type			Servo motor(24VDC)				
	Encoder			Incremental A/B (800 pulse/rotation)/Z phase				
	Rated voltage [V]			24VDC±10%				
	Power consumption [W] note5)			63		102		
	Standby power consumption when operating [W]			Horizontal 4/ Vertical 9				
	Max.instantaneous power consumption [W]			70		113		
Lock unit specifications	Type note8)			Non-magnetizing lock				
	Holding force [N]			20	39	47	78	157
	Power consumption [W] note9)			2.9		5		
	Rated voltage [V]			24VDC±10%				

Note 1) The strokes shown in ( ) are produced upon receipt of order.
Note 2) The speed is dependent on the workload. Check the following “Speed-workload graphs” for the selected model.
Note 3) A reference value for correcting an error in reciprocal operation.
Note 4) Impact resistance: No malfunction occurred when the actuator was tested with a drop tester in both an axial direction and perpendicular direction to the lead screw. (The test was performed with the actuator in the initial state.)
Vibration resistance: No malfunction occurred in a test ranging between 45 to 2000 Hz, when the actuator was tested in both an axial direction and a perpendicular direction to the lead screw. (The test was performed with the actuator in the initial state.)
Note 5) The "Power consumption" (including the controller) is for when the actuator is operating.
Note 6) The “Standby power consumption when operating” (including the controller) is for when the actuator is stopped in the set position during operation.
Note 7) The "Momentary max. power consumption" (including the controller) is for when the actuator is operating.
This value can be used for the selection of the power supply.
Note 8) Only applies to actuators supplied with a lock.

Note 9) For the actuator with lock, please add the power consumption for the lock.

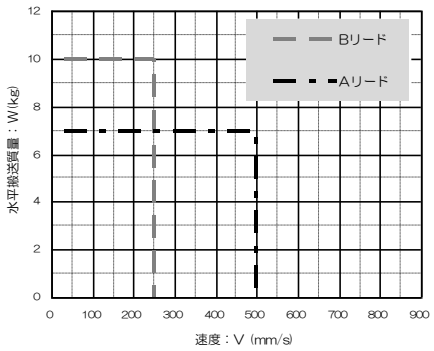
Weight

Model	LEFS16A									
Stroke(mm)	50	100	150	200	250	300	350	400	450	500
Weight(kg)	0.83	0.9	0.98	1.05	1.13	1.2	1.28	1.35	1.43	1.5
Additional w eight for lock(kg)	0.12									

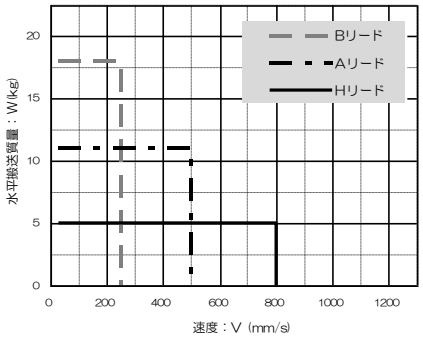
Model	LEFS25A															
Stroke(mm)	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
Weight(kg)	1.70	1.84	1.98	2.12	2.26	2.40	2.54	2.68	2.82	2.96	3.10	3.24	3.38	3.52	3.66	3.80
Additional w eight for lock(kg)	0.26															

<Speed-Workload graph> Horizontal Transfer

LEFS16A

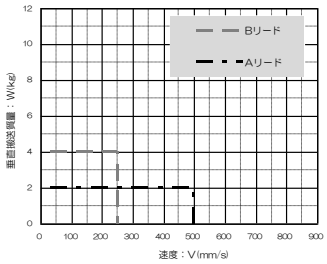


LEFS25A

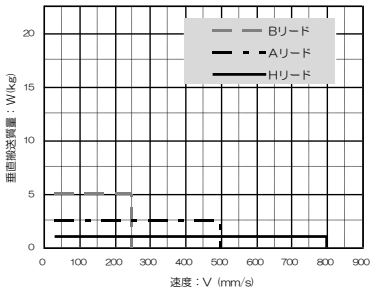


Vertical Transfer

LEFS16A



LEFS25A



2.2 Slider type LEF Series / Belt drive Specification

(1) Step motor (servo 24VDC) Belt drive

	Model			LEFB16	LEFB25	LEFB32
Actuator specification	Stroke [mm] Note1)			300, 500, 600, 700, 800, 900, 1000	300, 500, 600, 700, 800, 900, 1000, 1200, 1500, 1800, 2000	300, 500, 600, 800, 900, 1000, 1200, 1500, 1800, 2000
	Work load [kg] note2)	Horizontal	LECP6/LECP1/LECPMJ/JXC91	1	10	19
			LECPA	1	5	14
	Note2)Speed [mm/s]			48 to 1100	48 to 1400	48 to 1500
	Max.acceleration/deceleration [mm/s2]			3,000		
	Positioning repeeatability [mm]			±0.08		
	Lost motion[mm] note3)			0.1 or less		
	Equivalent lead [mm]			48	48	48
	Impact/Vibration resistanc [m/s2] note4)			50 / 20		
	Actuation type			Belt		
	Guide type			Linear Guide		
	Operating temperature range [°C]			5 to 40		
	Operating humidity range [%RH]			90 or less(No condensation)		
Electric specifications	Motor size			□28	□42	□56.4
	Motor type			Step motor(Servo 24V DC)		
	Encoder			Incremental A/Bphase (800 pulse/rotation)		
	Rated voltage [V]			24VDC±10%		
	Power consumption [W] note5)			24	32	52
	Standby power consumption when operating [W]			18	16	44
	Max.instantaneous power consumption [W]			51	60	127
Lock unit specifications	Type note8)			Non-magnetizing lock		
	Holding force [N]			4	19	36
	Power consumption [W] note9)			2.9	5	5
	Rated voltage [V]			DC24VDC±10%		

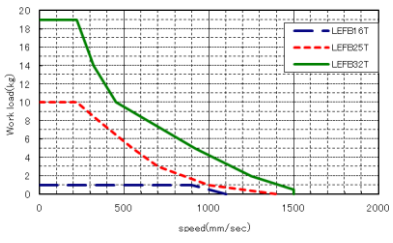
Note 1) The strokes shown in ( ) are produced upon receipt of order.
Note 2) The speed is dependent on the workload. Check the following “Speed-workload graphs” for the selected model.
Note 3) A reference value for correcting an error in reciprocal operation.
Note 4) Impact resistance: No malfunction occurred when the actuator was tested with a drop tester in both an axial direction and perpendicular direction to the lead screw. (The test was performed with the actuator in the initial state.)
Vibration resistance: No malfunction occurred in a test ranging between 45 to 2000 Hz, when the actuator was tested in both an axial direction and a perpendicular direction to the lead screw. (The test was performed with the actuator in the initial state.)
Note 5) The "Power consumption" (including the controller) is for when the actuator is operating.
Note 6) The “Standby power consumption when operating” (including the controller) is for when the actuator is stopped in the set position during operation.
Note 7) The "Momentary max. power consumption" (including the controller) is for when the actuator is operating. This value can be used for the selection of the power supply.
Note 8) Only applies to actuators supplied with a lock.
Note 9) For the actuator with lock, please add the power consumption for the lock.

Weight

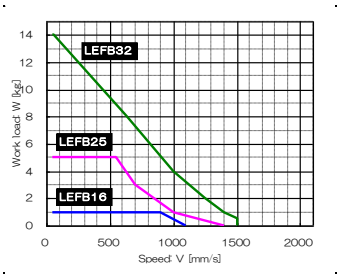
Model	LEFB16							LEFB25										
Stroke(mm)	300	500	600	700	800	900	1000	300	500	600	700	800	900	1000	1200	1500	1800	2000
Weight(kg)	1.19	1.45	1.58	1.71	1.84	1.97	2.10	2.39	2.85	3.08	3.31	3.54	3.77	4.00	4.46	5.15	5.84	6.30
Additional weight for lock(kg)	0.12							0.26										

Model	LEFB32										
Stroke(mm)	300	500	600	700	800	900	1000	1200	1500	1800	2000
Weight(kg)	4.12	4.80	5.14	5.48	5.82	6.16	6.50	7.18	8.20	9.22	9.90
Additional weight for lock(kg)	0.53										

<Speed-Workload graph> **Horizontal Transfer**



LECP6/LECP1/LECPMJ /JXC91



LECPA

(2) Servo motor (24VDC) Belt drive

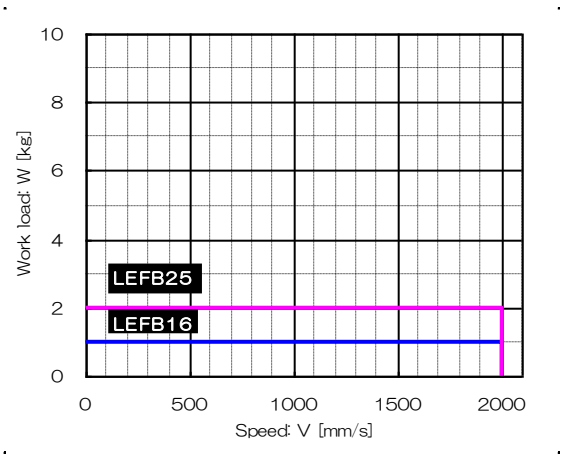
	Model		LEFB16	LEFB25
Actuator specification	Stroke [mm] Note1)		300, 500, 600, 700, 800, 900, 1000	300, 500, 600, 700, 800, 900, 1000, 1200, 1500, 1800, 2000
	Work load [kg] note2)	Horizontal	1	2
	Note2)Speed [mm/s]		5 to 2000	5 to 2000
	Max.acceleration/deceleration [mm/s2]		3,000	
	Positioning repeeatability [mm]		±0.08	
	Lost motion[mm] note3)		0.1 or less	
	Equivalent lead [mm]		48	48
	Impact/Vibration resistanc [m/s2] note4)		50 / 20	
	Actuation type		Belt	
	Guide type		Linear Guide	
	Operating temperature range [℃]		5 to 40	
	Operating humidity range [%RH]		90 or less(No condensation)	
Electric specifications	Motor size		□28	□42
	Motor output [W]		30	36
	Motor type		Servo motor(24VDC)	
	Encoder		Incremental A/B (800 pulse/rotation)/Z phase	
	Rated voltage [V]		24VDC±10%	
	Power consumption [W] note5)		78	69
	Standby power consumption when operating [W]		Horizon 4	Horizon5
	Max.instantaneous power consumption [W]		87	120
Lock unit specifications	Type note8)		Non-magnetizing lock	
	Holding force [N]		4	19
	Power consumption [W] note9)		2.9	5
	Rated voltage [V]		DC24±10%	

Note 1) The strokes shown in ( ) are produced upon receipt of order.
Note 2) The speed is dependent on the workload. Check the following “Speed-workload graphs” for the selected model.
Note 3) A reference value for correcting an error in reciprocal operation.
Note 4) Impact resistance: No malfunction occurred when the actuator was tested with a drop tester in both an axial direction and perpendicular direction to the lead screw. (The test was performed with the actuator in the initial state.)
Vibration resistance: No malfunction occurred in a test ranging between 45 to 2000 Hz, when the actuator was tested in both an axial direction and a perpendicular direction to the lead screw. (The test was performed with the actuator in the initial state.)
Note 5) The "Power consumption" (including the controller) is for when the actuator is operating.
Note 6) The “Standby power consumption when operating” (including the controller) is for when the actuator is stopped in the set position during operation.
Note 7) The "Momentary max. power consumption" (including the controller) is for when the actuator is operating. This value can be used for the selection of the power supply.
Note 8) Only applies to actuators supplied with a lock.
Note 9) For the actuator with lock, please add the power consumption for the lock.

Weight

Model	LEFB16A							LEFB25A										
Stroke(mm)	(300)	500	(600)	(700)	800	(900)	1000	(300)	500	(600)	(700)	800	(900)	1000	(1200)	(1500)	(1800)	(2000)
Weight(kg)	1.19	1.45	1.58	1.71	1.84	1.97	2.10	2.39	2.85	3.08	3.31	3.54	3.77	4.00	4.46	5.15	5.84	6.30
Additional weight for lock(kg)	0.12							0.19										

<Speed-Workload graph> **Horizontal Transfer**



2.3 How to Order

<Ball screw drive>

LEFS H 25 R □ B– 200 □ □ – S 1 6N 1 □

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫ ⑬

①Accuracy

Nil	Basic type
H	High precision type

③Motor mounting position

Nil	In-line type
R	Right side parallel type
L	Left side parallel type

⑤Lead[mm]

symbol	LEFS16	LEFS25	LEFS32	LEFS40
H		20	24	30
A	10	12	16	20
B	5	6	8	10

⑨ Actuator cable type

Nil	Without cable
S	Standard cable※
R	Robot cable (Flexible cable)

* The standard cable should be used on fixed parts. For using on moving parts, select the robotic cable.
* Only available for the motor type "Step motor".

② Size

16
25
32
40

⑥ Stroke [mm]

50	50
to	to
1200	1200

⑦ Motor option

Nil	Without option
B	With lock

⑧ Seal band holder type

Nil	Basic type
N	Seal band holder roller type (Non grease surface specification)

⑩ Actuator cable length [m]

Nil	Without cable	8	8※
1	1.5	A	10※
3	3	B	15※
5	5	C	20※

④ Motor type

Symbol	Motor Type	Size				Compatible controller
		LEFS16	LEFS25	LEFS32	LEFS40	
Nil	Step motor (Servo/24 VDC)	●	●	●	●	LECP6 LECP1 LECPA LECPMJ JXC91
A	Servo motor (24 VDC)	●	●	-	-	LECA6

⑬Controller/Driver option

Controller/Driver type:6※、1※、A※、MJ

Nil	Screw mounting
D	DIN rail mounting

Controller/Driver type:C9

7	Screw mounting
8	DIN rail mounting

* DIN rail is not included Order it separately.

⑪Controller/Driver type

Nil	Without controller	
6N	LECP6/LECA6 (Step data input type)	NPN
6P		PNP
1N*	LECP1* (Program-less type)	NPN
1P*		PNP
MJ*	LECPMJ※ (CC-Link direct input type)	-
AN*	LECPA* (Pulse input type)	NPN
AP*		PNP
C9*	JXC9 (EtherNet/IP direct input type)	-

* Only available for the motor type "Step motor".

⑫ I/O Cable length [m]

Nil	Without cable
1	1.5
3	3
5	5

⑫ Communication plug connector (LECPMJ)

Nil	-
S	Straight type
T	T-Branched type

⑫ Controller/Driver type:C9

Number of axis and type of power supply

1	1 axis,DC24V

*Applicable stroke table

Model \ Stroke[mm]	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1100	1200
LEFS16	●	●	●	●	●	●	●	●	●	●	-	-	-	-	-	-	-	-	-	-	-	-
LEFS25	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	-	-	-	-	-	-
LEFS32	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	-	-
LEFS40	-	-	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

*Consult with SMC for the manufacture of intermediate strokes.

⚠ Caution

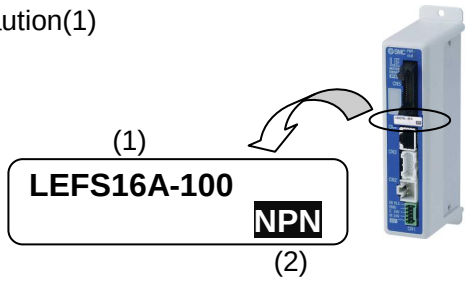
The actuator body and controller are sold as a package.

If when only the actuator is purchased separately, confirm that the combination of the controller, which you have and the actuator is compatible. / P.34 Notes 5.3⚠Caution(1)

<Be sure to check the following before use.>

(1) Check that actuator label for model number.
This matches the controller.

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



<Belt drive>

LEFB 16 ① ☐ ② T ③ – 200 ④ ☐ ⑤ ☐ ⑥ – S ⑦ 1 ⑧ 6N ⑨ 1 ⑩ ☐ ⑪

① Size

16
25
32

⑤ Motor option

Nil	Without option
B	With lock

⑥ Seal band holder type

Nil	Basic type
N	Seal band holder roller type (Non grease surface specification)

⑦ Actuator cable type

Nil	Without cable
S	Standard cable※
R	Robot cable (Flexible cable)

* The standard cable should be used on fixed parts. For using on moving parts, select the robotic cable.
* Only available for the motor type "Step motor".

② Motor type

Symbol	Motor Type	Size LEFB16	Size LEFB25	Size LEFB32	Compatible controller
Nil	Step motor (Servo/24 VDC)	●	●	●	LECP6 LECP1 LECPA LECPMJ JXC91
A	Servo motor (24 VDC)	●	●	-	LECA6

⑧ Actuator cable length [m]

Nil	Without cable	8	8※
1	1.5	A	10※
3	3	B	15※
5	5	C	20※

* Produced upon receipt of order. (Robotic cable only)

③ Lead[mm]

T	48

⑨ Controller type

Nil	Without controller	
6N	LECP6/LECA6 (Step data input type)	NPN
6P		PNP
MJ*	LECPMJ※ (CC-Link direct input type)	-
1N*	LECP1* (Program-less type)	NPN
1P*		PNP
AN*	LECPA* (Pulse input type)	NPN
AP*		PNP
C9*	JXC9 (EtherNet/IP direct input type)	-

* Only available for the motor type "Step motor".

⑩ I/O Cable length [m]

Nil	Without cable
1	1.5
3	3
5	5

④ Stroke [mm]

300	300
to	to
2000	2000

*Applicable stroke table

Model \ Stroke [mm]	300	500	600	700	800	900	1000	1200	1500	1800	2000
LEFB16	●	●	●	●	●	●	●	-	-	-	-
LEFB25	●	●	●	●	●	●	●	●	●	●	●
LEFB32	●	●	●	●	●	●	●	●	●	●	●

⑩ Communication plug connector (LECPMJ)

Nil	-
S	Straight type
T	T-Branched type

⑩ Controller/Driver type:C9
Number of axis and type of power supply

1	1 axis,DC24V

⑪ Controller/Driver option

Controller/Driver type:6※、1※、A※、MJ

Nil	Screw mounting
D	DIN rail mounting

Controller/Driver type:C9

7	Screw mounting
8	DIN rail mounting

* DIN rail is not included Order it separately.

⚠ Caution

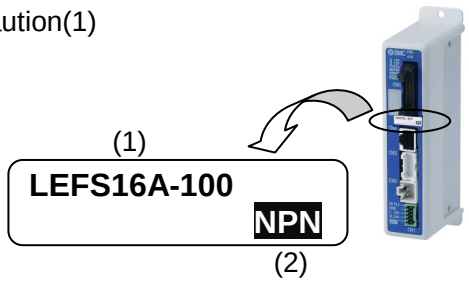
The actuator body and controller are sold as a package.

If when only the actuator is purchased separately, confirm that the combination of the controller, which you have and the actuator is compatible. / P.34 Notes 5.3⚠Caution(1)

<Be sure to check the following before use.>

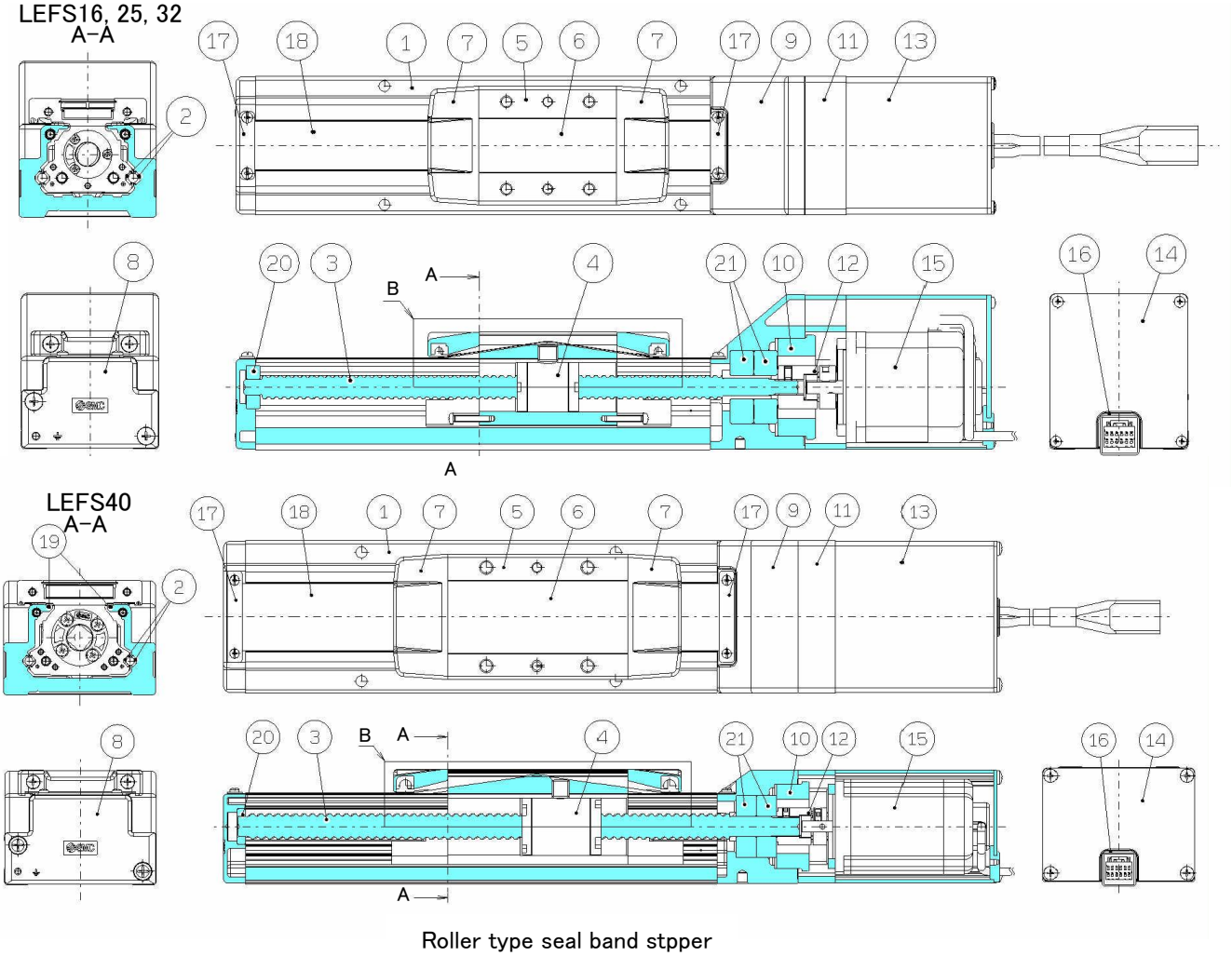
(1) Check that actuator label for model number.
This matches the controller.

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



2.4 Construction

<Ball screw drive (16/25/32/40)> In-line mouting type



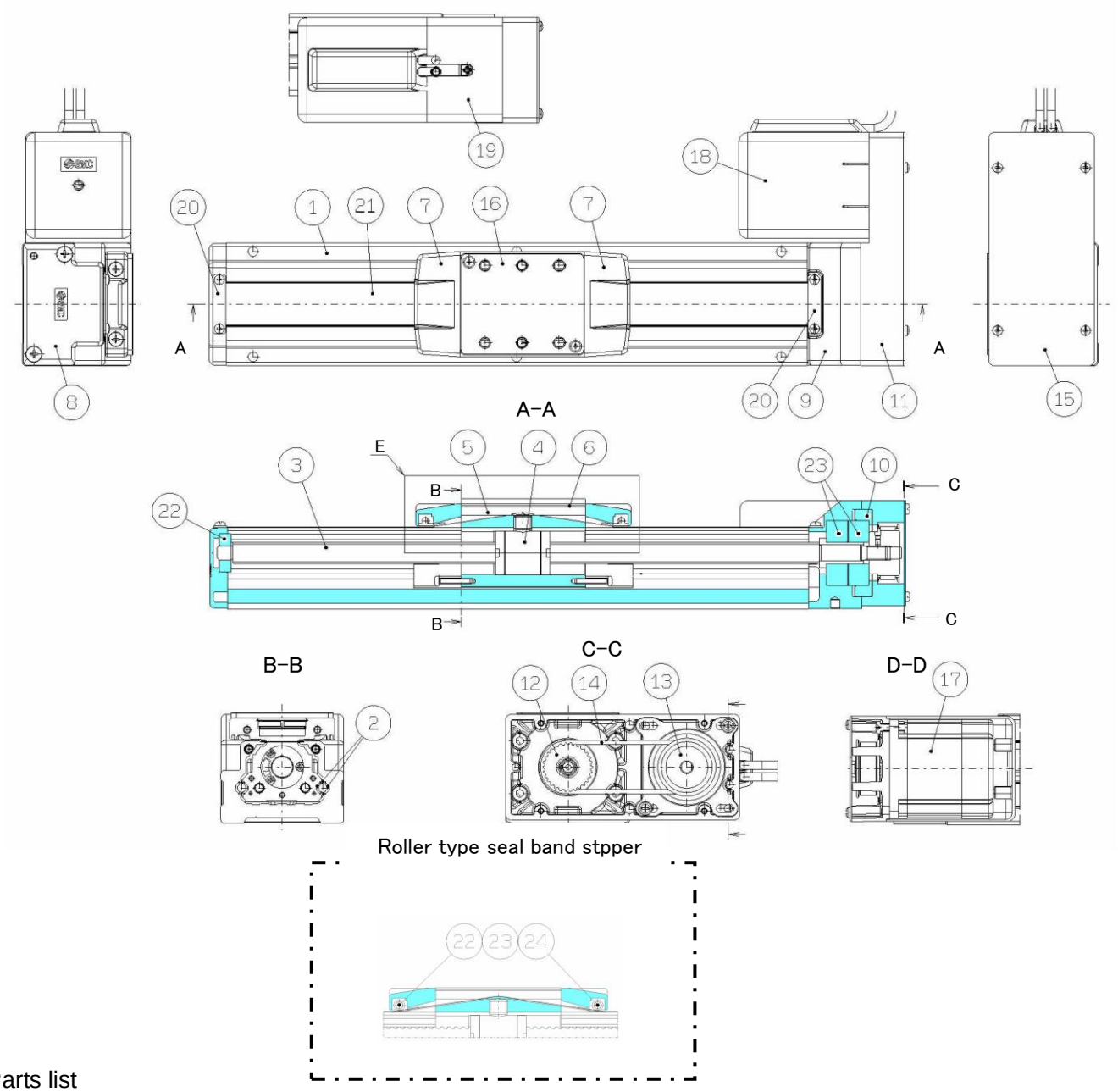
Parts list

No	Description	Material	Note
1	**Body**	Aluminum alloy	Anodized
2	**Rail guide**	–	
3	**Ball screw**	–	
4	**Ball screw nut**	–	
5	**Table**	Aluminum alloy	Anodized
6	**Blanking plate**	Aluminum alloy	Anodized
7	**Seal band holder**	Synthetic resin	
8	**Housing A**	Aluminum die- casted	Coating
9	**Housing B**	Aluminum die- casted	Coating
10	**Bearing stopper**	Aluminum alloy	
11	**Motor mount**	Aluminum alloy	
12	**Coupling**	–	

No	Description	Material	Note
13	**Motor cover**	Aluminum alloy	Anodized
14	**End cover**	Aluminum alloy	Anodized
15	**Motor**	–	
16	**Rubber bushing**	NBR	
17	**Band stopper**	Stainless steel	
18	**Dust seal band**	Stainless steel	
19	**Seal magnet**	–	
20	**Slide bearing**	Synthetic resin	
21	**Bearing**	–	
22	**Roller shaft**	Stainless steel	
23	**Roller**	Synthetic resin	
24	**Bearing**	–	

<Ball screw drive (16/25/32/40)> Right / Left side parallel type

With lock

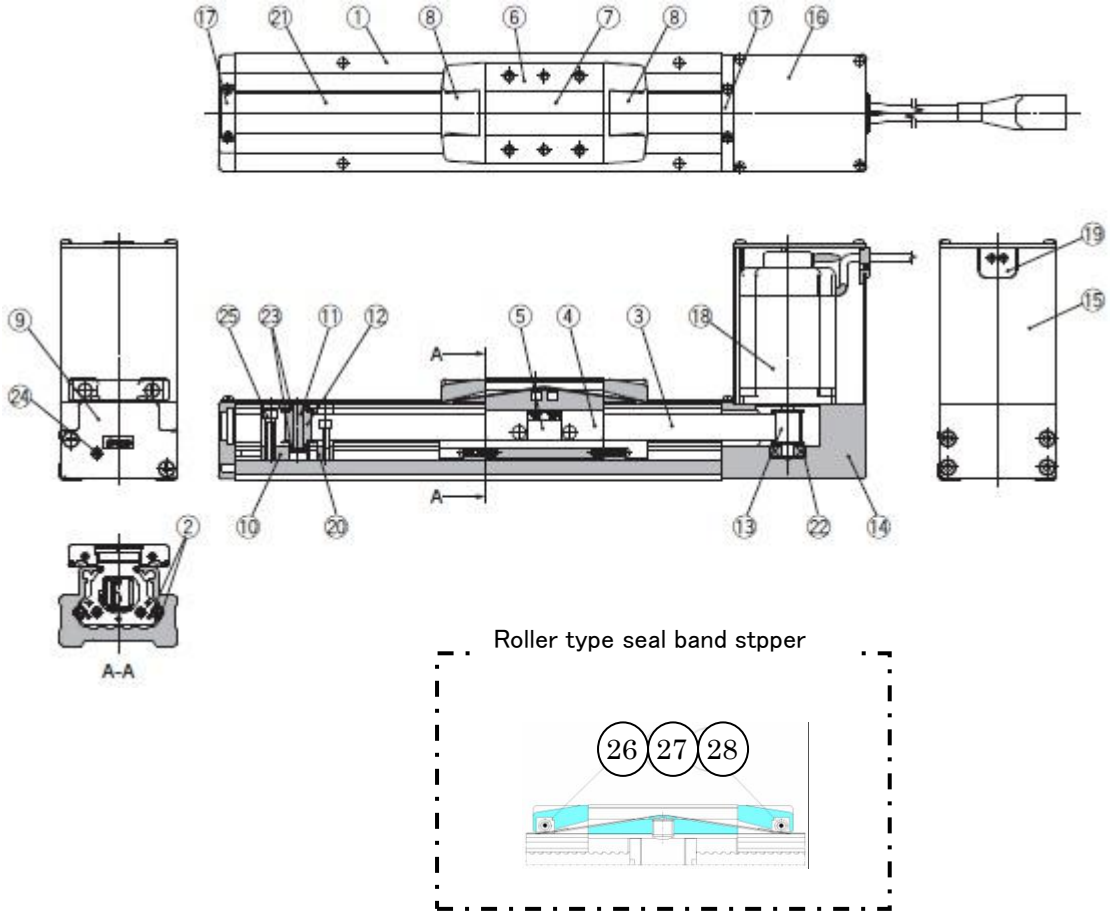


Parts list

No	Description	Material	Note
1	**Body**	Aluminum alloy	Anodized
2	**Rail guide**	–	
3	**Ball screw**	–	
4	**Ball screw nut**	–	
5	**Table**	Aluminum alloy	Anodized
6	**Blanking plate**	Aluminum alloy	Anodized
7	**Seal band holder**	Synthetic resin	
8	**Housing A**	Aluminum die- casted	Coating
9	**Housing B**	Aluminum die- casted	Coating
10	**Bearing stopper**	Aluminum alloy	
11	**Return plate**	Aluminum alloy	
12	**Pulley**	Aluminum alloy	
13	**Pulley**	Aluminum alloy	

No	Description	Material	Note
14	**Belt**	–	
15	**Cover plate**	Aluminum alloy	Anodized
16	**Table spacer**	Aluminum alloy	LEFS32only
17	**Motor**	–	
18	**Motor cover**	Synthetic resin	
19	**Motor cover with lock**	Aluminum alloy	
20	**Band stopper**	Stainless steel	
21	**Dust seal band**	Stainless steel	
22	**Slid bearing**	Synthetic resin	
23	**Bearing**	–	
24	**Roller shaft**	Stainless steel	
25	**Roller**	Synthetic resin	
26	**Bearing**	–	

<Belt drive>



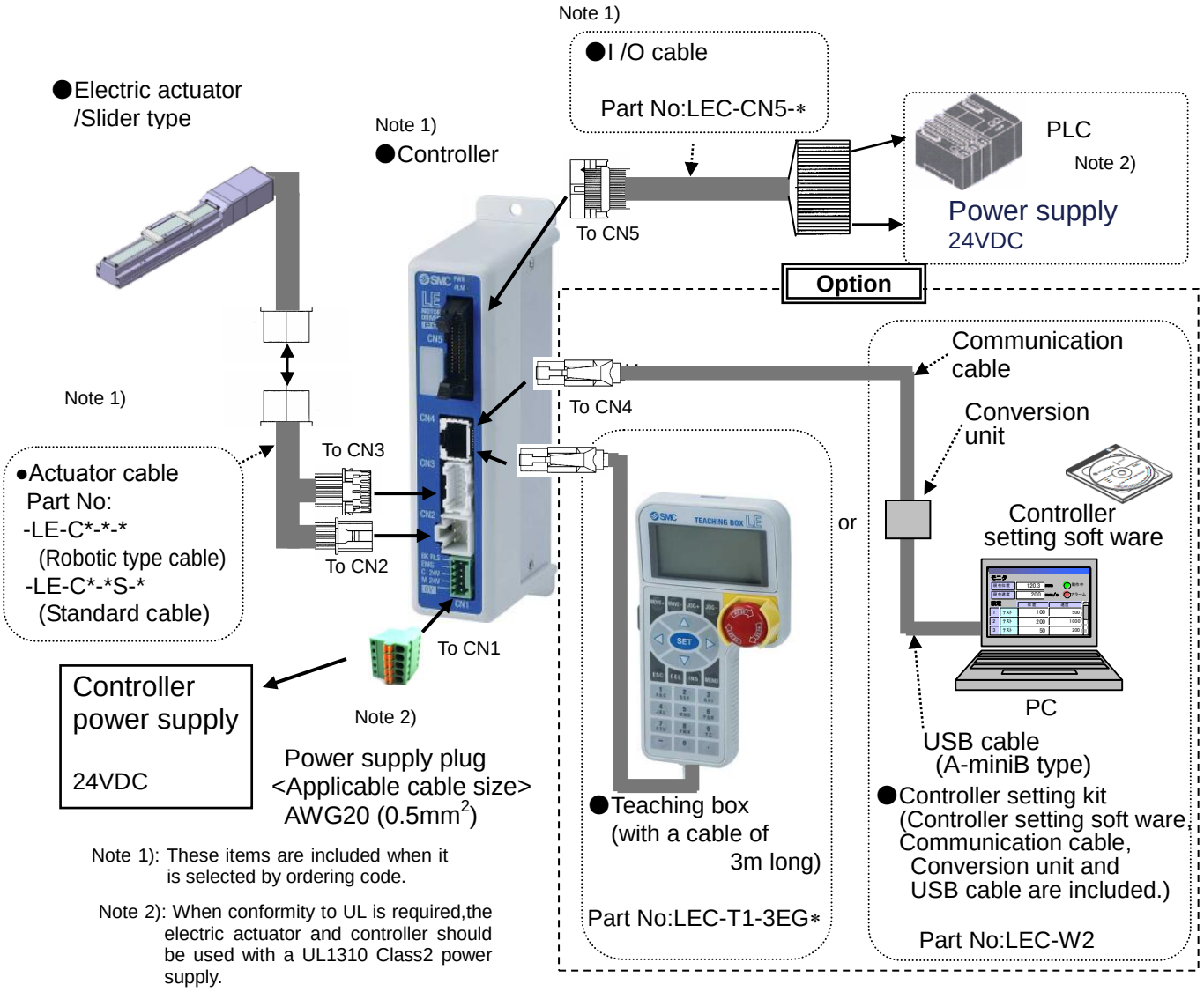
Parts list

No	Description	Material	Note
1	**Body**	Aluminum alloy	Anodized
2	**Rail guide**	–	
3	**Belt**	–	
4	**Belt holder**	Carbon steel	Chromating
5	**Belt stopper**	Aluminum alloy	Anodized
6	**Table**	Aluminum alloy	Anodized
7	**Blanking plate**	Aluminum alloy	Anodized
8	**Seal band holder**	Synthetic resin	
9	**Housing A**	Aluminum die- casted	Coating
10	**Pully holder**	Aluminum alloy	
11	**Pulley shaft**	Stainless steel	
12	**End pulley**	Aluminum alloy	Anodized
13	**Motor pulley**	Aluminum alloy	Anodized
14	**Motor mount**	Aluminum alloy	Anodized

No	Description	Material	Note
15	**Motor cover**	Aluminum alloy	Anodized
16	**End cover**	Aluminum alloy	Anodized
17	**Band stopper**	Stainless steel	
18	**Motor**	–	
19	**Rubber bushing**	NBR	
20	**Stopper**	Aluminum alloy	
21	**Dust seal band**	Stainless steel	
22	**Bearing**	–	
23	**Bearing**	–	
24	**Tension adjustment cap screw**	Chromium molybdenum steel	
25	**Pulley retaining screw**	Chromium molybdenum steel	
26	**Roller shaft**	Stainless steel	
27	**Roller**	Synthetic resin	
28	**Bearing**	–	

3. Product Outline

3.1 System construction



Note 1): These items are included when it is selected by ordering code.

Note 2): When conformity to UL is required,the electric actuator and controller should be used with a UL1310 Class2 power supply.

⚠Warning

Refer to the operation manual of the LEC (controller) for detailed wiring.
/ See 4 Wiring of cables on p.32.

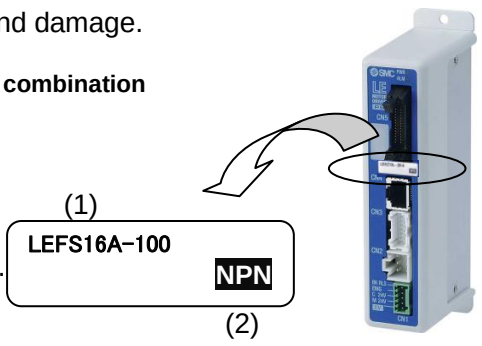
Communication cable is to be connected to PC by USB cable through conversion unit.
Do not connect the teaching box directly to the PC.
Use only specified cables otherwise there maybe fire risk and damage.

The actuator and controller are sold as a package.
If when only the actuator is purchased separately, confirm that the combination of the controller, which you have and the actuator is compatible.
/ See 5.3 Caution (1) on p. 34

<Be sure to check the following before use.>

(1) Check that actuator label for model number.
This matches the controller.

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



3.2 Setting Function

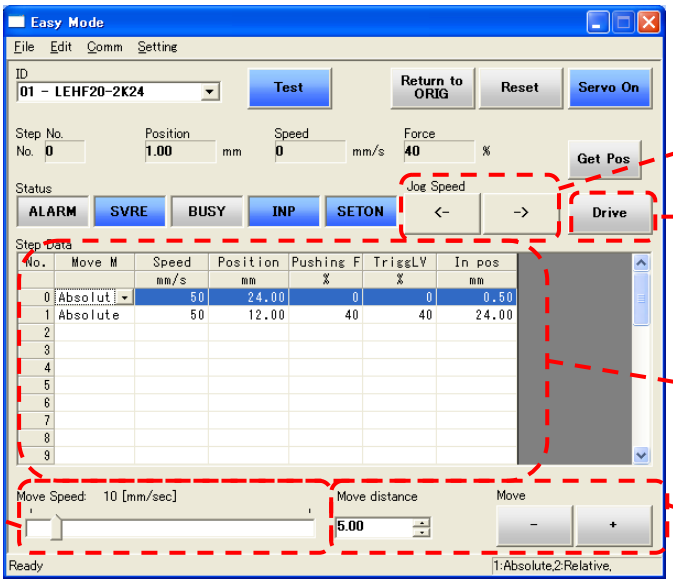
Refer to the operation manual of the controller (LEC series) for the detail of the setting function.

Easy Mode for simple setting

>Select “Easy mode” for instant operation

Controller setting software

- Setting and operation, such as the step data setting, test drive and JOG / fixed-distance moving, can be performed on the same page.



JOG moving

Start testing

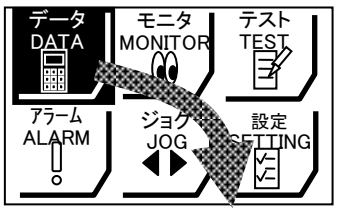
Positioning data setting

Speed setting of JOG / fixed distance

Fixed distance moving

Teaching box

- Setting and operation by the simple screen without scrolling.
- Select function by the iconized menu at the first page.
- Step data setting and monitoring at the second page.



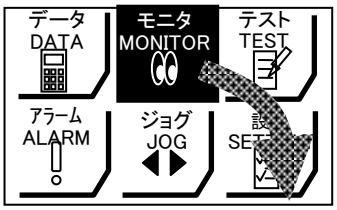
1st screen

2nd screen

Data	Axis 1
Step No.	0
Posn	123.45mm
speed	400mm/s

It can be registered by “SET” after entering the values.

1st screen



Monitor	Axis 1
Step No.	1
Posn	12.34mm
speed	50mm/s

Operation status can be checked

Example of setting the step data

Example of checking the operation status

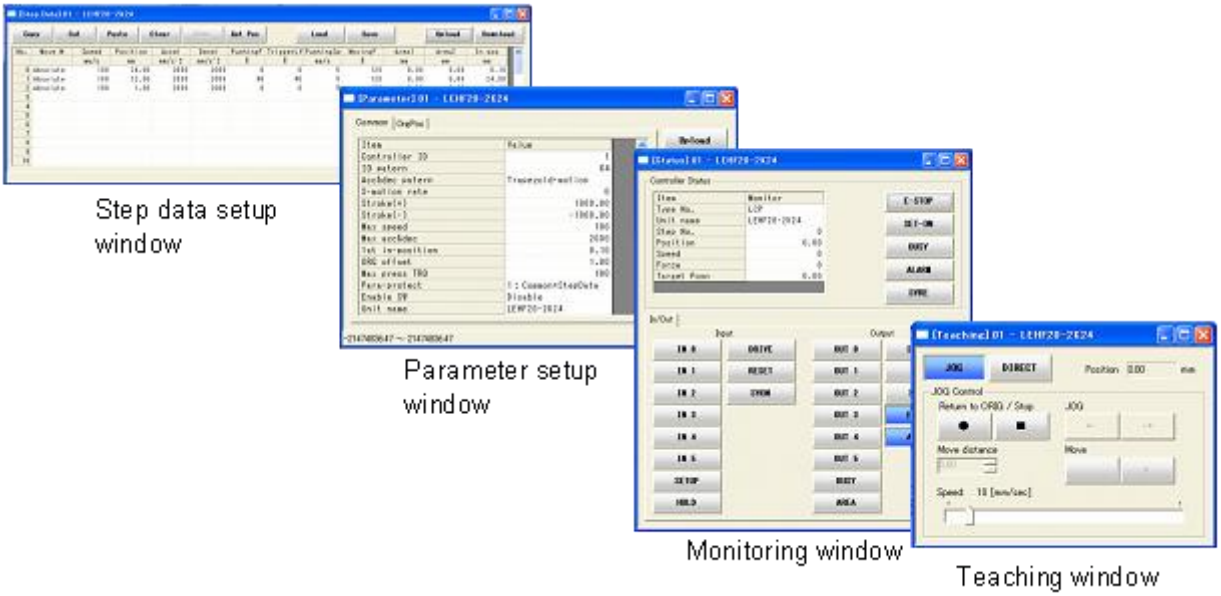
Normal mode for the detailed setting

>Select “Normal mode” if the detailed setting are necessary.

- Step data can be set in detail.
- Parameters can be set.
- Signals and terminal condition can be monitored.
- JOG and fixed distance movement, return to origin position, test operation and testing of compulsory output can be done.

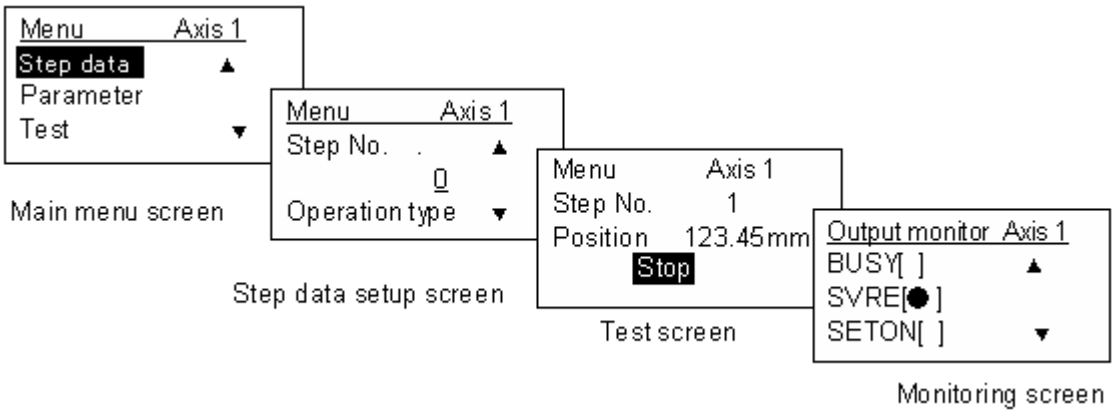
Controller setting soft ware

- Every function, step data, parameter, monitor and teaching are indicated in a different window.



Teaching box

- The data in the controller can be saved / forwarded in this teaching box.
- Continuous test operation can be made after specifying five step data.



Controlled items

PC: Controller setting software
TB: Teaching box
O: Available function, x: Not available function

Function		Content	Easy mode		Normal mode
			PC	TB	PC/TB
Step data	Movement method	Can be selected of absolute/relative position move	○	×	○
	Speed	Can be set in units of 1mm/s.	○	○	○
	Position	Can be set in units of 0.01mm.	○	○	○
	Acceleration Deceleration	Can be set in units of 1mm/s^2.	○	○	○
	Pushing force	Can be set in units of 1%. / In case of positioning operation: Set to 0%. (Not available in this product)	×	×	×
	Trigger LV	Trigger level of target pushing force when pushing operation Can be set in units of 1%. (Not available in this product)	×	×	×
	Pushing speed	Can be set in units of 1mm/s. (Not available in this product)	×	×	×
	Moving force	100% at step motor, 250% at servo motor (Not changeable).	○	×	○
	Area output	Can be set in units of 0.01mm.	○	×	○
	In position	During positioning operation: Width to the target position. It should be set to LEFS:0.5 or more. LEFB:1.0 or more	○	×	○
Parameter (Excerpt)	Stroke(+)	+ side limit of position. （Can be set in units of 0.01mm）.	×	×	○
	Stroke(-)	- side limit of position （Can be set in units of 0.01mm）.	×	×	○
	ORIG speed	Speed when returning to home position can be set.	×	×	○
	ORIG ACC	Acceleration when returning to origin can be set.	×	×	○
Test	JOG	It can make continuous operation at the set speed while the switch is being pressed	○	○	○
	MOVE	It can make test operation at the set distance and speed from the current position when the switch is pressed.	○	×	○
	Return to ORIG	Test of return to origin can be done.	○	○	○
	Test drive	The operation of the specified step data can be tested.	○	○	○ (Continuous operation)
	Forced output	ON/OFF of the output terminal can be tested.	×	×	○
Monitor	DRV mon	Current position, current speed, current force and the specified step data No. can be monitored.	○	○	○
	In/Out mon	Current ON/OFF status of the input and output terminal can be monitored.	×	×	○
ALM	Status	The alarm currently being generated can be confirmed.	○	○	○
	ALM Log record	The alarm generated in the past can be confirmed.	×	×	○
File	Save - Load	The step data and parameter of the objective controller can be saved, forwarded and deleted.	×	×	○
Other	Language	Language can be changed to Japanese / English.	○ *3	○ *2	○ *2 *3

*1 Every parameter is set to the recommended condition before shipment from the factory. Only change the setting of the items which require adjustment.
*2 Teaching box: In the Normal mode the teaching box can be set to work in English or Japanese.
*3 Controller setting software: Can be installed by selecting English version or Japanese version.

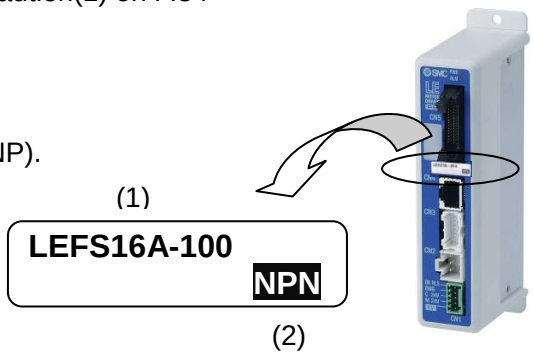
3.3 Step data setting method

Refer to the operation manual of the controller (LEC series) for details.
This operation manual specifies the electric actuator slider type, if an actuator other than the slider type is used, refer to the operation manual of each type of actuator and controller (LEC series) regarding the description of step data.

⚠ Caution

The actuator body and controller are sold as a package.
If when only the actuator is purchased separately, confirm that the combination of the controller, which you have and the actuator is compatible. / See 5.3⚠Caution(1) on P.34

<Be sure to check the following before use.>
(1) Check that actuator label for model number.
This matches the controller.
(2) Check Parallel I /O configuration matches (NPN or PNP).

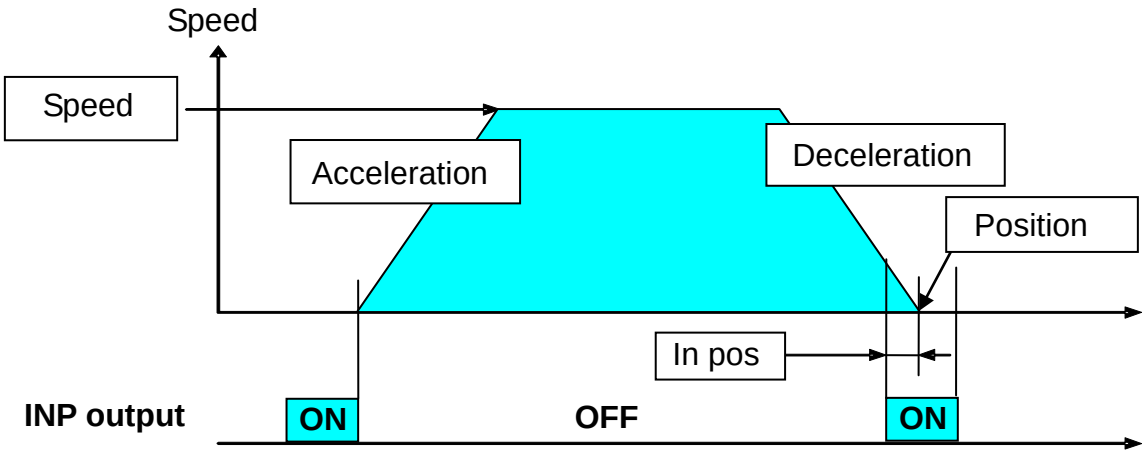


Positioning operation

In the positioning operation, the actuator transfers to and stops at the target position.
The following image shows the set items and operation.

<Confirmation of reaching the target position during the positioning operation>

When the table of actuator reaches the range of the target position, the “target position reaching signal”【INP】(in position) is outputted.
When the table of actuator enters the range of【in position】, the INP output signal turns on.



<Items and set values in positioning operation>

Step No. 1: Positioning operation

a	b	c	d	e	f	g	h	i	j	k

Step data

No.	Move M	Speed	Position	Accel	Decel	Pushing F	TriggLV	Pushing Sp	Moving F	Area1	Area2	In pos
		mm/s	mm	mm/s2	mm/s2	%	%	mm/s	%	mm	mm	mm
0	Absolute	250	50.00	3000	3000	0	0	0	100	48.00	50.00	0.50
1	Absolute	250	0.00	3000	3000	0	0	0	100	0.00	2.00	0.50

[◎] Need to be set - [○] Need to be adjusted as required.
[×] Not used. Items don't need to be changed in positioning operation.

a< ◎ Movement Method> When the absolute position is required, set Absolute
When the relative position is required, set Relative
→ Absolute: Distance from the origin position. / General setting method
Relative: Feed from the current position. / This is used when simplified data.

b< ◎ Speed> Transfer speed to the target position.

C< ◎ Position> Target position.

d< ○ Acceleration> The parameter which defines how rapidly the actuator reaches the speed set in b .
The higher the set value, the faster it reaches the speed set in b .

e< ○ Deceleration> The parameter which defines how rapidly the actuator comes to stop.
The higher the set value, the quicker it stops.

f< ◎ Pushing force> Set
(If values other than 0 set the operation will be changed to the pushing operation.)

g< × Trigger LV> For pushing operation only. Not applicable for this product.

h< × Pushing speed> For pushing operation only. Not applicable for this product.

i< × Moving force> Max. Force at the positioning operation.
The force is automatically adjusted corresponding to the load.
Set [100] % at step motor / [250]% at servo motor. (Not changeable)

j< ○ Area1, Area2> This is the condition that turns on the AREA output signal.
The setting condition should be .
It is possible to set at relative operation too.
The position will be Absolute (position from the origin).
Example) In case of Step no.1
[AREA] output signal is outputted between Area 1: 0 and Area 2: 2.

k< ○ In position> This is the condition that turns on the INP (in position) output signal.
→When the electric actuator reaches the range of the target position, the INP output signal is output.
When it is necessary to output the target position reaching signal earlier, make the value larger.
Note) Set the value more than [0.50]: LEFS, [1]: LEFB (Default).
Example) In case of Step no.1
Position: 0 + In position: 0.5 = [INP] is outputted from the value of 0.5.

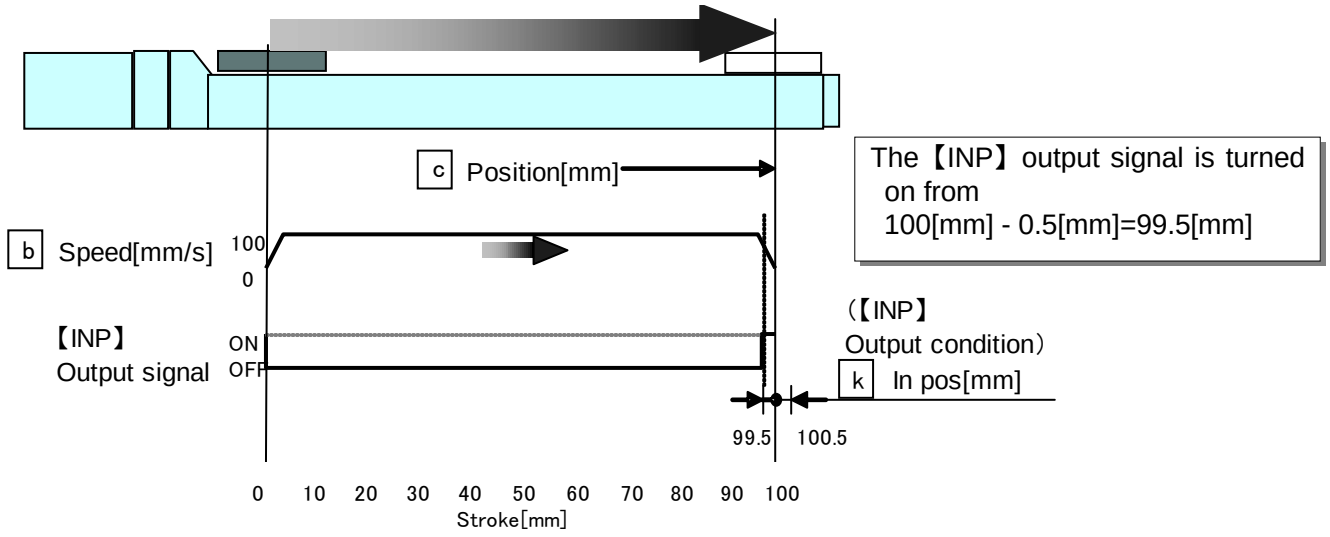
Example of step data input (1)

〈 Positioning operation - 【INP】output signal, 【AREA】output signal 〉

	a	b	c	d	e	f	g	h	i	j	k
Step data											
No.	Move M	Speed	Position	Accel	Decel	Pushing F	TriggLV	Pushing Sp	Moving F	Area1	Area2	In pos
		mm/s	mm	mm/s2	mm/s2	%	%	mm/s	%	mm	mm	mm
0	Absolute	100	100.00	3000	3000	0	0	0	100	80.00	90.00	0.50

・Step data no.0: Positioning operation (It moves from Position: 0[mm] to Position: 100[mm])

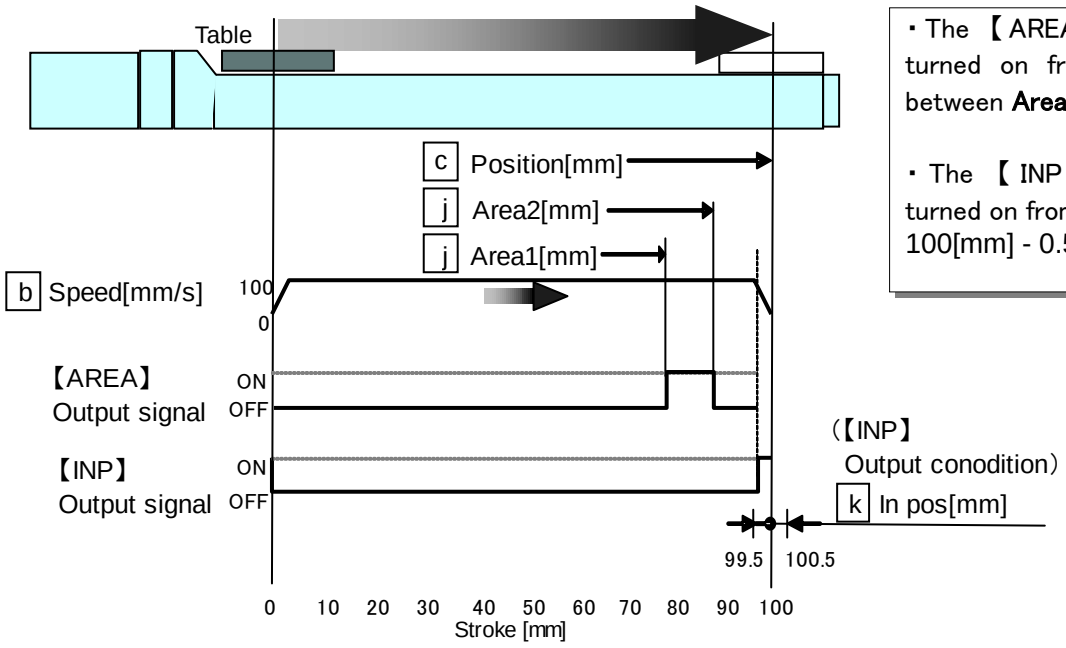
Condition 1) The 【AREA】output signal is not used.



The 【INP】 output signal is turned on from 100[mm] - 0.5[mm]=99.5[mm]

Condition 2) The 【AREA】output signal is used.

*The 【AREA】output signal is a signal output when the table traverses through a certain range (The step data: from **Area 1** to **Area 2**).
This feature is useful when an output to check the table position at intermediate stroke is required.



・The 【AREA】output signal is turned on from **Area 1**:80[mm] between **Area 2**:90[mm].

・The 【INP】output signal is turned on from 100[mm] - 0.5[mm]=99.5[mm]

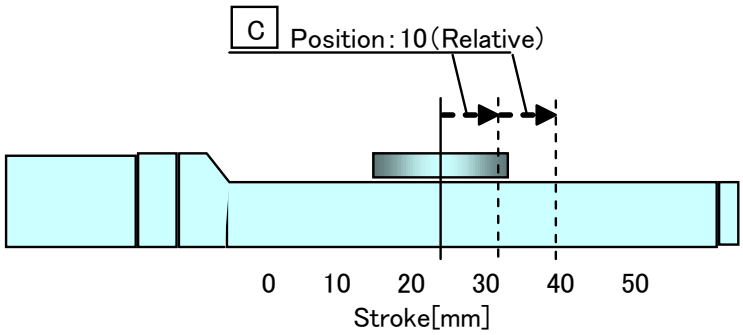
Example of step data input (2)

〈 Positioning operation - Relative 〉

	a	b	c	d	e	f	g	h	i	j	k
Step data											
No.	Move M	Speed	Position	Accel	Decel	Pushing F	TriggLV	Pushing Sp	Moving F	Area1	Area2	In pos
		mm/s	mm	mm/s2	mm/s2	%	%	mm/s	%	mm	mm	mm
0	Relative	100	10.00	3000	3000	0	0	0	100	10.00	20.00	0.50
1	Relative	100	−10.00	3000	3000	0	0	0	100	10.00	20.00	0.50

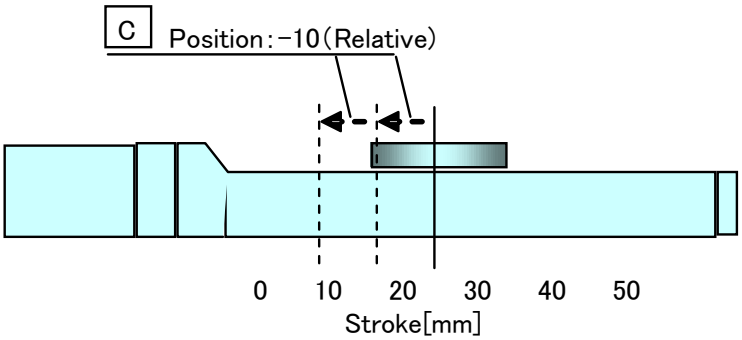
*Absolute: Distance from the origin position. / General setting method
*Relative: Feed from the current position. / This is used when simplified data.

Condition 1) 30mm position → **Step no.0** → **Step no.0** (Move Method: Relative)



Attainment point: 50[mm]

Condition 2) 30mm position → **Step no.1** → **Step no.1** (Move Method: Relative)



Attainment point: 10[mm]

Operating procedure and input / output signals for each operation

The input / output signal and the operation description for operating this electric actuator are as follows.

1) Signals along with the operation procedures

In case the operation order is

1. Supply power to the motor → 2. Return to origin → 3.Step no. 1 → 4.Step no. 2 → 5.Cut power to the motor

Procedure	Input signal	Output signal for the input signal	Operation description
1	SVON(Servo on)[●]	SVRE(Servo ready) [●]	Power is supplied to the motor, and detection of the magnetic pole position starts. => Completion.
2	SETUP [●]	SETON [●] INP(In position)[●]	Returning to the origin starts. =>Completion.
3	IN0 [●] IN1 [ ] IN2 [ ] IN3 [ ] IN4 [ ] IN5 [ ] ↓ DRIVE [●] ⇒[ ] note.3)5)	OUT0 [●] OUT1 [ ] OUT2 [ ] OUT3 [ ] OUT4 [ ] OUT5 [ ] } note.3)4) ↓ After reaching of target position, INP [●] After stopping motion, BUSY [ ]	Step no. 1 is selected, and the operation starts. =>Complete.
4	IN0 [ ] IN1 [●] IN2 [ ] IN3 [ ] IN4 [ ] IN5 [ ] ↓ DRIVE [●] ⇒[ ] note.3)5)	OUT0 [ ] OUT1 [●] OUT2 [ ] OUT3 [ ] OUT4 [ ] OUT5 [ ] } note.3)4) ↓ After reaching of target position, INP [●] After stopping motion, BUSY [ ]	Step no. 2 is selected, and the operation starts. =>Complete.
5	SVON [ ]	SVRE [ ] SETON [●] note.2) INP [●]	Power to the motor is cut.

Note 1) [●] means ON, [ ] means OFF.

Note 2) The origin has been recognized when the operation is repeated, so it can operate without the procedure item 2.

Note 3) The “OUT*” signals are reset during the rising edge of the Drive signal. The “OUT*” signal which follows the “IN*”signal are outputted at the falling edge of the "drive" signal.

Note 4) When the alarm is generated, the alarm group is displayed.
Please confirm the controller (LEC series) manual for a detailed content of the alarm.

Note 5) Leave an interval of 15ms (the recommendation is 30ms) or more between input signals and maintain the state of the signal for 15ms (the recommendation is 30ms) or more, because PLC processing delays and controller scanning delays can occur.

2) Signals when Stopped: In the event when “EMG” is used

/ See 5.1 Warning (9) on p. 33

The operating sequence is 1. “Stop” → 2. Release the “Stop”

Procedure	Input signal	Output signal for the input signal	Operation description
1	EMG: Not energizing (TB / Stop switch: Locking	∗ ESTOP[ ] SVRE [ ] SETON [●]	Power to the motor is cut by the “Stop “ command regardless of whether it is operating or stopping.
2	EMG: Energizing (TB / Stop switch: Releasing	∗ ESTOP[●] SVRE [●] SETON [●] Note 2)	The stop is released.

Note 1) [●] means ON, [ ] means OFF and *means negative logic.

Note 2) SETON signal does not change after releasing the “STOP”.

3.4 Parameter setting method

Initial setting for the basic parameters

Refer to the controller's (LEC series) operation manual for detail.

As the "basic parameter" is unique data of each actuator, if an actuator other than the "electric actuator / slider type" is used, refer to the operation manual of each actuator and the controller's (LEC series) operation manual for the basic parameter.

Description(Extract)	Initial input value	Input range
Controller ID	1	1 to 64 note1)
IO pattern	1: 64	-
Acceleration / deceleration pattern	1: Trapezoid - motion	-
S-motion ratio	0	-
Stroke (+), note 2), 3)	Stroke + 2	10000
Stroke (-), note 2), 3)	-2	-10000
Maximum speed	Max. speed of each product	Step data input limit: Max. speed of each product
Maximum acceleration / deceleration	3000	to 3000
Default In positioning	LEFS: 0.5 LEFB: 1	LEFS: 0.5 to product stroke LEFB: 1 to product stroke
Origin offset note4)	0.00	Origin direction: CCW: -10000 + "product stroke" to 9999 Origin direction: CW -9999 to +10000 - "product stroke"
Maximum pushing force	-	-
Parameter protect	1: Common + StepData	Changeable parameter 1: Common + StepData, 2: Common
Enable switch	2: Disable	Select 1:Enable or 2:Disable when using a teaching box
Model name	Part no. of each product	Only the English characters and numbers are changeable.
W-area output end 1	0.00	-
W-area output end 2	0.00	-
Origin correction data	0.00	-

Note1) Become effective after restarting the controller.

Note 2) Set the stroke setting value which has the additional distance. When inputting the product stroke, the "stroke limit"alarm may be generated. (Code 1-052).（Stroke + 2mm as recommended）

Note 3) The initial input value is when the origin direction is "CCW". When the origin direction set to "CW", input "2" to the "stroke(+)" and input "-(stroke)-2" to the "stroke(-)".

Note 4) The origin offset is used for the "return to origin". / See <Origin offset> on P.31.

Initial setting for the ORIG parameters

Refer to the controller's (LEC series) operation manual for detail.
As the "ORIG parameter" is unique data of each actuator, if an actuator other than the "electric actuator / slider type" is used, refer to the operation manual of each actuator and the controller's (LEC series) operation manual for the "ORIG parameters".

Description (Extract)	Initial input value		Input range
ORIG direction	CCW note1)		1:CW , 2:CCW
ORIG mode	1:ORIG Press		-
ORIG limit	LEF**	100	-
	LEF*16A*	150	
	LEF*25A*	250	
ORIG time	LEFS	200	-
	LEFB	200	
ORIG speed	LEFS	30	-
	LEFB	60	
ORIG ACC /DEC	1000		-
Creep speed	LEFS	30	
	LEFB	60	-
ORIG sensor	0: Disable		-

Note1) CCW direction: motor side origin, CW direction: end side origin. Become effective after restarting the controller.

<Return to origin>

It is necessary to establish the origin before commencing any other operation.

1) Sequence of return to origin

Input the origin signal → Move to the origin → Stop moving (pushing) → Move to the opposite direction → Origin
（Moving distance 2mm / not changeable）

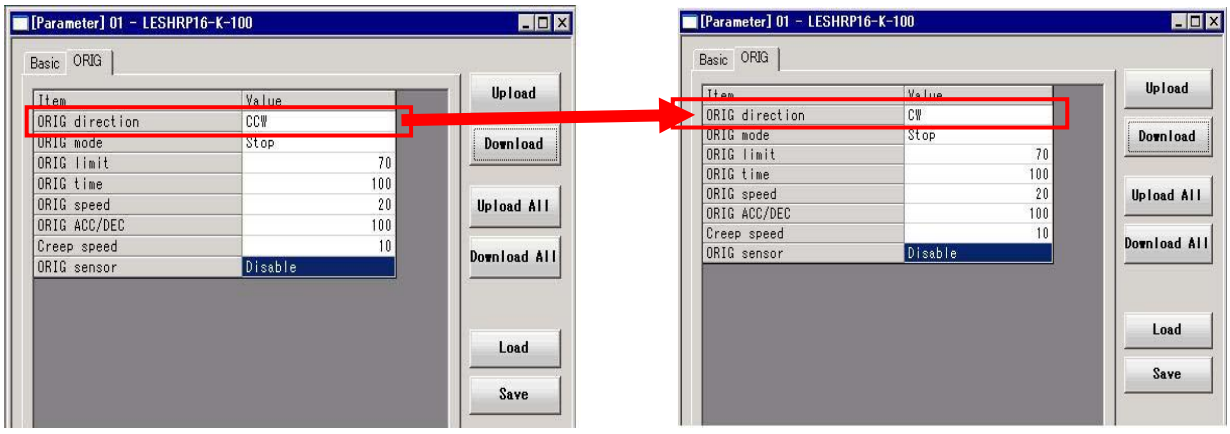
⚠WARNING

Do not alter any parameter except the ones shown. Or else there is a possibility of damage.

2) Method of changing direction of origin

Use the following procedures when you change the direction of the origin. Initial setting of origin is motor side.

Procedure 1- In the [Parameter] 01 dialogue box select the ORIG tab.
And the direction of the origin is changed from CCW to CW.



Procedure 2- In the [Parameter] 01 dialogue box press the "Download All" radio button.
Procedure 3- Power supply OFF (→ Power supply ON)

＜Origin offset＞

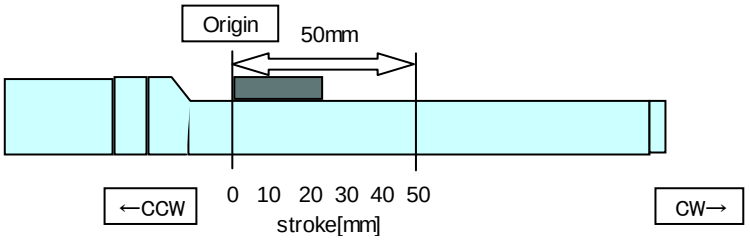
The origin offset means the value of the origin. (“Origin offset”=The display value of origin)
When the parameter “Origin offset” is changed, the value of “Stroke(+)”, “Stroke(-)” of basic parameter should be checked again.

When the parameter “Origin offset” is changed, the display value of origin is changed. The step data should be checked again.
Please refer to basic parameter on page 25 for changing of “Origin offset”.
Initial input value: “Origin offset”=0. Move in the opposite direction（Moving distance 2mm / Not changeable）by the return to origin becomes "origin =0".

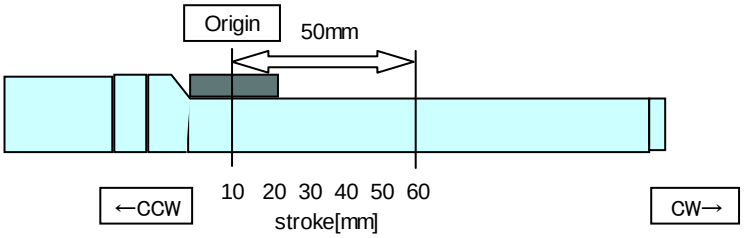
a) In case of Origin direction: CCW

Example) Actuator stroke 50mm

“Origin offset”＝0 (Initial input value)



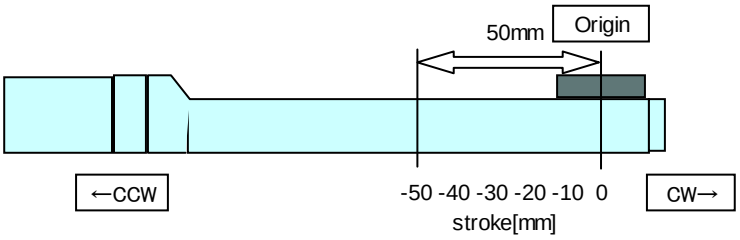
Changed to “Origin offset”＝10



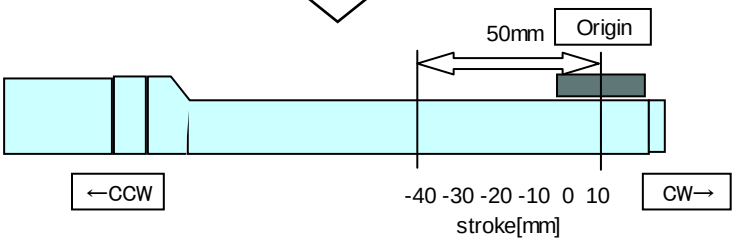
b) In case of Origin direction: CW

Example) Actuator stroke 50mm

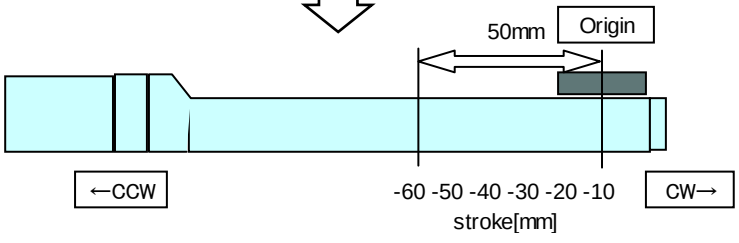
“Origin offset”＝0 (Initial input value)



Changed to “Origin offset”＝10



Changed to “Origin offset”＝-10



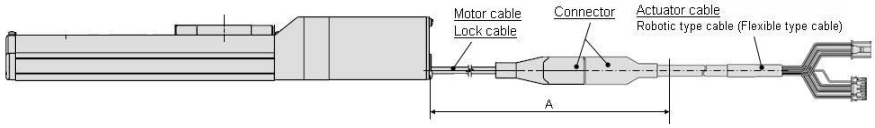
4. Wiring of cables / Common precautions

⚠Warning

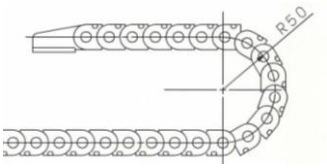
1. **Adjusting, mounting or wiring change should never be done before disconnecting the power supply to the product.**
   Electrical shock, malfunction and damage can result.
2. **Do not disassemble the cables.**
   Use only specified cables.
3. **Do not connect or disconnect the wires, cables and connectors when the power is turned on.**

⚠ Caution

1. **Wiring securely. Do not apply any voltage to the terminals other than those specified in the Operation Manual.**
2. **Wire the connector securely.**
3. **Take appropriate measures against noise.**
   Noise in a signal line may cause malfunction. As a countermeasure separate the high voltage and low voltage cables, and shorten the wiring lengths, etc.
4. **Do not route input/output wires and cables together with power or high voltage cables.**
   The product can malfunction due to interference of noise and surge voltage from power and high voltage cables to the signal line. Route the wires of the product separately from power or high voltage cables.
5. **Take care that actuator movement does not catch cables.**
6. **Operate with all wires and cables secured. Avoid bending cables at sharp angles where they enter the product.**
7. **Avoid twisting, folding, rotating or applying an external force to the cable.**
   Risk of electric shock, wire breakage, contact failure and loss of control of the product can happen.
8. **Fix the motor cables protruding from the actuator in place before use.**
   The motor and lock cables are not robotic type cables and can be damaged when moved. Therefore fix the cables and the connectors (part “A” in figure below) when set up.



9. **Select “Robotic type cables” in case of inflecting actuator-cable repeatedly. And do not put cables into a flexible moving tube with a radius smaller than the specified value. (Min. 50mm).**
   Risk of electric shock, wire break, contact failure and loss of control for the product can happen if “Standard cables” are used in case of inflecting the cables repeatedly



10. **Confirm proper wiring of the product.**
    Poor insulation (interference with other circuits, poor insulation between terminals and etc.) can apply excessive voltage or current to the product causing damage.
11. **The Speed / pushing force may vary, depending on the cable length, load and mounting conditions etc.**
    If the cable length exceeds 5m, the speed/pushing force will be reduced 10% per 5m as the maximum.(if cable length is 15m: 20% reduction as the maximum.)

[Transportation]

⚠ Caution

1. **Do not carry or swing the product by the cables.**

5. Electric actuators / Common precautions

5.1 Design and selection

⚠Warning

1. **Be sure to read the operation manual (this manual and the one for the controller: LEC series).**
   Handling or usage/operation other than that specified in the Operation Manual may lead to breakage and operation failure of the product.
   Any damage attributed to the use beyond the specifications is not guaranteed.
2. **There is a possibility of dangerous sudden action by the product if sliding parts of machinery are twisted due to external forces etc.**
   In such cases, human injury may occur, such as by catching hands or feet in the machinery, or damage to the machinery itself may occur. Design the machinery should be designed to avoid such dangers.
3. **A protective cover is recommended to minimize the risk of personal injury.**
   If a driven object and moving parts of the product are in close proximity, personal injury may occur. Design the system to avoid contact with the human body.
4. **Securely tighten all stationary parts and connected parts so that they will not become loose.**
   When the product operates with high frequency or is installed where there is a lot of vibration, ensure that all parts remain secure.
5. **Consider a possible loss of power source.**
   Take measures to prevent injury and equipment damage even in the case of a power source failure.
6. **Consider behavior of emergency stop of whole system.**
   Design the system so that human injury and/or damage to machinery and equipment will not be caused, when it is stopped by a safety device for abnormal conditions such as a power outage or a manual emergency stop of whole system.
7. **Consider the action when operation is restarted after an emergency stop or abnormal stop of whole system.**
   Design the system so that human injury or equipment damage will not occur upon restart of operation of whole system.
8. **Never disassemble or modify (including additional machining) the product.**
   An injury ro failure can result.
   It will cause the loss of the product performance.
9. **Do not use the stop signal, "EMG" of the controller and stop switch on the teaching box as the emergency stop of system.**
   The stop signal, "EMG" of controller and the stop switch on the teaching box are for decelerating and stopping the actuator.
   Design the system with an emergency stop circuit which is applied relevant safety standard separately.
10. **When using it for vertical application, it is necessary to build in a safety device.**
    The table may fall due to the weight of work. The safety device should not interfere with normal operation of the machine.
11. **Do not exceed product specification, even if work load is supported by external linear guides.**
    The moment to actuator is reduced by external guide, but required ability for transport (relationship between speed and work load) is not redeuced.

⚠ Caution

1. **Operate within the limits of the maximum usable stoke.**
   The product will be damaged if it is used with the stroke which is over the maximum stroke. Refer to the specifications of the product.
2. **When the product repeatedly cycles with partial strokes, operate it at a full stroke at least once every 10 strokes.**
   Otherwise, lubrication can run out.
3. **Do not use the product in applications where excessive external force or impact force is applied to it.**
   The product can be damaged.
4. **Returning to origin cannot be done during the operation.**
   It cannot be done during positioning operation, pushing operation and pushing.
5. **Refer to a common auto switch /matter (Best Pneumatics No 2) when an auto switch is built in and used.**

6. **When conformity to UL is required,the electric actuator and controller should be used with a UL1310 Class2 power supply.**

5.2 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 for future reference.**
2. **Observe the tightening torque for screws.**
   Unless stated otherwise, 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 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 table or mounting face etc., by striking or holding them with other objects. The components are manufactured to precise tolerances, so that even a slight deformation may cause faulty operation or seizure.
6. **Do not use the product until you verify that the equipment can be operated correctly.**
   After mounting or repair, connect the power supply to the product and perform appropriate functional inspections to check it is mounted correctly.
7. **Cantilever**
   When the actuator is operated at high speed while it is fixed at one end and free at the other end, a bending moment may act on the actuator due to vibration generated at the stroke end, which can damage the actuator. In such a case, install a support bracket to suppress the vibration of the actuator body or reduce the speed so that the actuator does not vibrate.
8. **When attaching to the work piece, do not apply strong impact or large moment.**
   If an external force over the allowable moment is applied, it may cause looseness in the guide unit, an increase in sliding resistance or other problems.
9. **Maintenance space**
   Allow sufficient space for maintenance and inspection.
10. **When mounting the actuator or attaching to the work piece, do not apply strong impact or large moment.**

5.3 Handling

⚠ **Warning**

1. **Do not touch the motor while in operation.**
   The surface temperature of the motor can increase to approx. 80°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 turn 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 the moving part of the actuator while in operation.**
5. **When installing, adjusting, inspecting or performing maintenance on the product, controller and related equipment, be sure to turn 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 actuator that has a servo motor (24VDC), the “motor phase detection step" is done by inputting the servo on signal just after the controller power is turned on. The "motor phase detection step" moves the table/rod for the distance of one screw-lead as the maximum. (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 actuator.**

7. Do not apply impact/collision/resistance for mover of actuator in operation.
It will cause decrease of product's life, damage to product, and so on.

⚠ Caution

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

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

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

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

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

6. Do not remove the nameplate.

7. Operation test should be performed by low speed. Start operation by predefined speed after confirming there are no problems.

[Earth]

⚠ Warning

1. Please give the ground to the actuator.

2. The ground should be exclusive use. (Less than 100Ω)

3. The ground cable length should be as short as possible.

[Unpackaging]

⚠ Caution

1. Check the received product is as ordered.
If the different product is installed from the one ordered, injury or damage could result.

5.4 Operating environment

⚠ Warning

1. Avoid use in the following environments.
a. Locations where a large amount of dusts and cutting chips are airborne.
b. Locations where the ambient temperature is outside the range (refer to specifications).
c. Locations where the ambient humidity is outside the range (refer to specifications).
d. Locations where corrosive gas, flammable gas, sea water, water and steam are present.
e. Locations where strong magnetic or electric fields are generated.
f. Locations where direct vibration or impact is applied to the product.
g. Areas that are dusty, or are exposed to splashes of water and oil drops.
h. Areas exposed to direct sunlight (ultraviolet ray).

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

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

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

5. Shield the product if there is a heat source nearby.
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. Protect it with a cover, etc.

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

[Storage]

⚠ **Warning**

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

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

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

5.5 Maintenance

⚠ **Warning**

1. Do not disassemble or repair the product.

Fire or electric shock can result.

Contact SMC, in case of disassembly for the maintenance.

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

Electrical shock can result.

⚠ **Caution**

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

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

2. Removal of product

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

[Lubrication]

⚠ **Caution**

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

Contact SMC if lubrication will be applied.

5.6 Precautions for 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 situation will happen when the lock slips due to a force higher than its holding force, as this will accelerate 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 are adhered to the sliding part of the lock, its holding force will reduce significantly. Or, lock sliding part performance and condition changes may be cause of lock release malfunction.

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

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

7. **When the actuator is operated manually (when SVRE output signal is off), supply 24DCV to the [BK RLS] terminal of the power supply connector.**
   If the product is operated without releasing the lock, wearing of the lock sliding surface will be accelerated, causing reduction in the holding force and the life of the locking mechanism.
8. **Do not supply 24VDC power supply constantly to the [BK RLS(Lock release)] terminal.**
   Stop supplying 24VDC power supply to the [BK RLS(Lock release) terminal during normal operation. If power is supplied to the [BK RLS] terminal continuously, the lock will be released, and workpieces may be dropped at stop (EMG).
   /Refer to the operation manual of LEC (controller) for details of wiring.

6. Electric actuators / Slider type Common precautions

6.1 Design and selection

⚠ **Warning**

1. **Do not apply a load in excess of the actuator specification.**
   A product should be selected based on the maximum work load and allowable moment.
   If the product is used outside of the operating specification, eccentric load applied to the guide will become excessive and have adverse effects such as creating play in the guide, reduced accuracy and reduced product life.
2. **Do not exceed the speed limit of the actuator specification.**
   Select a suitable actuator by the relationship of allowable work load and speed.
   Noise or reduction of accuracy may occur if the actuator is operated in excess of its specification and could lead to reduced accuracy and reduced product file.
3. **Do not use the product in applications where excessive external force or impact force is applied to it.**
   This can lead to premature failure of the product.
4. **When the product repeatedly cycles with partial strokes (see the table below), operate it at a full stroke at least once every 10 strokes.**
   Otherwise, lubrication can run out.

Model	Partial stroke
LEF□16	40mm or less
LEF□25	50mm or less
LEF□32	50mm or less
LEFS40	105mm or less

5. **Actuator sizing is necessary with the total workload including the external force if external force is added on the actuator table.**
   When mounting cable-duct to actuator, the resistance of actuator table may increase. It causes an overload alarm, so pay attention to the resistance.

6.2 Handling

⚠ **Caution**

1. **INP output signal**
   1) Positioning operation
   When the product comes within the set range by step data [In positon], output signal will be turned on. Set to [0.50] for LEFS and [1] for LEFB, or higher.
2. **Do not change the positioning force from initial setting.**
   If the positioning force is changed, it may cause a decrease in performance.
3. **Do not operate by fixing the table and moving the actuator body.**
   An excessive load will be applied to the table, which could lead to damage to the actuator and reduced accuracy and reduced product life.
4. **Belt drive actuator cannot be used for vertically mounted applications.**
5. **Check the specification for the minimum speed of each actuator.**
6. **In the case of the belt driven actuator, vibration may occur during operation at speeds within the actuator specification, this could be caused by the operating conditions.**
   Change the speed setting to a speed that does not cause vibration.
7. **The actual speed of this actuator is affected by the work load and stroke.**

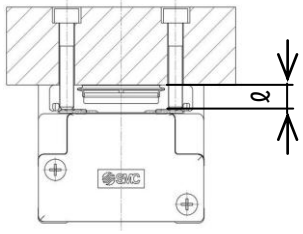
8. **Do not apply aload ,impact or resistance in addition to the transferred during return to origin.**
9. **Do not den't ,scratch or cause other damage to the body and table mounting surfaces.**
10. **Do not hit the table with the workpiece in the positioning operation and positioning range.**
11. **There is a type where grease is applied to the dust seal band for sliding.When wiping off the grease remove foreign matter,etc.,be sure to apply grease again.**
12. **For bottom mounting, the dust seal band may be deflected.**

6.3 Mounting

⚠ **Caution**

1. **Keep the flatness of mounting surace to within [0.1mm or less for length 500mm].**
   Insufficient flatness of the work piece or the surface onto which the actuator body is to be mounted can cause play in the guide and increased sliding resistance.
2. **When mounting the workpiece or other device to the actuator tighten the fixing screws with adequate torque within the specified torque range.**
   Tightening the screws with a higher torque than the maximum may cause malfunction, whilst tightening with a lower torque can cause the displacement of the mounting position or in extreme conditions detaching of the work piece.

Work piece mounting

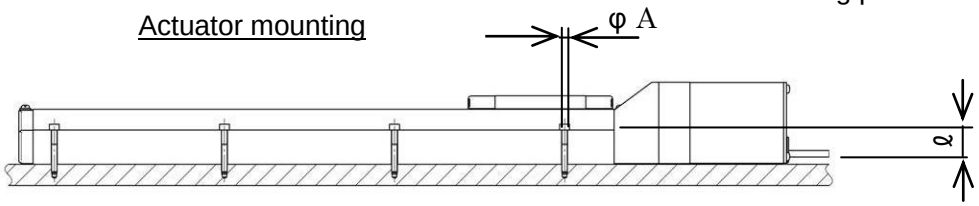


Model	Bolt size	Maximum tightening torque [Nm]	ℓ (Maximum thread depth [mm])
LEF□16	M4x0.7	1.5	6
LEF□25	M5x0.8	3	8
LEF□32	M6x1	5.2	9
LEFS40	M8x1.25	12.5	14

Use screws with adequate length, but with length less than the maximum thread depth.
The use of screws that are to long can touch the body and cause malfunction.

3. **When mounting the actuator, use screws with adequate length and tighten them to the adequate torque. And use all mounting holes to maintain the catalogue performance.**
   Tightening the screws with a higher torque than recommended may cause malfunction, whilst the tightening with lower torque can cause the displacement of mounting position or in extreme conditions the actuator could become detached from its mounting position.

Actuator mounting



Model	Bolt size	φA(mm)	ℓ(mm)
LEF□16	M3	3.5	20
LEF□25	M4	4.5	24
LEF□32	M5	5.5	30
LEFS40	M6	6.6	31

4. **When mounting the actuator, leave a gap of 40mm or more to allow for bending of the actuator cable.**

6.4 Precaution on maintenance

⚠ **Warning**

1. **Turn off the power supply before maintenance and replacement of the product.**

2. Put on protective goggles when applying grease.

[Maintenance frequency]

Perform maintenance according to the table below. Contact SMC if any abnormality is found.

Frequency	Appearance check	Internal check	Belt check
Inspection before daily operation	○		
Inspection every six months / 1000km / 5million cycle *	○	○	○

***Whichever occurs first.**

[Items for visual appearance check]

1. Loose screws. Abnormal dirt.
2. Check of flaws/faults and cable connections.
3. Vibration, noise.

[Items for internal check]

1. Lubricant condition on moving parts.
2. Loose or mechanical play in fixed parts or fixing screws.

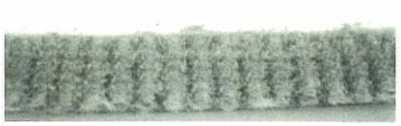
[Items for belt check]

Check the belt regularly as shown in “maintenance frequency”.

Stop operation immediately and contact SMC when the belt appears to be like photographs shown below.

a. Tooth shape canvas is worn out

Canvas fiber becomes fuzzy.
Rubber is removed and the fiber becomes whitish.
Lines of fibers become unclear.



Teeth become fuzzy

b. Peeling off or wearing of the side of the belt

Belt corner becomes round and frayed thread sticks out.



c. Belt partially cut

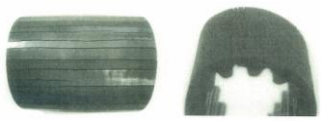
Belt is partially cut. Foreign matter caught in teeth other than cut part causes flaw.

d. Vertical line of belt teeth

Flaw, which is made when the belt runs on the flange.

e. Rubber back of the belt is softened and sticky.

f. Crack on the back of the belt

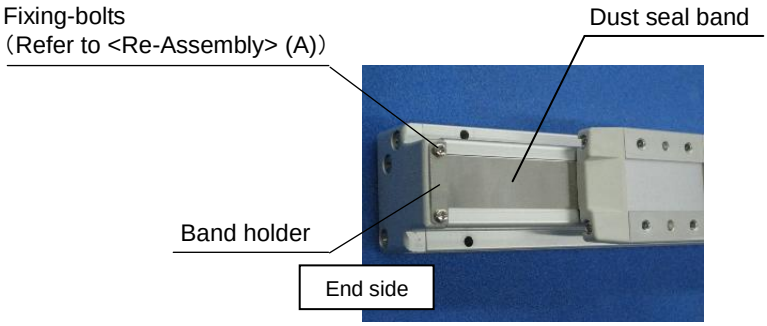


6.5 How to detach and attach the dust seal band

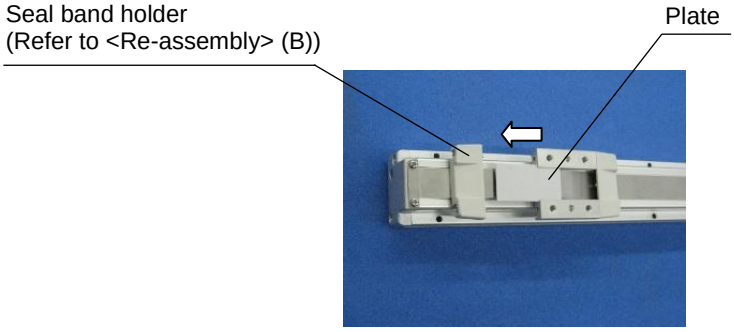
For the internal-check as the maintenance, the method of detaching and attaching the dust seal band is shown as the following.

<Dis-assembly>

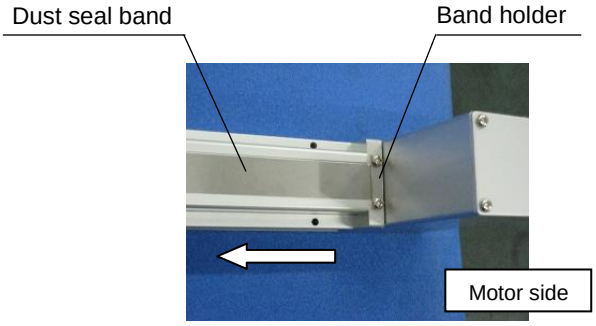
1. **Loosen the fixing bolts of end side of the "Band holder".**
   (The picture shows LEFB, but LEFS is same instruction as LEFB.)
   Pay attention to not cut hand on the edges of the "Dust seal band".
   Note: The "Dust seal band" can only be removed by loosening the "Band holder" bolts.



2. **Remove the "Seal band holder" and the "plate" as shown.**



3. **Loosen the fixing bolts of motor side of the "Band holder" and then remove the "Dust seal band".**



<Re-assembly>

The re-assembly is completed by the reverse procedure of "Dis-assembly" sections 1, 2 and 3.

(A)

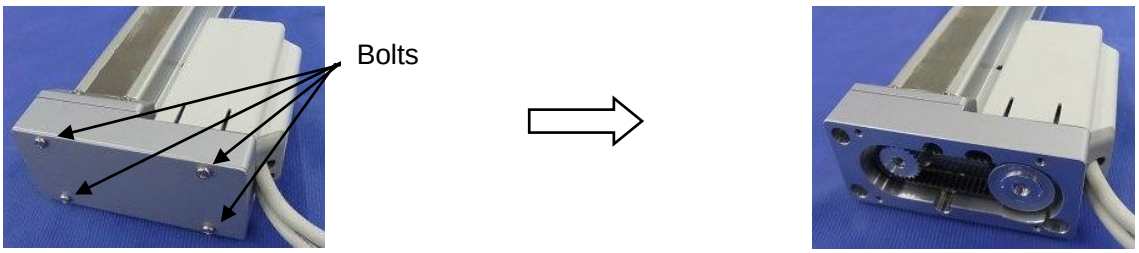
Model	Type of bolt	Bolt size
LEF□16	Round head combination screw	M2.5x5
LEF□25	Round head combination screw	M3x6
LEF□32	Round head combination screw	M3x6
LEFS40	Round head combination screw	M3x6

(B)

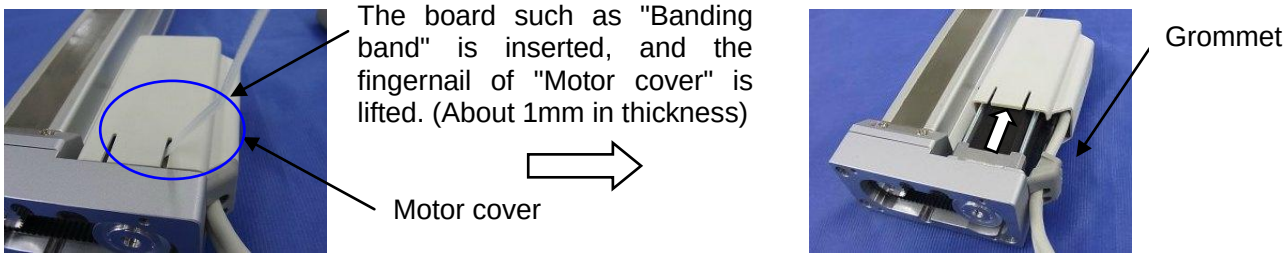
Model	Type of bolt	Bolt size
LEF□16	Cross recessed round head screw	M2.5x16
LEF□25	Cross recessed round head screw	M3x20
LEF□32	Cross recessed round head screw	M4x30
LEFS40	Round head combination screw	M4x35

6.6 Replacement of belt

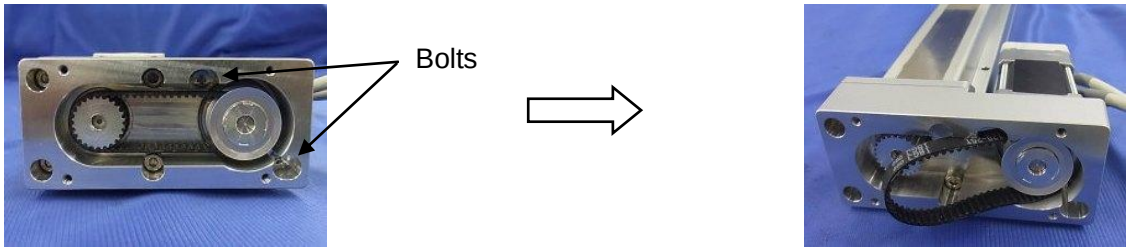
1. After Bolt is removed, "Pulley plate" is removed.



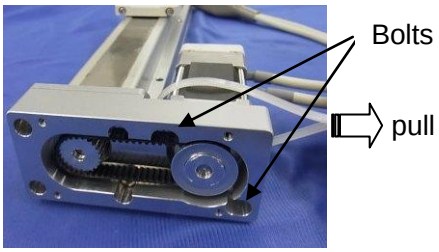
2."Motor cover" and "Grommet" are removed. (Only "With motor cover")



3. The bolt that is the fixation of "Motor" is loosened (To extent in which the slide can be done), and "Bearing support" is removed, and "Belt" is removed.

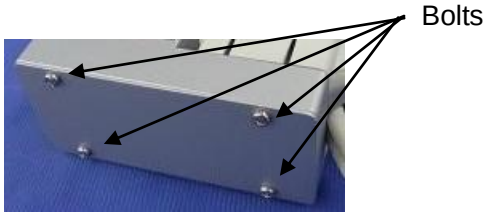


4. After "Belt" is installed, and the bearing support is obtained, the root of "Motor" is pulled in a string or a long banding band. With tensile force adjusted, tighten the bolts which fix the actuator to the motor. （See the table below）



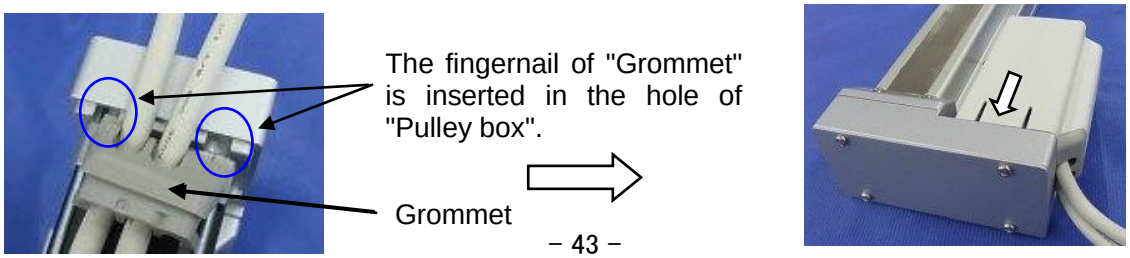
Size	Belt Part number	Belt tension （N）
LEF16	LE-D-6-1	9.8
LEF25	LE-D-6-2	19.6
LEF32	LE-D-6-3	49.0
LEF40	LE-D-6-4	98.1

5."Pulley plate" is installed.



Size	Tightening torque (Nm)
M2.5	0.36±10%
M3	0.63±10%
M4	1.5±10%
M5	3±10%

6.“Motor cover” is installed. (Only "With motor cover")

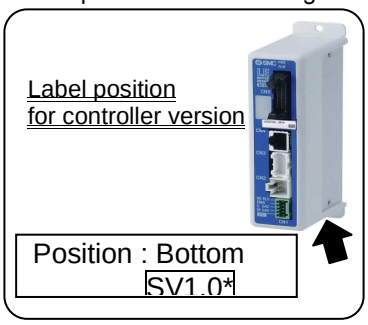


7. Troubleshooting

Alarms below are abstract of representative examples.
For other alarms, see operation manual of controller.

No.	Phenomenon	Cause	Countermeasure
1	Fail to operate / Initial stage	1) The cable is not connected or has been disconnected.	Check if the cable is properly installed / /See 4. Wiring of cable on p. 32
	When power is supplied, alarm for “Phase Det ALM /code: 1-193” is generated. ↓ <Procedure of restart> “Turn the power supply off.” ↓ “Turn the power supply on”	2) The load/resistance being applied to the actuator constantly exceeds the actuators specification.	Keep load and resistance within specification range. Check the actuator mounting condition or check if external force adds the resistance of actuator table by using movable cable-duct. /See 2.1 Specifications on p.9
		3) The combination of the controller and actuator is not correct.	The controller and the actuator combination at the time of shipment should not be changed. /See 5.3⚠Caution (1) on p.34
		4) Excessive external force is being applied, (including vibration) or impact load.	Operate within the specified range. /See 2.1 Specifications on p.9
	Alarm for “Step data ALM1/code:1-048” is generated ↓ <Procedure of restart> Input the “RESET” signal.	Setting condition for step data is not correct. < Correct set condition > (1)Area 1 < Area 2	Review the content of step data. / Refer to the LEC controller operation manual.
	Alarm for “Servo off ALM/code: 1-098” is generated ↓ <Procedure of restart> Input the “RESET” signal.	Perform the “Return to origin”, the positioning operation and JOG operation during the “SVON”: OFF.	Provide the operation instruction after confirming that the input signal [SVON] is ON and then the output signal [SVRE] is ON.
	Alarm for “Drive ALM/code: 1-099” is generated. ↓ <Procedure of restart> Input the “RESET” signal.	Perform positioning operation before the “return to origin”.	Provide the operation instruction after confirming that the input signal [SETUP] is ON and then the output signal [SETON] is ON.

No.	Phenomenon	Cause	Countermeasure
2	Operation not completed / Operation continue Alarm for “Over load/code: 1-148” or “Posn failed/code: 1-149” is generated. ↓ <Procedure of restart> Controller version /SV1.0 or later 1. Input the “reset signal.” →“SVRE”: Automatically ON Controller version /SV0.8* or before 1. Input the “reset signal.” →“SVRE”: Automatically ON 2. Input the “setup signal.” → Restart operation after the completion of the”retun to origin”. Label position for controller version  Position : Bottom SV1.0*	1) Added excessive external force (including vibration) or impact load.	Operate within the specified range. /See 2.1 Specifications on p.9
		2) The Power supply does not have sufficient capacity.	Check the power consumption for each actuator and controller: If necessary replace the existing power supply with a power supply with sufficient capacity. /See 2.1 Specifications on p.9
		3) Load/resistance more than specified range is being applied to the actuator.	Use within specification range. Check the actuator mounting condition or check if external force adds the resistance of actuator table by using movable cable-duct. /See 2.1 Specifications on p.9
		4) Pushing operation is performed at “Positioning operation”	Review the content of the step data.
		5) The cable is not connected or has been disconnected.	Confirm that the cable is connected correctly. /See 4. Wiring of cable on p.32
		6) It was not the intended origin position because the actuator pinched the work-piece during the“return to origin”.	Remove the work-piece and restart the return to the intended origin position.
		7) Actuator mouting condition is not good.	Check the actuator mounting surface. Keep the flatness of mounting surace to within 0.1mm or less.
		8) Wrong input [0] is input as the positioning force.	Check the step data.<Moving force> /See 3.3.Step data setting method on p.23
		9) The step data position is not changed correctly after the return to origin direction is changed.	Check the step data. <Position> /See 3.3.Step data setting method on p.23
		10) Because the operation of the step data is set to [INC/relative], the table comes into contact with an external object and does not move due to continuous operation.	Check the step data. <Position> /See 3.3.Step data setting method on p.23
	Operation not completed / Operation continue Alarm for “Stroke limit/code: 1-052” is generated. ↓ <Procedure of restart> Input the “RESET” signal.	1)Moving distance exceeds the “Stroke(+)” / “Stroke(-).	1) Check the value of the “Position” of step data and the value of the “Stroke(+)” / “Stroke(-)” of the basic parameter. /See 3.3.Step data setting on p.23 3.4.Parameter setting on P.29 /Refer to the LEC controller operation manual.

No.	Phenomenon	Cause	Countermeasure
2	Operation not completed / Operation continue Alarm for “Over motor Vol /code: 1-145” is generated. ↓ <Procedure of restart> Controller version /SV1.0 or later 1. Input the “reset signal.” →“SVRE”: Automatically ON Controller version /SV0.8* or before 1. Input the “reset signal.” →“SVRE”: Automatically ON 2. Input the “setup signal.” →Restart operation after the completion of the ”retun to origin”.  	1) If the power supply is an “inrush-current restraining type”, the alarm may be generated due to voltage drop.	Replace the power supply with a non “inrush-current restraining type” power supply. / Refer to the LEC controller operation manual.
		2) The Power supply does not have sufficient capacity.	Check the power consumption for each actuator and controller: If necessary replace the existing power supply with a power supply with sufficient capacity. /See 2.1 Specification P.9 to 11 for LEFS / See 2.2 Specification P.12, 13 for LEFB
		3) Load/resistance more than specified range is being applied to the actuator.	Use within specification range. Check the actuator mounting condition or check if external force adds the resistance of actuator table by using movable cable-duct. /See 2.1 Specifications on p.9
	Alarm for “Err overflow/code: 1-196” is generated. ↓ <Procedure of restart> “Turn the power supply off.” ↓ “Turn the power supply on”	1) Added excessive external force (including vibration) or impact load.	Operate within the specified range. /See 2.1 Specification P.9 to 11 for LEFS / See 2.2 Specification P.12, 13 for LEFB
		2) The Power supply does not have sufficient capacity.	Check the power consumption for each actuator and controller: If necessary replace the existing power supply with a power supply with sufficient capacity. /See 2.1 Specification P.9 to 11 for LEFS / See 2.2 Specification P.12, 13 for LEFB
		3) Load/resistance more than specified range is being applied to the actuator.	Use within specification range. Check the actuator mounting condition or check if external force adds the resistance of actuator table by using movable cable-duct. /See 2.1 Specification P.9 to 11 for LEFS / See 2.2 Specification P.12, 13 for LEFB
		4) The pushing operation is performed at the “Positioning operation position”	Review the content of the step data.

No.	Phenomenon	Cause	Countermeasure
		5) The cable is not connected or has been disconnected.	Confirm that the cable is connected correctly. /See 4. Wiring of cable on p.32
		6) It was not the intended origin position because the actuator pinched the work-piece during the"return to origin".	Remove the work-piece and restart the return to the intended origin position.
		7) Wrong input [0] is input as the positioning force.	Check the step data.<Moving force> /See 3.3. Step data setting method on p.23
		8) The step data position is not changed correctly after the return to origin direction is changed.	Check the step data. <Position> /See 3.3. Step data setting method on p.23
		9) Because the operation of the step data is set to [INC/relative], the table comes into contact with an external object and does not move due to continuous operation.	Check the step data. <Position> /See 3.3. Step data setting method on p.23
2	Operation not completed / During operation (Not always, but may happen occasionally) Alarm for "Step data ALM2/code: 1-051" is generated. ↓ <Procedure of restart> Input the "reset" signal.	1) Command invalid (unregistered) step data.	Check if the step data is valid (registered).
		2) Different input signal to the expected step number is inputted to the controller, because of a too short an interval between the input signal of "IN*" and the "Drive" or inputting the signals at the same time.	Add an interval of 15ms (the recommendation is 30ms) or more between the input signals. / See "Operating procedure input / output signals for each operation type" on P.27
		3) Different input signal to the expected step number is inputted to the controller, because the input signal time was too short.	Add an interval of 15ms (the recommendation is 30ms) or more between the input signals. / See "Operating procedure input / output signals for each operation type" on P.27
		4) Different input signal to the expected step number is inputted to the controller, caused by PLC or other device.	Check that the step number is inputted correctly for the required motion.
	- Operation completed by unexpected motion. - No alarm / During operation (Not always, but may happen occasionally)	1) Different input signal to the expected step number is inputted to the controller, because of a too short an interval between the input signal of the "IN*" and the "Drive" or inputting the signals at the same time.	Add an interval of 15ms (the recommendation is 30ms) or more between the input signals. / See "Operating procedure input / output signals for each operation type" on P.27 Note) Recommend to check the "OUT" output signal for more secure operation.
		2) Different input signal to the expected step number is inputted to the controller, because the input signal time was too short.	Add an interval of 15ms (the recommendation is 30ms) or more between the input signals. / See "Operating procedure input / output signals for each operation type" on P.27 Note) Recommend to check the "OUT" output signal for more secure operation.

No.	Phenomenon	Cause	Countermeasure
		3) Different input signal to the expected step number is inputted to the controller, caused by PLC or other device.	Check that the step number is inputted correctly for the required motion. / See "Operating procedure input and output signals for each operation type" on P.27 Note) Recommend to check the "OUT" output signal for more secure operation.
3	"INP" output signal is unstable. "INP" output signal is unstable even after the positioning operation is completed.	1) The value of [In position] in step data is too small.	Increase [In position] value as the following. LEFS: [0.5] or more LEFB: [1] or more
4	Positioning repeatability is out of specified range.	1) It shifts to the next operation by receiving the "INP" output signal.	Shift to the next operation after receiving the "BUSY" output signal is outputted.
		2) The belt is loosened.	Readjust belt tension to the appropriated value.
5	Damage	1) Abnormal external force	Interference of mechanism, eccentric load or excess load leads to cause deformation or damage of the actuator. Eliminate these factors.
6	The table of the actuator with vertical mounting vibrates repeated up and down.	1) Actuator carries excess load.	Check if the workload is within the specification range.
7	The belt driven actuator, vibration / noise occur during operation at speeds within the actuator specification.	1) Influence of character frequency	Change the speed setting to a speed that does not cause vibration.
		2) The gain tuning is not suitable.	It may need gain tuning suitable for the application. Contact SMC in this case.
8	Cannot be actuated manually or by manual override adjustment screw (does not operate). (At stop(EMG) or SVRE[OFF])	1) Contacts the stroke end of the actuator or the workpiece.	Check the stroke position and how workpieces are mounted.
		2) [Lock type] is selected	Supply 24VDC power supply to the [BK RLS] terminal of controller/CN1 power supply plug in order to unlock. /see 5.6 Precautions for the actuator with lock ⚠Warning(7) on P36
	Lock type is selected, but workpieces are dropped during stopping(EMG) or SVRE[OFF], or moved by external force.	1) Load exceeding the maximum work load is mounted, or external force more than the lock holding force is applied.	Check the mounted load and lock holding force to confirm if they are within the operation range. /See 2.1 Specification P.9 to 11 for LEFS / See 2.2 Specification P.12, 13 for LEFB
		2) 24VDC is supplied to "BK RLS" terminal of controller/CN1 power supply connector.	Stop supplying 24VDC power supply to the [BK RLS] terminal /see 5.6 Precautions for the actuator with lock ⚠ Warning(8) on p36

Revision history
No.LEF-OM00201
Jun / 2009 1st printing
No.LEF-OM00202
Apr/ 2010 Revision
No.LEF-OM00206
Dec / 2010 Revision
・Addition / LEFS40
No.LEF-OM00207
Mar / 2011 Revision
・Addition / LECP1
No.LEF-OM00208
Apr / 2012 Revision
・Addition / Notes about UL recognition.
No.LEF-OM00209
Mar / 2013 Revision
・Addition / Side parallel type
No.LEF-OM00210
Jan/ 2014 Revision
・Addition / stroke,ball screw read,controller
No.LEF-OM00211
Mar/ 2016 Revision
・Addition / stroke
No.LEF-OM00212
Dec/ 2016 Revision
No.LEF-OM00213
Mar/ 2017 Revision

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Note: Specifications are subject to change without prior notice and any obligation on the part of the manufacturer.
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