Doc. no. LEF-OM00405

SMC

Operation Manual

PRODUCT NAME

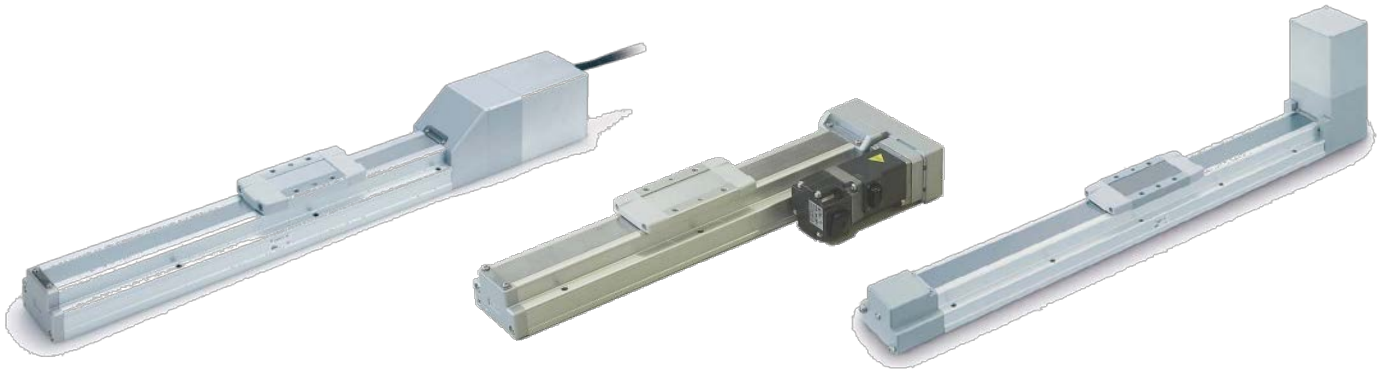
Electric Actuator /Slider Type

《 AC Servo Motor 》

MODEL / Series

LEF Series

Applicable models: LEFS/LEFB



AC Servo Motor Driver

LECS Series

LECSA
(Pulse input / Positioning)

LECSB
(Pulse input)

LECSC
(CC-Link)

LECSS
(SSCNETⅢ)

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,whichever is first.*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

1.1 Preparation

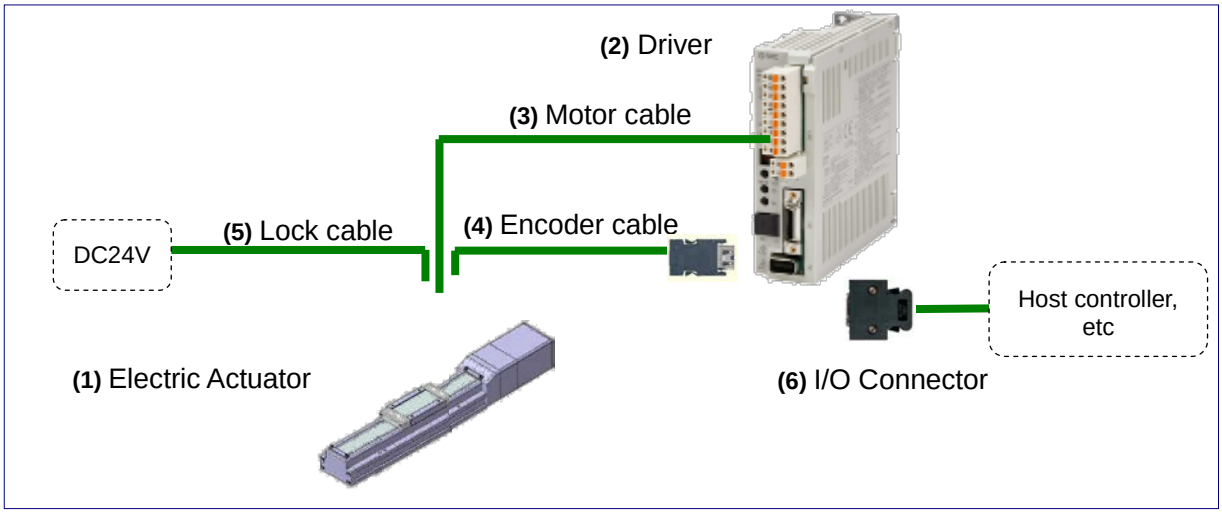
(1) Items to be prepared

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

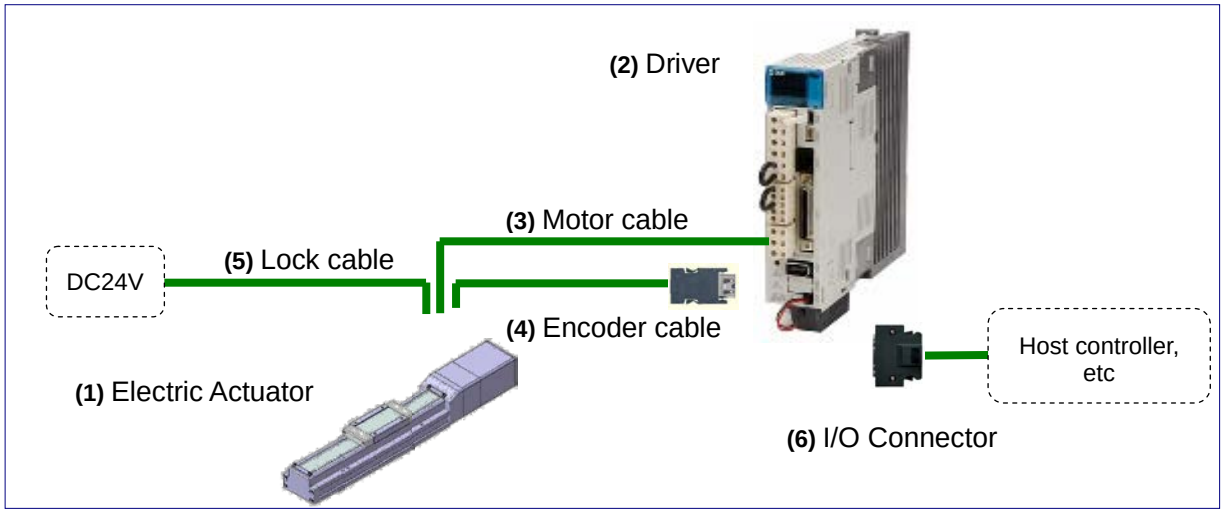
Table 1. Componets

No.	Part name	Qty
(1)	Electric Actuator / LEF Series	1
(2)	Driver / LECS Series	1(in case with driver)
(3)	Motor cable	Pre-installed (1) (in case with cable)
(4)	Encoder cable	
(5)	Lock cable	
(6)	I/O Connector	1(in case with I/O connector)

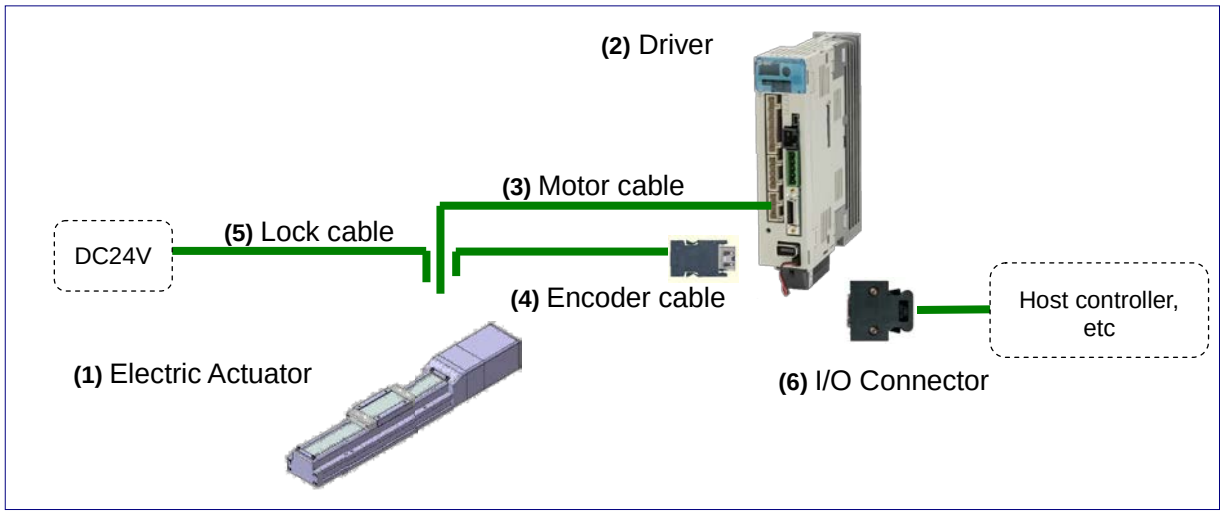
LECSA(Pulse input / Positioning)



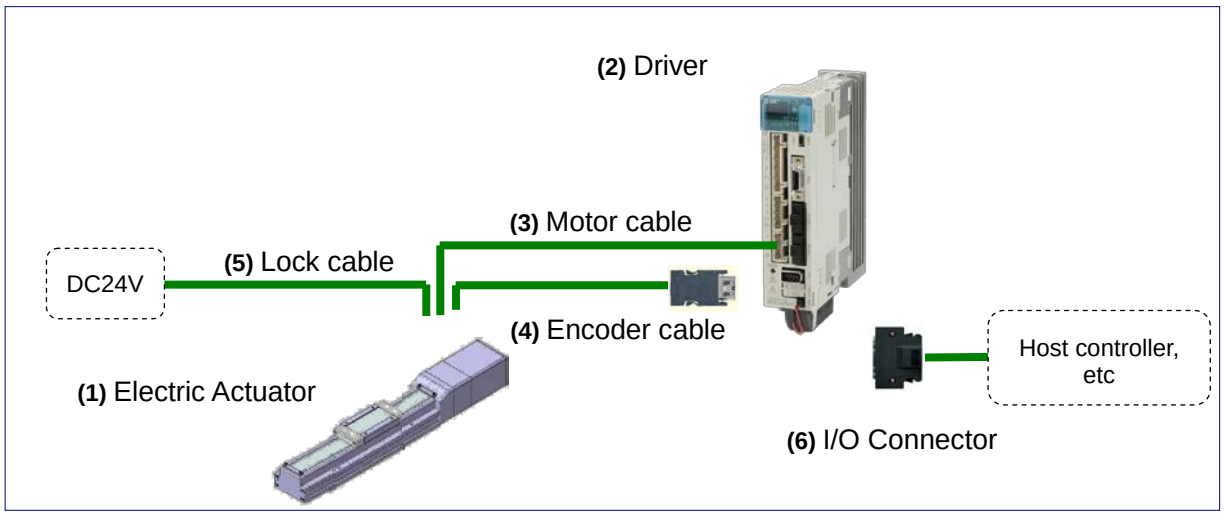
LECSB(Pulse input)



LECSC(CC-Link)

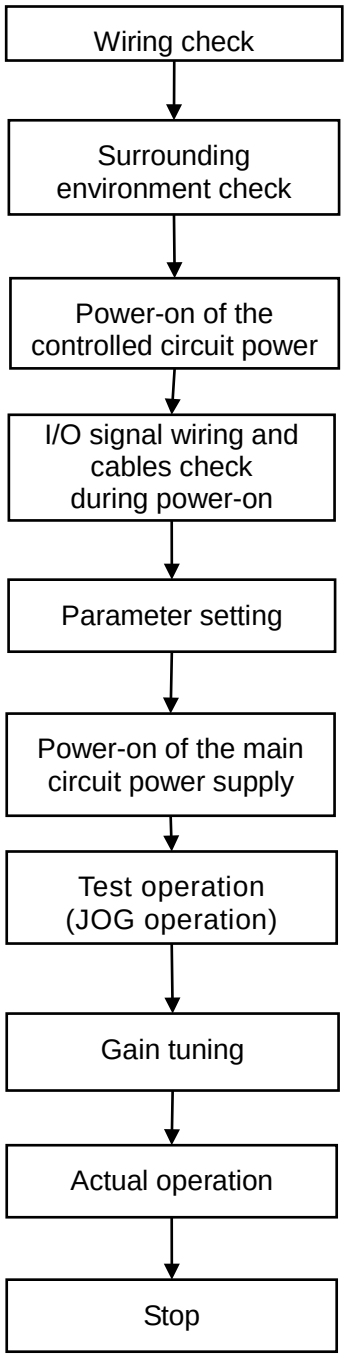


LECSS(SSCNET III)



1.2 Startup

When switching the power on for the first time, follow the startup procedure below.
Refer to the “Driver operation manual” for wiring method and detailed procedure.



- - - Confirm that the cables to the driver and the actuator are connected correctly.

- - - Check the surrounding environment (cable routing and impurity such as wire off cuts or metallic dust) of the driver and the servo motor.

- - - Follow the procedure shown in the "Driver Operation Manual" to supply power to the product.

- - - Check the wiring of the input and output signals and cables[1)] according to the procedure shown in the "Driver Operation Manual".

- - - Set the parameters as necessary, such as selecting the control mode and each control value.

- - - Follow the procedure shown in the "Driver Operation Manual" to supply power to the product.

- - - Use the test operation mode (JOG operation) at the slowest speed and check whether the servo motor rotates.[2)]

- - - Operation with a vibration might be done according to the condition.
In that case, adjust gain. (Refer to section 1.3)

- - - Check if the cables to the driver and actuator are connected correctly.

- - - Stop command to stop the operation.

1)CC-Link cable (LECSC), SSCNETIII cable (LECSS)
2)When using test operation mode (JOG operation), the LECSC and LECSS need the MR-Configurator.

1.3 Gain tuning

1.3.1 Procedur

Here are the steps for basic gain tuning.
Refer to the “Driver operation manual” for details and for tuning methods other than shown below.

●For LECSA (Pulse input / Positioning)

A. One-touch tuning

During motor driving, push “AUTO” button on the front of the driver for three seconds.
When display panel becomes “ Ai ”, push “AUTO” button again.
⇒The gain (including filter, etc) is adjusted automatically.
When the error occurs, refer to the “Driver operation manual”.

B. Auto tuning (Mode1) 1)

Do this operation, if you are not satisfied with the result of “One-touch tuning”.
Set parameter No.PA08 “001”. Afterwards, do 1 and 2 alternately.

1. Reduce value of parameter No.PA09 to be less than present value.
2. Operate and ascertain the situation.

⇒The gain is adjusted automatically.

●For LECSB (Pulse input), LECSC (CC-Link), LECSS(SSCNETIII)

A. Adaptive filter II

Set parameter No.PB01 “0001” and drive the motor.
⇒The filter is adjusted automatically.

B. Auto tuning (Mode1)

Do this operation, if you are not satisfied with the result of “Adaptive filter II”.
Set parameter No.PA08 “0001”. Afterwards, do 1 and 2 alternately.

1. Reduce value of parameter No.PA09 to be less than present value.
2. Operate and ascertain the situation.

⇒The gain is adjusted automatically.

⚠ Warning

A mechanical resonance may occur depending on the configuration or the mounting orientation of the transferred object. Please change the appropriate parameter in the initial setting.
Refer to "The recommended the parameter for each driver" for the parameter.

1) The auto tuning mode 1 may not be performed properly if the following conditions are not satisfied.

・Time to reach 2,000rpm is the acceleration/deceleration time constant of 5[s] or less.
・Speed is 150rpm or higher.
・Load to motor inertia is 100 times or less.
・The acceleration/deceleration is 10% or more of the rated torque.

1.3.2 The recommended the parameter for each driver

The recommended the parameter for each driver. Please change the parameter values by use of the customer.
Please refer to the manual of the driver for more details.

【LECSA/In the case of a ball screw drive】

Series			LEFS25			LEFS32			LEFS40		
	Lead symbol		H	A	B	H	A	B	H	A	B
	Lead		20	12	6	24	16	8	30	20	10
Parameter	Para No	Initial value	Recommended value								
Number of command input pulses per revolution *3	PA05	100	**100**								
Electronic gear numerator *3	PA06	1	**100(Positioning mode: 10)**								
Electronic gear denominator *3	PA07	1	**20**	**12**	**6**	**24**	**16**	**8**	**30**	**20**	**10**
Feel length multiplication (STM) (Multiplier)	PE02	0000	**0000(Less than stroke 1000)/ 0001(Stroke 1000 or more)**								
Home position return type	PE03	0010	**□□□3（Stopper type）**								
Home position return direction	PE03	0010	□□1□(Motor side)								
Home position return Speed (rpm)	PE04	500	**90**	**150**	**300**	**75**	**113**	**225**	**60**	**90**	**180**
Home position return/JOG operation acceleration/deceleration time constants (msec)	PE07	100	**1000**	**600**	**300**	**1200**	**800**	**400**	**1500**	**1000**	**500**
Home position return position data (μm)	PE08	0	**−2000(Less than stroke 1000)/ −200(Stroke 1000 or more)**								
Stopper type home position return stopper time (msec)	PE10	100	**200**								
Stopper type home position return torque limit value (%)	PE11	15	**30**								
Regenerative option	PA02	000	**000(Non) / 002(LEC-MR-RB-032)**								
Rotation direction selection	PA14	0	**1(+：Counter motors side)**								
Adaptive tuning mode	PB01	000	000								
Load to motor inertia moment ratio	PB06	7	7								
Machine resonance suppression filter 1	PB13	4500	4500								
Notch shape selection 1	PB14	000	000								

*1 Parameter is the recommended value. Please change the parameter to make appropriate value for your operating method.
*2 A mechanical resonance may occur depending on the configuration or the mounting orientation of the transferred object. Please change the parameter in the initial setting.
*3 When the positioning mode is not set: The travel distance of the actuator per 1 pulse should be 10 [μm/pulse].
When the positioning mode is set: The minimum unit of the travel distance of the actuator should be 1 [μm].

【LECSA/In the case of a belt drive】

Series			LEFB25	LEFB25U	LEFB32	LEFB32U	LEFB40	LEFB40U
	Lead symbol		S					
	Lead		54					
Parameter	Para No	Initial value	Recommended value					
Number of command input pulses per revolution *3	PA05	100	**100**					
Electronic gear numerator *3	PA06	1	**100(Positioning mode: 10)**					
Electronic gear denominator *3	PA07	1	**54**					
Feel length multiplication (STM) (Multiplier)	PE02	0000	**0000(Less than stroke 1000)/ 0001(Stroke 1000 or more)**					
Home position return type	PE03	0010	**□□□3（Stopper type）**					
Home position return direction	PE03	0010	□□1□ (Motor side)					
Home position return Speed (rpm)	PE04	500	**66**					
Home position return/JOG operation acceleration/deceleration time constants (msec)	PE07	100	**2700**					
Home position return position data (μm)	PE08	0	**−3000(Less than stroke 1000)/ −300(Stroke 1000 or more)**					
Stopper type home position return stopper time (msec)	PE10	100	**200**					
Stopper type home position return torque limit value (%)	PE11	15	**30**					
Regenerative option	PA02	000	**000(Non) / 002(LEC-MR-RB-032)**					
Rotation direction selection	PA14	0	**1(+: Counter motors side)**	0(+: Counter motors side)	**1(+: Counter motors side)**	0(+: Counter motors side)	**1(+: Counter motors side)**	0(+: Counter motors side)
★Adaptive tuning mode	PB01	000	**002**		000			
★Load to motor inertia moment ratio	PB06	7	**50**					
★Machine resonance suppression filter 1	PB13	4500	**400**		4500			
★Notch shape selection 1	PB14	000	**030**		000			

★：Parameter should be changed.

*1 Parameter is the recommended value. Please change the parameter to make appropriate value for your operating method.
*2 A mechanical resonance may occur depending on the configuration or the mounting orientation of the transferred object. Please change the parameter in the initial setting.
*3 When the positioning mode is not set: The travel distance of the actuator per 1 pulse should be 10 [μm/pulse].
When the positioning mode is set: The minimum unit of the travel distance of the actuator should be 1 [μm].

【LECSB/In the case of a ball screw drive】

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

【LECSB/In the case of a belt drive】

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

★:Parameter should be changed.

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

【LECSC/In the case of a ball screw drive】

Series			LEFS25			LEFS32			LEFS40		
	Lead symbol		H	A	B	H	A	B	H	A	B
	Lead		20	12	6	24	16	8	30	20	10
Parameter	Para. No.	Initial value	Recommended value								
Electronic gear numerator *3	PA06	1	**32768**								
Electronic gear denominator *3	PA07	1	**2500**	**1500**	**750**	**3000**	**2000**	**1000**	**3750**	**2500**	**1250**
Feel length multiplication (STM) (Multiplier)	PA05	0000	**0000(Less than stroke 1000)/ 0001(Stroke 1000 or more)**								
Home position return type	PC02	0000	**□□□3（Stopper type）**								
Home position return direction	PC03	0001	□□□1 (Motor side)								
Home position return Speed (rpm)	PC04	500	**90**	**150**	**300**	**75**	**113**	**225**	**60**	**90**	**180**
Home position return position data (μm)	PC07	0	**-2000(Less than stroke 1000)/ -200(Stroke 1000 or more)**								
Stopper type home position return stopper time (msec)	PC09	100	**200**								
Stopper type home position return torque limit value (%)	PC10	15	**30**								
Regenerative option	PA02	0000	**0000(Non) / 0002(LEC-MR-RB-032)**								
Rotation direction selection	PA14	0	**1(+：Counter motors side)**								
Adaptive tuning mode	PB01	0000	0000								
Load to motor inertia moment ratio	PB06	7	7								
Machine resonance suppression filter 1	PB13	4500	4500								
Notch shape selection 1	PB14	0000	0000								

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

【LECSC/In the case of a belt drive】

Series			LEFB25	LEFB25U	LEFB32	LEFB32U	LEFB40	LEFB40U
	Lead symbol		S					
	Lead		54					
Parameter	Para. No.	Initial value	Recommended value					
Electronic gear numerator *3	PA06	1	**32768**					
Electronic gear denominator *3	PA07	1	**6750**					
Feel length multiplication (STM) (Multiplier)	PA05	0000	**0000(Less than stroke 1000)/ 0001(Stroke 1000 or more)**					
Home position return type	PC02	0000	**□□□3（Stopper type）**					
Home position return direction	PC03	0001	□□□1 (Motor side)					
Home position return Speed (rpm)	PC04	500	**66**					
Home position return position data (μm)	PC07	0	**−3000(Less than stroke 1000)/ −300(Stroke 1000 or more)**					
Stopper type home position return stopper time (msec)	PC09	100	**200**					
Stopper type home position return torque limit value (%)	PC10	15	**30**					
Regenerative option	PA02	0000	**0000(Non) / 0002(LEC-MR-RB-032)**					
Rotation direction selection	PA14	0	**1(+: Counter motors side)**	0(+: Counter motors side)	**1(+: Counter motors side)**	0(+: Counter motors side)	**1(+: Counter motors side)**	0(+: Counter motors side)
★Adaptive tuning mode	PB01	0000	**0002**		0000			
★Load to motor inertia moment ratio	PB06	7	**50**					
★Machine resonance suppression filter 1	PB13	4500	**400**		4500			
★Notch shape selection 1	PB14	0000	**0030**		0000			

★：Parameter should be changed.

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

【LECSS/In the case of a ball screw drive】

Series			LEFS25			LEFS32			LEFS40		
	Lead symbol		H	A	B	H	A	B	H	A	B
	Lead		20	12	6	24	16	8	30	20	10
Parameter	Para. No.	Initial value	Recommended value								
Regenerative option	PA02	0000	**0000(Non) / 0002(LEC-MR-RB-032)**								
Rotation direction selection	PA14	0	**1(+:Counter motors side)**								
Adaptive tuning mode	PB01	0000	0000								
Load to motor inertia moment ratio	PB06	7	7								
Machine resonance suppression filter 1	PB13	4500	4500								
Notch shape selection 1	PB14	0000	0000								

【LECSS/In the case of a belt drive】

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

★:Parameter should be changed.

*1 Parameter is the recommended value. Please change the parameter to make appropriate value for your operating method.
*2 A mechanical resonance may occur depending on the configuration or the mounting orientation of the transferred object. Please change the parameter in the initial setting.

* For LECSS, please set the electronic gear with PC, PLC etc. in your application.

2. Slider type LEFS series

2.1 Specification

LEFS25,32,40 AC servo motor (100W / 200W/400W/)

Model				LEF25S*			LEF32S*			LEF40S*		
Actuator specification	Stroke [mm] Note 1)			50～600			50～800			150～1000		
	Work load [kg]		Work load [kg]	10	20	20	30	40	45	30	50	60
			Vertical	4	8	15	5	10	20	7	15	30
	Maximum Speed Note3) [mm/s]	Maximum Speed Note3) [mm/s]	～ 400	1500	900	450	1500	1000	500	1500	1000	500
			401 ～ 500	1200	720	360	1500	1000	500	1500	1000	500
			501 ～ 600	900	540	270	1200	800	400	1500	1000	500
			601 ～ 700	700	420	210	930	620	310	1410	940	470
			701 ～ 800	550	330	160	750	500	250	1140	760	380
			801 ～ 900	-	-	-	610	410	200	930	620	310
			901 ～ 1000	-	-	-	510	340	170	780	520	260
			1001 ～ 1100	-	-	-	-	-	-	500	440	220
			1101 ～ 1200	-	-	-	-	-	-	500	380	190
	Acceleration/deceleration [mm/s^2]			20000 (Refer catalog about limit according to work load and duty rate.)								
	Positioning repeatability [mm]			Basic type:±0.02/High precision type: ±0.01								
	Lost motion [mm]			Basic type:0.1 or less/High precision type: 0.05 or less								
	Lead [mm]			20	12	6	24	16	8	30	20	10
	Impact resistance/vibration Resistance [m/s^2] Note 4)			50/20								
	Drive method			Ball screw								
	Guide type			Liner guide								
	Operating temperature range [°C]			5 to 40								
	Operating humidity range [%RH]			90 or less (No condensation)								
Electric specification	Motor output [W] / size [mm]			100/□40			200/□60			400/□60		
	Type of Motor			AC servo motor (100/200VAC)								
	Encoder	[Type of Motor: S2,S3,S4]		Incremental 17bit encoder (Resolution: 131072 p/rev)								
		[Type of Motor: S6,S7,S8]		Absolute 18bit encoder (Resolution: 262144 p/rev)								
Lock unit spec	Type Note 5)			No excitation operating type								
	Holding force [N]			78	131	255	131	197	385	220	330	660
	Power consumption [W] at 20 °C Note 6)			6.3			7.9			7.9		
	Rated voltage [VDC]			24 $^{0}_{-10\%}$								

Product Weight [kg]

Series		LEFS25S*															
Stroke[mm]		50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
Motor type	S2	2.00	2.14	2.28	2.44	2.56	2.69	2.84	2.99	3.12	3.24	3.40	3.54	3.68	3.82	3.96	4.14
	S6	2.06	2.20	2.34	2.50	2.62	2.75	2.90	3.05	3.18	3.30	3.46	3.60	3.74	3.88	4.02	4.20
Additional weight for lock[kg]		S2:0.2/S6:0.3															

Series		LEFS32S*																				
Stroke[mm]		50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
Motor type	S3	3.40	3.60	3.80	4.00	4.20	4.40	4.60	4.80	5.00	5.20	5.40	5.60	5.80	6.00	6.20	6.40	6.60	6.80	7.00	7.20
	S7	3.34	3.54	3.74	3.94	4.14	4.34	4.54	4.74	4.94	5.14	5.34	5.54	5.74	5.94	6.14	6.34	6.54	6.74	6.94	7.14
Additional weight for lock[kg]		S3:0.4/S7:0.7																			

Series		LEFS40S*																				
Stroke[mm]		150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1100	1200
Motor type	S4	5.82	6.10	6.38	6.65	6.95	7.25	7.51	7.80	8.07	8.25	8.63	8.90	9.20	9.45	9.76	10.05	10.32	10.60	11.16	11.72
	S8	5.92	6.20	6.48	6.75	7.05	7.35	7.61	7.90	8.17	8.35	8.73	9.00	9.30	9.55	9.86	10.15	10.42	10.70	11.26	11.82
Additional weight for lock[kg]		S4:0.7/S8:0.7																			

Note 1) The middle stroke other than the above are produced upon receipt of order.
Note 2) The maximum value of the horizontal workload. (An external guide is necessary).
The actual workload will depend on the type of external guide.
Note 3) The allowable speed changes by the stroke.
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) Only when the motor option, "with lock", is selected.
Note 6) For an actuator with lock, add the power consumption for the lock.

2.2 How to Order

<Ball screw drive>

LEFS [32] [R] [S3] [B] – [200] [ ] – [S] [2] [A2] [ ]

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

① Size

25
32
40

② Motor mounting position

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

③ Motor type

Symbol	Type	Output [W]	Size	Compatible driver
S2	AC servo motor (Incremental encoder)	100	25	LECSA□-S1
S3		200	32	LECSA□-S3
S4		400	40	LECSA2-S4
S6	AC servo motor (Absolute encoder)	100	25	LECS[B/C/S]□-S5
S7		200	32	LECS[B/C/S]□-S7
S8		400	40	LECS[B/C/S]2-S8

④ Lead[mm]

Symbol	LEFS25	LEFS32	LEFS40
H	20	24	30
A	12	16	20
B	6	8	10

⑤ Stroke [mm]

100	100
to	to
1000	1000

⑥ Motor option

Nil	Without option
B	With lock

⑦Cable type

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

* Motor cable and encoder cable are included to the actuator. (When Motor option "with lock" is selected,lock cable is included too)

⑧ Cable length [m]

Nil	Without cable
2	2
5	5
A	10

* The length of motor,encoder and lock cable are same.

⑨ Driver type

	Compatible driver	Power supply voltage [V]
Nil	Without driver	–
A1	LECSA1-S□	100～120
A2	LECSA2-S□	200～230
B1	LECSB1-S□	100～120
B2	LECSB2-S□	200～230
C1	LECSC1-S□	100～120
C2	LECSC2-S□	200～230
S1	LECSS1-S□	100～120
S2	LECSS2-S□	200～230

* When the driver type is selected,the cable is included. Select cable type and cable length.

⑩ I/O connector

Nil	Without connector
H	With connector

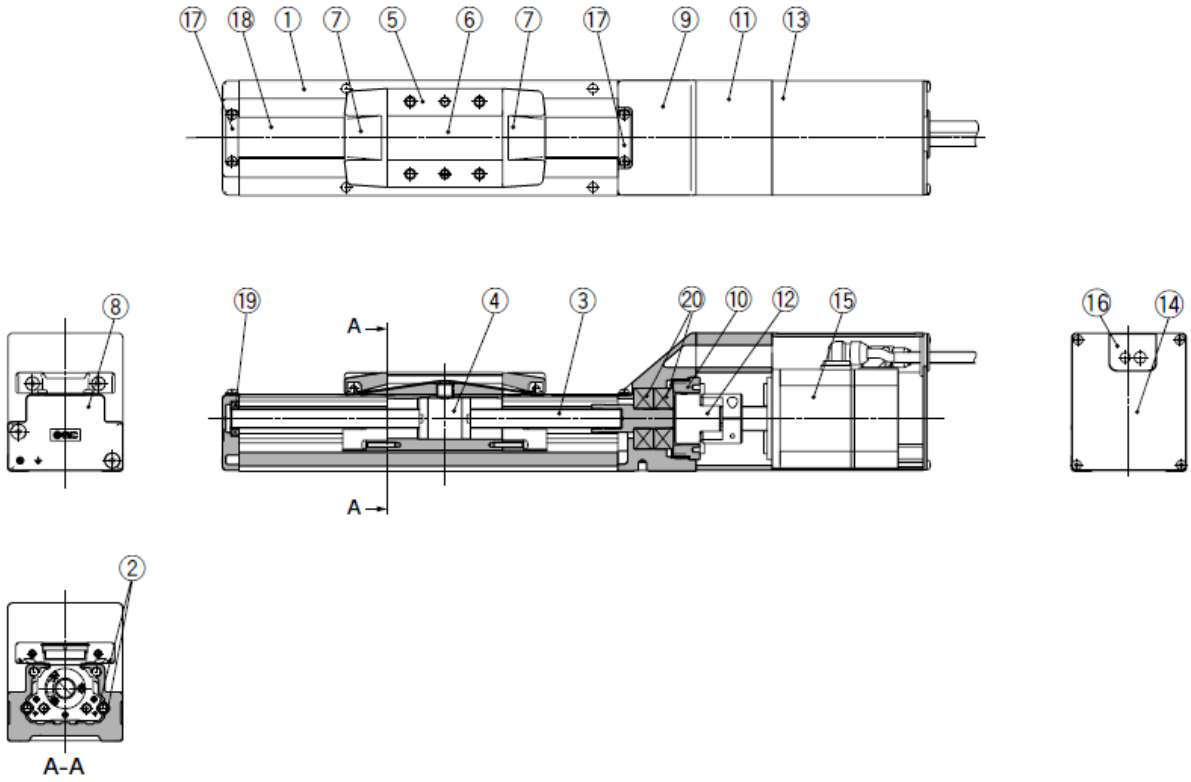
*Applicable stroke table

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

*Consult with SMC for the manufacture of intermediate strokes.

2.3 Construction

LEFS□S□S <Ball screw drive> In-line mouting type



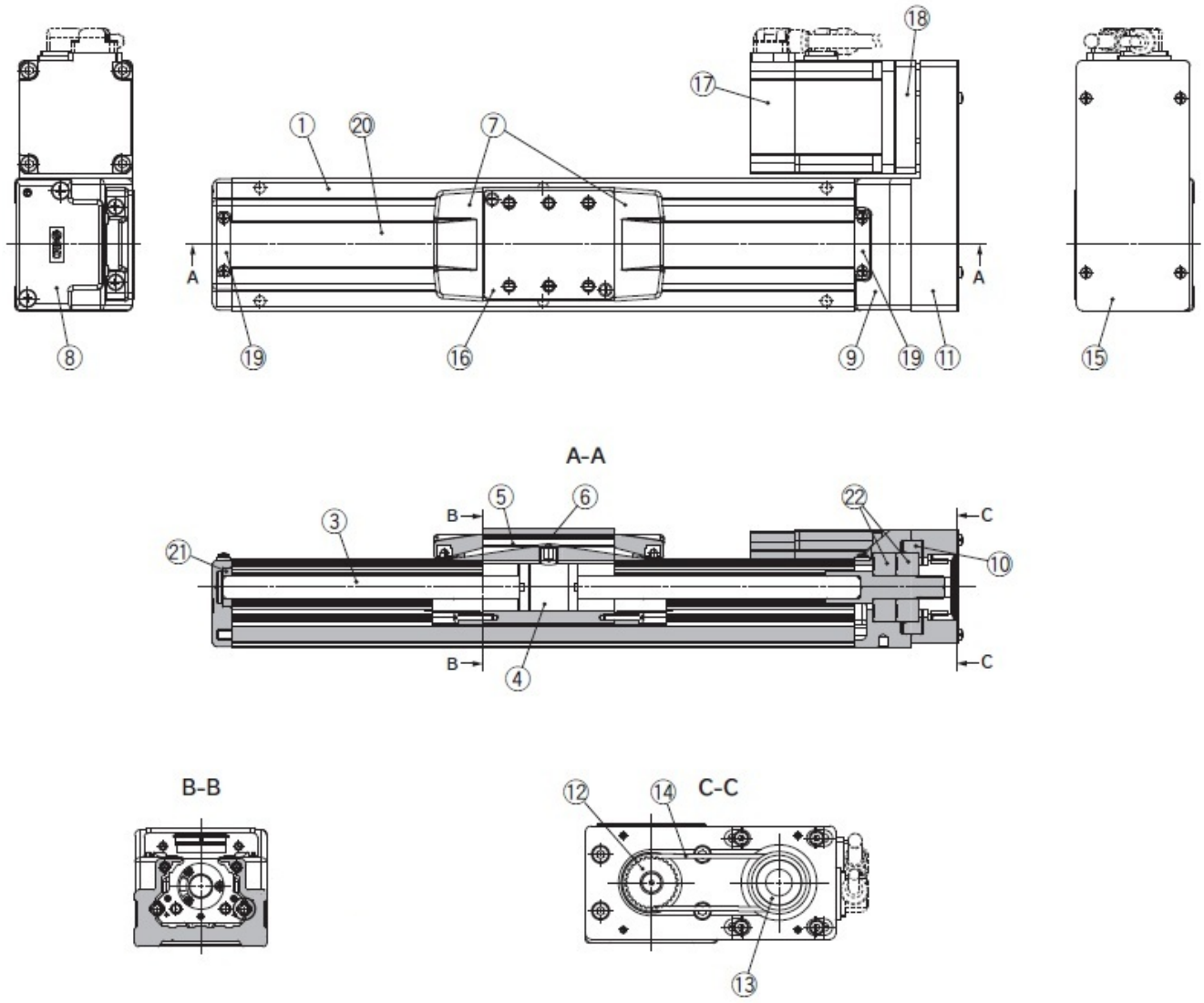
Parts list

Component Parts

No.	Description	Material	Note
1	**Body**	Aluminum alloy	Anodized
2	**Rail guide**	—	
3	**Ball screw shaft**	—	
4	**Ball screw nut**	—	
5	**Table**	Aluminum alloy	Anodized
6	**Blanking plate**	Aluminum alloy	Anodized
7	**Seal band stopper**	Synthetic resin	
8	**Housing A**	Aluminum die-cast	Coating
9	**Housing B**	Aluminum die-cast	Coating
10	**Bearing stopper**	Aluminum alloy	

No.	Description	Material	Note
11	**Motor mount**	Aluminum alloy	Coating
12	**Coupling**	—	
13	**Motor cover**	Aluminum alloy	Anodized
14	**Motor end cover**	Aluminum alloy	Anodized
15	**Motor**	—	
16	**Grommet**	NBR	
17	**Band stopper**	Stainless steel	
18	**Dust seal band**	Stainless steel	
19	**Bearing**	—	
20	**Bearing**	—	

LEFS□R/LS□S <Ball screw drive> Right / Left side parallel type



Parts list

No.	Description	Material	Note
1	Body	Aluminum alloy	Anodized
2	Rail guide	–	
3	Ball screw (shaft)	Alloy steel	
4	Ball screw nut	Resin/Alloy steel	
5	Table	Aluminum alloy	Anodized
6	Blanking plate	Aluminum alloy	Anodized
7	Seal band stopper	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	
14	Blet	–	

No.	Description	Material	Note
15	Cover plate	Aluminum alloy	Anodized
16	Table spacer	Aluminum alloy	Only LEFS32
17	Motor	–	
18	Motor adaptor	Aluminum alloy	Anodized
19	Band stopper	Stainless steel	
20	Dust seal band	Stainless steel	
21	Bearing	–	
22	Bearing	–	

3. Slider type LEFB series

3.1 Specification

LEFB25,32,40 AC servo motor (100W / 200W/400W/)

Model			LEFB25S*	LEFB32S*	LEFB40S*
Actuator specification	Stroke [mm] Note 1)		300,400,500,600, 700,800,900,1000, (1100),1200, (1300,1400), 1500,(1600,1700), (1800,1900),2000	300,400,500,600, 700,800,900,1000, (1100),1200,(1300,1400), 1500,(1600,1700), (1800,1900),2000,2500	300,400,500,600, 700,800,900,1000, (1100),1200,(1300,1400), 1500,(1600,1700), (1800,1900),2000 2500,3000
	Work load [kg]	Horizontal Note 2)	5	15	25
	MaximumSpeed Note3)[mm/s]		2,000	2,000	2,000
	Acceleration/deceleration [mm/s^2]		20,000 Note3)		
	Positioning repeatability [mm]		±0.06		
	Lost motion [mm]		0.1 or less		
	Lead [mm]		54	54	54
	Impact resistance/vibration Resistance [m/s^2] Note 4)		50 / 20		
	Drive method		Belt		
	Guide type		Liner guide		
	Operating temperature range [℃]		5 to 40		
	Operating humidity range [%RH]		90 or less (No condensation)		
Electric specification	Motor output/size		100W / □40	200W/□60	400W/□60
	Type of Motor		AC servo motor (100/200VAC)		
	Encoder		[Type of Motor: S2,S3,S4] : Incremental 17bit encoder (Resolution: 131072 p/rev) [Type of Motor: S6,S7,S8] : Absolute 18bit encoder (Resolution: 262144 p/rev)		
Lock specification	Type Note 5)		No excitation operating type		
	Holding force [N]		27	54	110
	Power consumption [W] at 20℃ Note 6)		6.3	7.9	7.9
	Rated voltage [VDC]		24 $^{0}_{-10\%}$		

Note 1) The middle stroke other than the above are produced upon receipt of order.
Note 2) The maximum value of the horizontal workload. (An external guide is necessary).
The actual workload will depend on the type of external guide.
Note 3) The allowable speed changes by the stroke.
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) Only when the motor option, "with lock", is selected.
Note 6) For an actuator with lock, add the power consumption for the lock.

Product Weight

Model		LEFB25S*																		
Stroke [mm]		300	400	500	600	700	800	900	1000	(1100)	1200	(1300)	(1400)	1500	(1600)	(1700)	(1800)	(1900)	2000
Weight (kg)	S2	3	3.25	3.5	3.75	4	4.25	4.5	4.75	5	5.25	5.5	5.75	6	6.25	6.5	6.75	7	7.25
	S6	3.06	3.31	3.56	3.81	4.06	4.31	4.56	4.81	5.06	5.31	5.56	5.81	6.06	6.31	6.56	6.81	7.06	7.31
Additional weight for lock(kg)		S2:0.2/S6:0.3																	

Model		LEFB32S*																		
Stroke [mm]		300	400	500	600	700	800	900	1000	(1100)	1200	(1300)	(1400)	1500	(1600)	(1700)	(1800)	(1900)	2000	2500
Weight (kg)	S3	4.9	5.25	5.6	5.95	6.3	6.65	7	7.35	7.7	8.05	8.4	8.75	9.1	9.45	9.8	10.15	10.5	10.85	12.6
	S7	4.84	5.19	5.54	5.81	6.24	6.59	6.94	7.29	7.64	7.99	8.34	8.69	9.04	9.39	9.74	10.09	10.44	10.79	12.54
Additional weight for lock(kg)		S3:0.4/S7:0.7																		

Model		LEFB40S*																			
Stroke [mm]		300	400	500	600	700	800	900	1000	(1100)	1200	(1300)	(1400)	1500	(1600)	(1700)	(1800)	(1900)	2000	2500	3000
Weight (kg)	S4	7.1	7.55	8	8.45	8.9	9.35	9.8	10.25	10.7	11.15	11.6	12.05	12.5	12.95	13.4	13.85	14.3	14.75	17	19.25
	S8	7.2	7.65	8.1	8.55	9	9.45	9.9	10.35	10.8	11.25	11.7	12.15	12.6	13.05	13.5	13.95	14.4	14.85	17.1	19.35
Additional weight for lock(kg)		S4:0.7/S8:0.7																			

3.2 How to Order

<Belt drive>

LEFB [40] [ ] [S4] [S] – [300] [ ] – [S] [2] [A1] [ ]

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

① Size

25
32
40

⑤ Stroke [mm]

300	300
to	to
2000	2000

⑧ Cable length [m]

Nil	Without cable
2	2
5	5
A	10

* Common to encoder / motor / lock cable

② Motor mounting position

Nil	Top mounting type
U	Bottom mounting type

⑥ Motor option

Nil	Without option
B	With lock

⑨ Driver type

	Compatible driver	Power supply voltage [V]
Nil	Without driver	–
A1	LECSA1-S□	100~120
A2	LECSA2-S□	200~230
B1	LECSB1-S□	100~120
B2	LECSB2-S□	200~230
C1	LECSC1-S□	100~120
C2	LECSC2-S□	200~230
S1	LECSS1-S□	100~120
S2	LECSS2-S□	200~230

③ Motor type

Symbol	Type	Output [W]	Size	Compatible driver
S2	AC servo motor (Incremental encoder)	100	25	LECSA□-S1
S3		200	32	LECSA□-S3
S4		400	40	LECSA2-S4
S6	AC servo motor (Absolute encoder)	100	25	LECS[B/C/S]□-S5
S7		200	32	LECS[B/C/S]□-S7
S8		400	40	LECS[B/C/S]2-S8

④ Lead [mm]

S	54

⑦ Actuator cable type

Nil	Without cable
B	Standard cable
R	Robot cable (Flexible cable)

* Motor cable and encoder cable are included.
(Lock cable is also included if motor option "With lock" is selected)

⑩ I/O connector

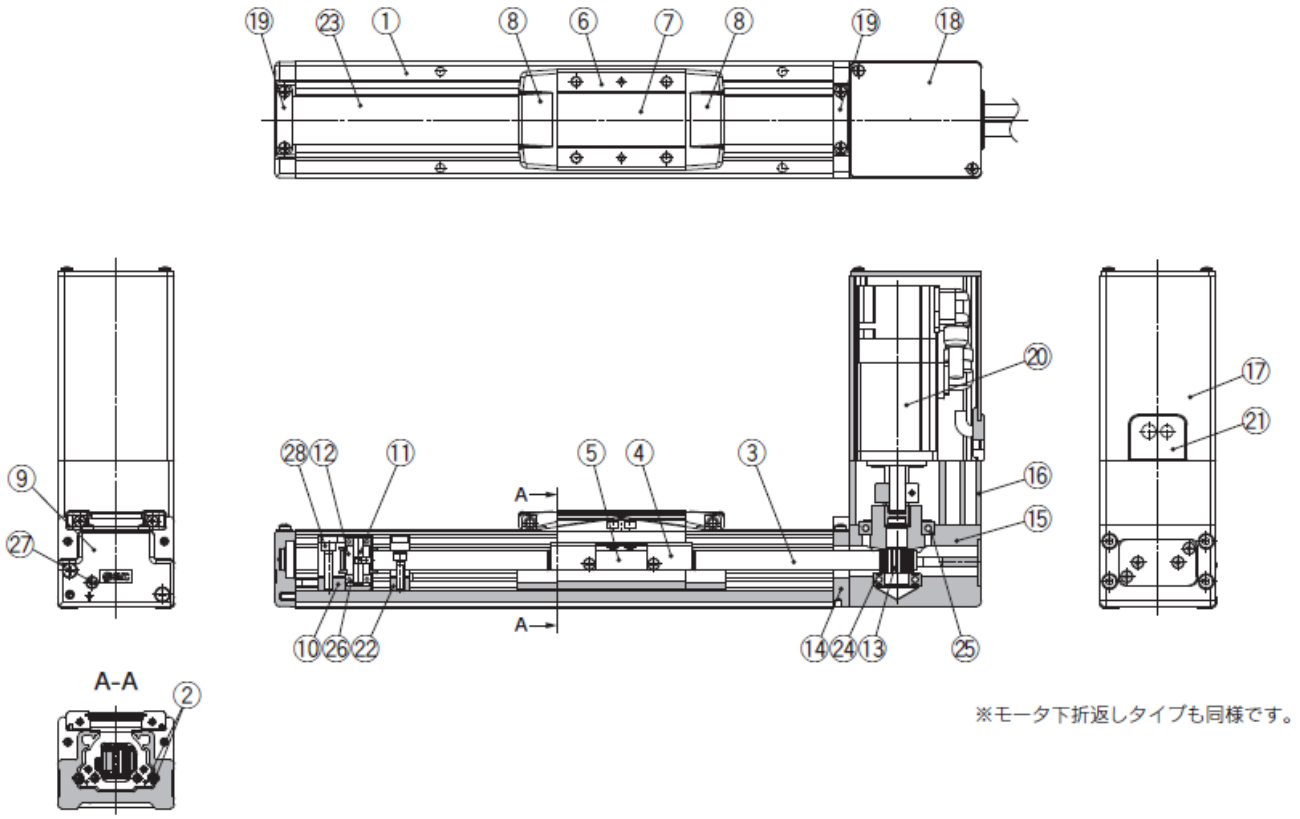
Nil	Without connector
H	With connector

*Applicable stroke table

Model \ Stroke [mm]	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2500	3000
LEFS25	●	●	●	●	●	●	●	●	○	●	○	○	●	○	○	○	○	●	–	–
LEFS32	●	●	●	●	●	●	●	●	○	●	○	○	●	○	○	○	○	●	●	–
LEFS40	●	●	●	●	●	●	●	●	○	●	○	○	●	○	○	○	○	●	●	●

3.3 Construction

LEFB25S□S <Belt drive (25)>



※モータ下折返しタイプも同様です。

Parts list

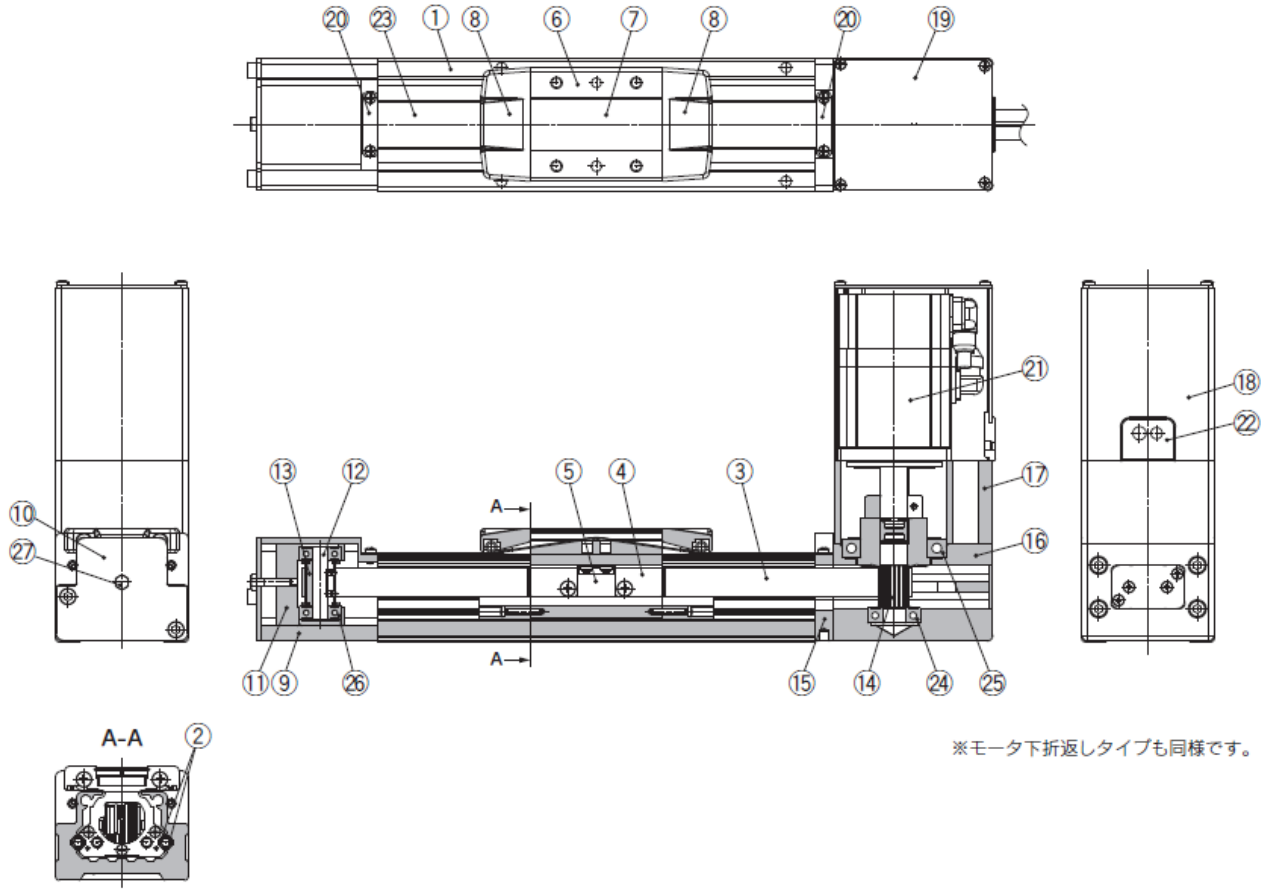
Component Parts

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

Component Parts

No.	Description	Material	Note
15	**Housing**	Aluminum alloy	Coating
16	**Motor mount**	Aluminum alloy	Coating
17	**Motor cover**	Aluminum alloy	Anodized
18	**Motor end cover**	Aluminum alloy	Anodized
19	**Band stopper**	Stainless steel	
20	**Motor**		
21	**Rubber bushing**	NBR	
22	**Stopper**	Aluminum alloy	
23	**Dust seal band**	Stainless steel	
24	**Bearing**		
25	**Bearing**		
26	**Spacer**	Stainless steel	
27	**Tension adjustment bolt**	Chromium molybdenum steel	Chromate treated
28	**Pulley fixing bolt**	Chromium molybdenum steel	Chromate treated

LEFB32/40S□S <Belt drive (32/40)>



※モータ下折返しタイプも同様です。

Parts list

Component Parts

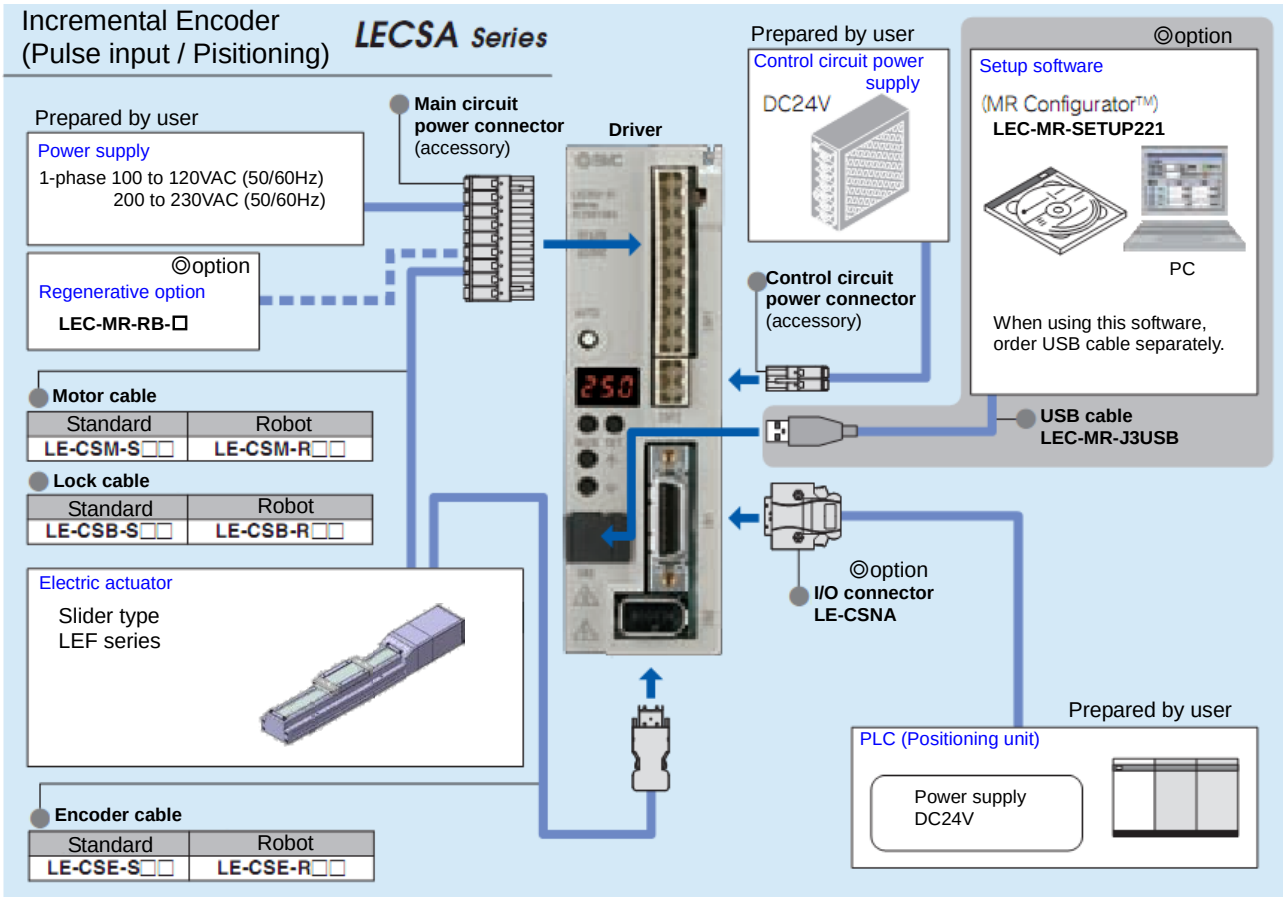
No.	Description	Material	Note
1	**Body**	Aluminum alloy	Anodized
2	**Rail guide**		
3	**Belt**		
4	**Belt holder**	Carbon steel	Chromate treated
5	**Belt stopper**	Aluminum alloy	Anodized
6	**Table**	Aluminum alloy	Anodized
7	**Blanking plate**	Aluminum alloy	Anodized
8	**Seal band stopper**	Synthetic resin	
9	**End block**	Aluminum alloy	Coating
10	**End block cover**		
11	**Pulley holder**	Aluminum alloy	
12	**Pulley shaft**	Stainless steel	
13	**End pulley**	Aluminum alloy	Anodized
14	**Motor pulley**	Aluminum alloy	Anodized

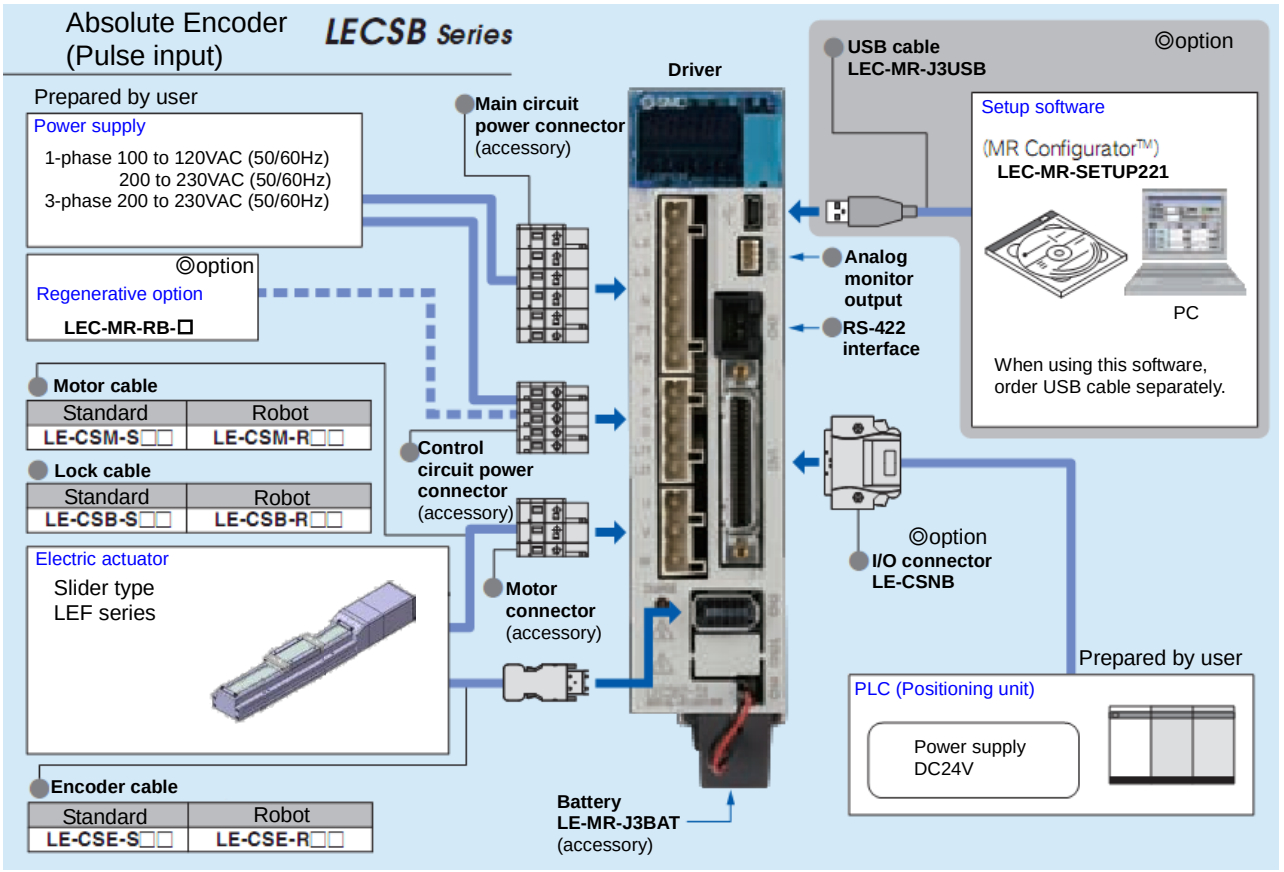
Component Parts

No.	Description	Material	Note
15	**Return flange**	Aluminum alloy	Coating
16	**Housing**	Aluminum alloy	Coating
17	**Motor mount**	Aluminum alloy	Coating
18	**Motor cover**	Aluminum alloy	Anodized
19	**Motor end cover**	Aluminum alloy	Anodized
20	**Band stopper**	Stainless steel	
21	**Motor**		
22	**Rubber bushing**	NBR	
23	**Dust seal band**	Stainless steel	
24	**Bearing**		
25	**Bearing**		
26	**Bearing**		
27	**Tension adjustment bolt**	Chromium molybdenum steel	Chromate treated

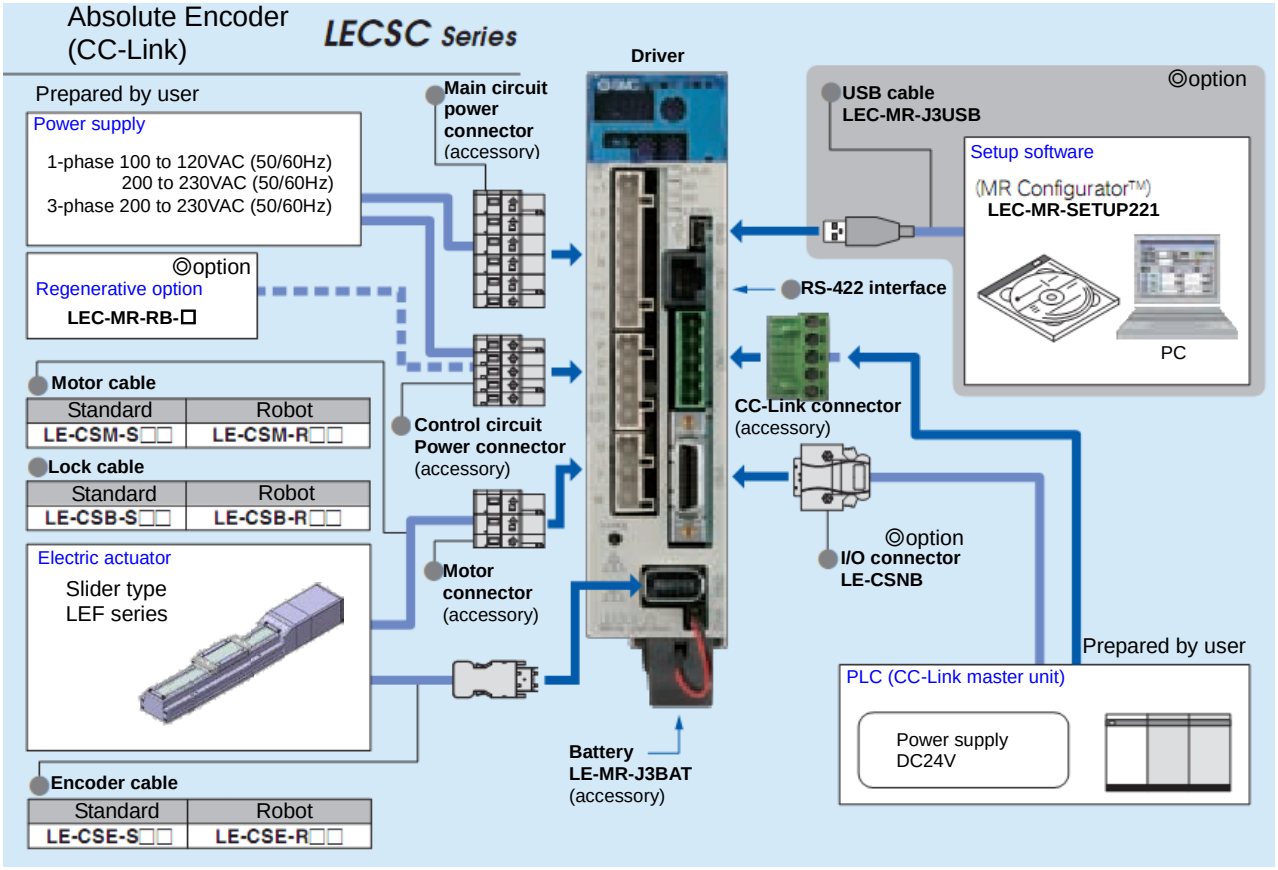
4. Product Outline

4.1 System construction

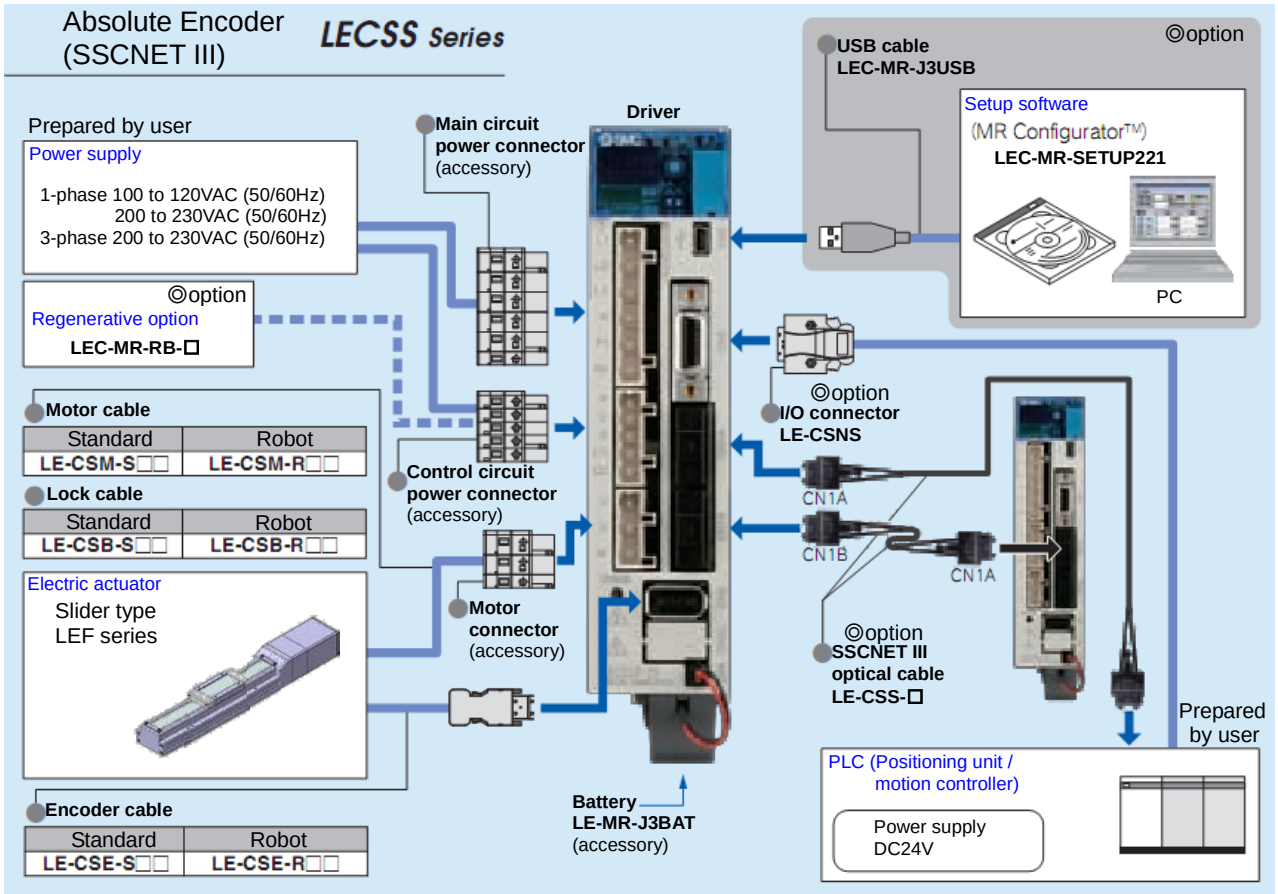




Absolute Encoder (CC-Link) *LECSC Series*



Absolute Encoder (SSCNET III) *LECSS Series*



4.2 Function/Configuration

The following control mode can be selected for applicable drivers.
Refer to the “Driver Operation Manual” about wiring and parameter setting.

Table4-1. Applicable control mode

Driver	Control mode[Note1)]	Encoder	Positioning		Parameter select
	Position control		Point table method	Program method[Note3)]	
LECSA (Pulse input / positioning)	Pulse train	Incremental	ON/OFF signal 3 points (max. 7 points)[Note2)]	ON/OFF signal 4 programs (max. 8 Programs)[Note2)]	PA01
LECSB (Pulse input)	Pulse train	Absolute	-	-	PA01
LECSC (CC-Link)	CC-Link (When 2 stations are occupied)	Absolute	CC-Link 31 points(When 1 station is occupied) 255 points(When 2 stations are occupied)	-	PC30
LECSS (SSCNET III)	SSCNET III	Absolute	-	-	Note4)
Operation method	Positioning operation	-	Positioning operation by point table No. setting	Positioning operation by program No. setting	-

Note1) Only the position control can be used.
Note2) To set the maximum value for the each method, it is necessary to change the setting.
Please refer “Driver Operation Manual”.
Note3) The MR Configurator is necessary to control by the program method. Order separately.
-MR Configurator (Setup software Japanese version) / LEC-MR-STUP221
-MR Configurator (Setup software English version) / LEC-MR-SETUP221E
-USB cable for Setup software (3m) / LEC-MR-J3USB
Note4) The LECSS is set by upper positioning unit or motion controller.

5. Wiring of cables / Common precautions

⚠ **Warning**

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

⚠ **Caution**

1. **Wire the connector securely. Do not apply any voltage to the terminals other than those specified in the product manual.**
2. **Wire the connector securely.**
   Check for correct connector wiring and polarity.
3. **Take appropriate measures against noise.**
   Noise in a signal line may cause malfunction. As a countermeasure, separate high voltage and low voltage cables, and shorten wiring lengths, etc.
4. **Do not route wires and cables together with power or high voltage cables.**
   The product can malfunction due to interference of noise and surge voltage from power and high voltage cables to the signal line. Route the wires of the product separately from power or high voltage cables.
5. **Take care that actuator movement does not catch cables.**
6. **Operate with cables secured. Avoid bending cables at sharp angles where they enter the product.**
7. **Avoid twisting, folding, rotating or applying an external force to the cable.**
   Risk of electric shock, wire break, contact failure and loss of control for the product can happen.
8. **Select “Robotic type cables” in case of inflecting cable(encoder/motor/rock) repeatedly.**
   Refer to the “Driver operation manual” for the bending life of the bending radius of the cable.
9. **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.

[Transportation]

⚠ **Caution**

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

6. Electric actuators / Common precautions

6.1 Design and selection

⚠ **Warning**

1. **Be sure to read the Operation Manual (this manual and the one for the driver: 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. **Disassembly and modification is prohibited**
   Do not modify or reconstruct (including additional machining) the product. An injury or failure can result.
9. **When using it for vertical application, it is necessary to build in a safety device.**
   The rod may fall due to the weight of work. The safety device should not interfere with normal operation of the machine.

⚠ **Caution**

1. **Operate within the limits of the maximum usable 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. **Refer to a common auto switch /matter (Best Pneumatics No 2) when an auto switch is built in and used.**

6.2 Mounting

⚠ **Warning**

1. **Install and operate the product only after reading the Operation Manual carefully and under standing its contents. Keep the manual in a safe place future reference.**
2. **Observe the tightening torque for screws.**
   Tighten the screws to the recommended torque for mounting the product.
3. **Do not make any alterations to this product.**
   Alterations made to this product may lead to a loss of durability and damage to the product, which can lead to human injury and damage to other equipment and machinery.
4. **When using external guide, the guide axis should be parallel to the actuator axis.**
   There will be damage/excessive wear on the lead screw if the external guide is not parallel.
5. **When an external guide is used, connect the moving parts of the product and the load in such a way that there is no interference at any point within the stroke.**
   Do not scratch or dent the sliding parts of the product tube or piston rod etc., by striking or grasping them with other objects. Components are manufactured to precise tolerances, so that even a slight deformation may cause faulty operation.
6. **Prevent the seizure of rotating parts.**
   Prevent the seizure of rotating parts (pins, etc.) by applying grease.
7. **Do not use the product until you verify that the equipment can operate properly.**
   After mounting or repair, connect the power supply to the product and perform appropriate functional inspections to check it is mounted properly.
8. **Cantilever**
   When the actuator is operated at high speed while it is fixed at one end and free at the other end (flange type, foot type, double clevis type, direct mount type), 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. Use a support bracket also when moving the actuator body or when a long stroke actuator is mounted horizontally and fixed at one end.
9. **When attaching work piece, do not apply strong impact or large moment.**
   If an external force over the allowable moment is applied, it may cause looseness in the guide unit, an increase in sliding resistance or other problems.
10. **Maintenance space**
    Allow sufficient space for maintenance and inspection.

6.3 Handling

⚠ **Warning**

1. **If abnormal heating, smoking or fire, etc., occurs in the product, immediately shut off the power supply.**
2. **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.
3. **Never touch the rotating part of the motor or moving part of the actuator while in operation.**
   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 installing, adjusting, inspecting or performing maintenance on the product, driver and related equipment, be sure to shut off the power supply to 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.**

⚠ **Caution**

1. **Keep the driver and product combined as delivered for use.**
   The product is set in parameters for shipment. If it is combined with a different parameter, failure can result.
2. **Check the product for the following points before operation.**
   a) Damage to 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 driver /driver mounting.
   d) Abnormal operation.
   e) Emergency stop of the total system.
3. **When more than one person is performing work, decide on the procedures, signals, measures and resolution for abnormal conditions before beginning the work. Also, designate a person to supervise work other than those performing work.**
4. **Actual speed of the product will be changed by the workload.**
   Before selecting a product, check the catalog for the instructions regarding selection and specifications.
5. **Do not apply a load, impact or resistance in addition to a transferred load during 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 done by low speed. Start operation by predefined speed after confirming there is no trouble.**

[Ground]

⚠ **Warning**

1. **Please do the earth construction surely.**
2. **Please refer to the driver manual for the grounding procedure and notes.**

[Unpackaging]

⚠ **Caution**

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

6.4 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 of the temperature specification (refer to specifications).
c. Locations where the ambient humidity is outside the range of the humidity specification (refer to specifications).
d. Locations where corrosive gas, flammable gas, sea water, water and steam are present.
e. Locations where strong magnetic or electric fields are generated.
f. Locations where direct vibration or impact is applied to the product.
g. Areas that are dusty, or are exposed to splashes of water and oil drops.
h. Areas exposed to direct sunlight (ultraviolet ray).

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.

6.5 Maintenance

⚠ **Warning**

1. **Do not disassemble or repair the product.**
   Fire or electric shock can result.
2. **Before modifying or checking the wiring, the voltage should be checked with a tester 5 minutes after the power supply is turned off.**
   Electrical shock can result.

⚠ **Caution**

1. **Maintenance should be performed according to the procedure indicated in the Operating Manual.**
   Incorrect handling can cause 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.

6.6 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 situations will happen when the lock slips due to a force hight 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 is applied to the sliding part of the lock, its holding force will be reduce significantly.
6. **Take measures against drops and check that safety is assured before mounting, adjustment and inspection of the product.**
   If the lock is released with the product mounted vertically, a work piece can drop due to its weight.

7. Electric actuators / Slider type Common precautions

7.1 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□25	65mm or less
LEF□32	70mm or less
LEF□40	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.

7.2 Handling

⚠ **Caution**

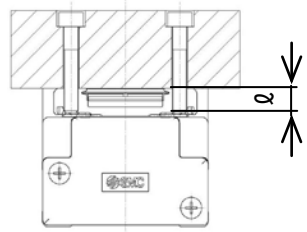
1. **Do not use the lock as a safety lock or a control that requires a locking force.**
   1) Positioning operation
   When the product comes within the set range by step data [In positon], output signal will be turned on. Set to [0.50] for LEFS and [1] for LEFB, or higher.
2. **Do not change the positioning 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.

7.3 Mounting

⚠ **Caution**

1. **Keep the flatness of mounting surace to within 0.1mm or less.**
   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

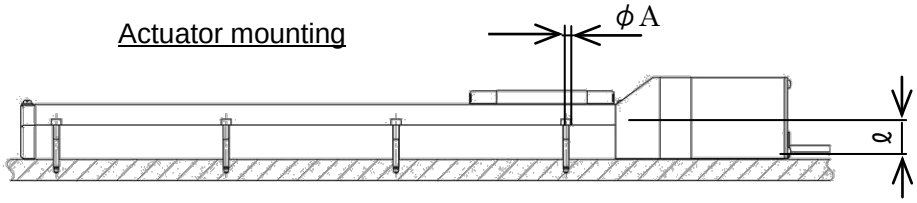


Model	Bolt size	Maximum tightening torque [Nm]	ℓ (Maximum thread depth [mm])
LEF□25	M5x0.8	3	8
LEF□32	M6x1	5.2	9
LEF□40	M8x1.25	12.5	14

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□25	M4	4.5	24
LEF□32	M5	5.5	30
LEF□40	M6	6.6	31

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

7.4 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]

Stop operation immediately when the belt appears to be like malfunction shown in the pictures below.
If it occurs in the first stage of use, confirm it is within the range of the product specification, the system requirements and conditions of use.
SMC will exchange belt for repair correspondence.
(When exchanging the belt yourself, contact SMC. Because it is difficult, adjustment for the motor origin, adjustment of the belt tension, etc. is accompanied, the repair correspondence is recommended.)

a. Wear-out of tooth shape canvas

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

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

Belt corner becomes round and frayed threads stick out.

c. Belt partially cut

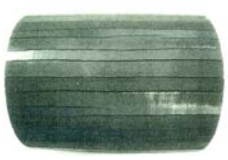
Belt is partially cut.
Foreign matter is caught in the teeth other than the cut part causes flaw.

d. Vertical line of belt teeth

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

e. The rubber back of the belt is softened and sticky.

f. Crack on the back of the belt

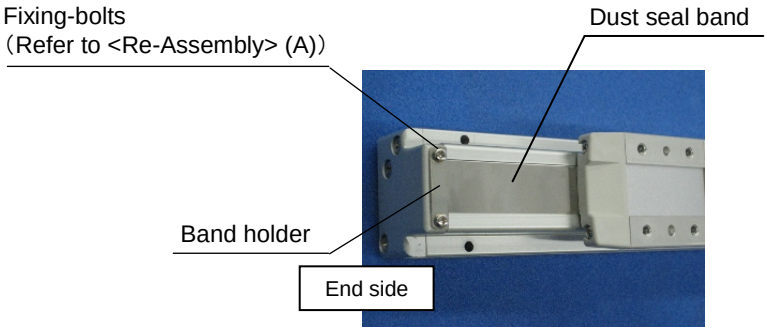


7.5 How to detach and attach the dust seal band

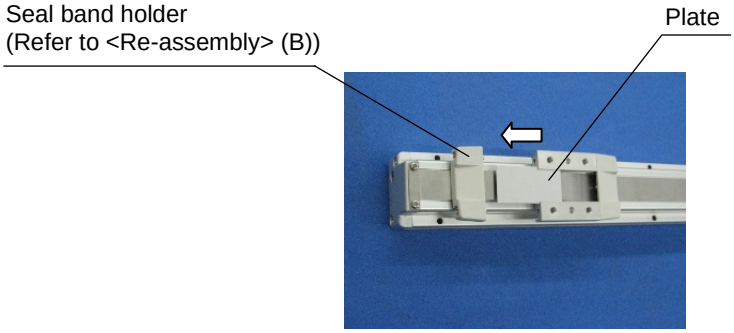
For the internal-check as the maintenance, the method of detaching and attaching the dust seal band is shown as the following.

<Dis-assembly>

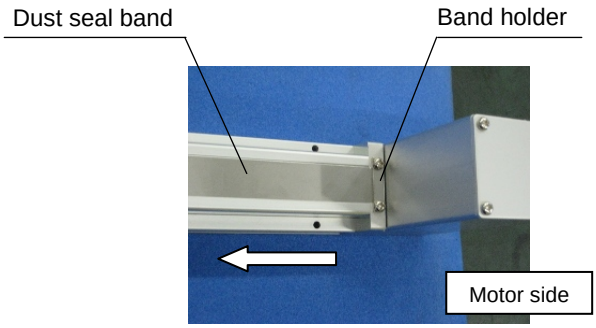
1. **Loosen the fixing bolts of end side of the “Band holder”.**
   (The picture shows LEFB, but LEFS is same instruction as LEFB.)
   Pay attention to not cut hand on the edges of the "Dust seal band".
   Note: The "Dust seal band" can only be removed by loosening the "Band holder" bolts.



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)

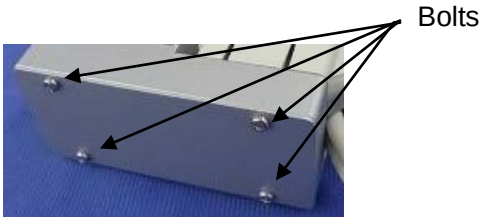
Model	Type of bolt	Bolt size
LEF□25	Round head combination screw	M3x6
LEF□32	Round head combination screw	M3x6
LEFS40	Round head combination screw	M3x6

(B)

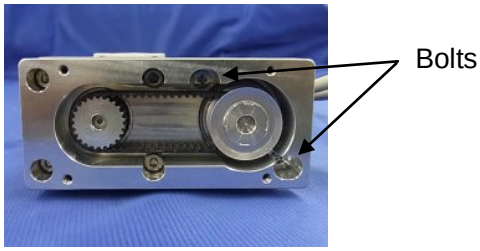
Model	Type of bolt	Bolt size
LEF□25	Cross recessed round head screw	M3x20
LEF□32	Cross recessed round head screw	M4x30
LEFS40	Round head combination screw	M4x35

7.6 Replacement of belt

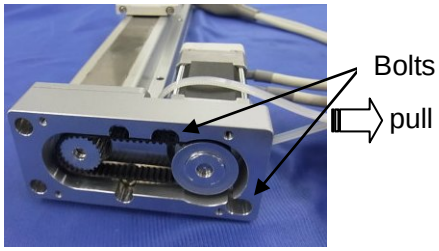
1. After Bolt is removed, "Pulley plate" is removed.



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

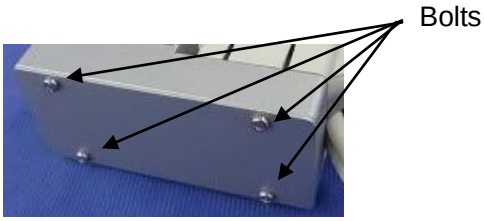


3. After "Belt" is installed, and the bearing support is obtained, the root of "Motor" is pulled in a string or a long banding band. With tensile force adjusted, tighten the bolts which fix the actuator to the motor. （See the table below）



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

4. "Pulley plate" is installed.



Size	Tightening torque (Nm)
M3	0.63±10%
M4	1.5±10%
M5	3±10%

8.Troubleshooting

8.1 Alarms and Warning

When a fault occurs during the operation, the corresponding alarm or warning is displayed. If any alarm or warning has occurred, refer to 「Driver Operation Manual」and take the appropriate action. After removing the cause of the alarm, the alarm can be deactivated in any of the methods marked ○ in the alarm deactivation column.

・LECSA(Pulse input / Positioning)

	Display	Name	Alarm deactivation		
			Power OFF→ON	Press "SET" on current alarm screen.	Alarm reset (RES)
Alarms	A.10	Undervoltage	○	○	○
	A.12	Memory error 1 (RAM)	○	-	-
	A.13	Clock error	○	-	-
	A.15	Memory error 2 (EEP-ROM)	○	-	-
	A.16	Encoder initial communication error1	○	-	-
	A.17	Board error	○	-	-
	A.19	Memory error 3 (Flash-ROM)	○	-	-
	A.1A	Motor combination error	○	-	-
	A.1C	Software combination error	○	-	-
	A.1E	Encoder initial communication error 2	○	-	-
	A.1F	Encoder initial communication error 3	○	-	-
	A.20	Encoder normal communication error 1	○	-	-
	A.21	Encoder normal communication error 2	○	-	-
	A.24	Main circuit error	○	○	○
	A.30	Regenerative error	○(Note1)	○(Note1)	○(Note1)
	A.31	Overspeed	○	○	○
	A.32	Overcurrent	○	-	-
	A.33	Overvoltage	○	○	○
	A.35	Command frequency error	○	○	○
	A.37	Parameter error	○	-	-
	A.39	Program error	○	-	-
	A.45	Main circuit device overheat	○(Note1)	○(Note1)	○(Note1)
	A.46	Servo motor overheat	○(Note1)	○(Note1)	○(Note1)
	A.50	Overload 1	○(Note1)	○(Note1)	○(Note1)
	A.51	Overload 2	○(Note1)	○(Note1)	○(Note1)
	A.52	Error excessive	○	○	○
	A.61	Operation alarm	○	○	○
	A.8E	USB communication error	○	○	○
	888	Watchdog	○	-	-

	Display	Name
Warning	A.90	Amplifier overheat warning
	A.91	Stroke limit warning
	A.96	Excessive regeneration warning
	A.97	Overload warning 1
	A.98	Servo forced stop warning
	A.99	Main circuit off warning
	A.E0	Overload warning 2
	A.E1	Output watt excess warning
	A.E6	Tough drive warning
	A.E9	Amplifier overheat warning
	A.EC	Stroke limit warning
	A.ED	Excessive regeneration warning
	A.F0	Overload warning 1

Note1. Deactivate the alarm about 30 minutes of cooling time after removing the cause of occurrence.

▪LECSB(Pulse input)

	Display	Name	Alarm deactivation		
			Power OFF→ON	Press "SET" on current alarm screen.	Alarm reset (RES)
Alarms	AL.10	Undervoltage	○	○	○
	AL.12	Memory error 1 (RAM)	○	-	-
	AL.13	Clock error	○	-	-
	AL.15	Memory error 2 (EEP-ROM)	○	-	-
	AL.16	Encoder error 1(At power on)	○	-	-
	AL.17	Board error	○	-	-
	AL.19	Memory error 3(Flash-ROM)	○	-	-
	AL.1A	Motor combination error	○	-	-
	AL.20	Encoder error 2(during runtime)	○	-	-
	AL.21	Encoder error 3(during runtime)	○	-	-
	AL.24	Main circuit error	○	○	○
	AL.25	Absolute position erase	○	-	-
	AL.30	Regenerative error	○(Note1)	○(Note1)	○(Note1)
	AL.31	Overspeed	○	○	○
	AL.32	Overcurrent	○	-	-
	AL.33	Overvoltage	○	○	○
	AL.35	Command pulse frequency alarm	○	○	○
	AL.37	Parameter error	○	-	-
	AL.45	Main circuit device overheat	○(Note1)	○(Note1)	○(Note1)
	AL.46	Servo motor overheat	○(Note1)	○(Note1)	○(Note1)
	AL.47	Cooling fan alarm	○	-	-
	AL.50	Overload 1	○(Note1)	○(Note1)	○(Note1)
	AL.51	Overload 2	○(Note1)	○(Note1)	○(Note1)
	AL.52	Error excessive	○	○	○
	AL.8A	Serial communication time-out error	○	○	○
	AL.8E	Serial communication error	○	○	○
	88888	Watchdog	○	-	-

	Display	Name
Warning	A.92	Battery cable disconnection warning
	A.96	Home position setting error
	A.99	Stroke limit warning
	A.9F	Battery warning
	A.E0	Excessive regeneration warning
	A.E1	Overload warning 1
	A.E3	Absolute position counter warning
	A.E5	ABS time-out warning
	A.E6	Servo emergency stop warning
	A.E8	Cooling fan speed reduction warning
	A.E9	Main circuit off warning
	A.EA	ABS servo on warning
	A.EC	Overload warning 2
	A.ED	Output watt excess warning

Note1. Deactivate the alarm about 30 minutes of cooling time after removing the cause of occurrence.

▪LECSC(CC-Link)

	Display	Name	Alarm deactivation		
			Power OFF→ON	MR Configuratior parameter unit(Note3)	Alarm reset (Note2)
Alarms	A10	Undervoltage	○	○	○
	A12	Memory error 1 (RAM)	○	-	-
	A13	Clock error	○	-	-
	A15	Memory error 2 (EEP-ROM)	○	-	-
	A16	Encoder error 1(At power on)	○	-	-
	A17	Board error	○	-	-
	A19	Memory error 3(Flash-ROM)	○	-	-
	A1A	Motor combination error	○	-	-
	A20	Encoder error 2	○	-	-
	A24	Main circuit error	○	○	○
	A25	Absolute position erase	○	-	-
	A30	Regenerative error	○(Note1)	○(Note1)	○(Note1)
	A31	Overspeed	○	○	○
	A32	Overcurrent	○	-	-
	A33	Overvoltage	○	○	○
	A35	Command pulse frequency alarm	○	○	○
	A37	Parameter error	○	-	-
	A45	Main circuit device overheat	○(Note1)	○(Note1)	○(Note1)
	A46	Servo motor overheat	○(Note1)	○(Note1)	○(Note1)
	A47	Cooling fan alarm	○	-	-
	A50	Overload 1	○(Note1)	○(Note1)	○(Note1)
	A51	Overload 2	○(Note1)	○(Note1)	○(Note1)
	A52	Error excessive	○	○	○
	A61	Operation alarm	○	○	○
	A8A	Serial communication time-out	○	○	○
	A8D	CC-Link alarm	○	○	○
	A8E	Serial communication error	○	○	○
	888	Watchdog	○	-	-

	Display	Name
Warning	A90	Home positioning incomplete warning
	A92	Open battery cable warning
	A96	Home position setting error
	A97	Next station warning
	A99	Stroke limit warning
	A9D	CC-Link warning 1
	A9E	CC-Link warning 2
	A9F	Battery warning
	AE0	Excessive regeneration warning
	AE1	Overload warning 1
	AE3	Absolute position counter warning
	AE6	Servo emergency stop warning
	AE8	Cooling fan speed reduction warning
	AE9	Main circuit off warning
	AEC	Overload warning 2
	AED	Output watt excess warning

Note1. Deactivate the alarm about 30 minutes of cooling time after removing the cause of occurrence.

Note2. Turns on RY(n+1)A or RY(n+3)A.

Note3. Clicking the “Alarm reset” button on the “Alarm display” screen of MR Configurator allows an alarm to be deactivated.
Pressing the “STOP RESET” key of the parameter unit allows an alarm to be deactivated.

▪LECSS(SSCNET III)

	Display	Name	Alarm deactivation		
			Power OFF→ON	Error reset	CPU reset
Alarms	10	Undervoltage	○	○	○
	12	Memory error 1 (RAM)	○	-	-
	13	Clock error	○	-	-
	15	Memory error 2 (EEP-ROM)	○	-	-
	16	Encoder error 1(At power on)	○	-	-
	17	Board error	○	-	-
	19	Memory error 3(Flash-ROM)	○	-	-
	1A	Motor combination error	○	-	-
	20	Encoder error 2(during runtime)	○	-	-
	21	Encoder error 3(during runtime)	○	-	-
	24	Main circuit error	○	○	○
	25	Absolute position erase	○	-	-
	30	Regenerative error	○(Note1)	○(Note1)	○(Note1)
	31	Overspeed	○	○	○
	32	Overcurrent	○	-	-
	33	Overvoltage	○	○	○
	34	Receive error 1	○	○(Note2)	○
	35	Command pulse frequency alarm	○	○	○
	36	Receive error 2	○	○	○
	37	Parameter error	○	-	-
	3D	Driver communication parameter setting error	○	-	○
	45	Main circuit device overheat	○(Note1)	○(Note 1)	○(Note1)
	46	Servo motor overheat	○(Note1)	○(Note 1)	○(Note1)
	47	Cooling fan alarm	○	-	-
	50	Overload 1	○(Note1)	○(Note1)	○(Note1)
	51	Overload 2	○(Note1)	○(Note1)	○(Note1)
	52	Error excessive	○	○	○
	82	Master/Slave operation alarm	○	○(Note2)	○
	8A	USB communication time-out error	○	○	○
	8E	USB communication error	○	○	○
	888	Watchdog	○	-	-

	Display	Name
Warning	92	Battery cable disconnection warning
	96	Home position setting error
	9F	Battery warning
	E0	Excessive regeneration warning
	E1	Overload warning 1
	E3	Absolute position counter warning
	E4	Parameter warning
	E6	Servo forced stop warning
	E7	Controller forced stop warning
	E8	Cooling fan speed reduction warning
	E9	Main circuit off warning
	EC	Overload warning 2
	ED	Output watt excess warning

Note1. Deactivate the alarm about 30 minutes of cooling time after removing the cause of occurrence.

Note2. In some controller communication status, the alarm factor may not be removed.

Revision history
No.LEF-OM00402 Sep/ 2011 Revision
No.LEF-OM00402 Jul/ 2012 Revision
No.LEF-OM00403 Mar / 2013 Revision ・Addition / Side parallel type
No.LEF-OM00404 Nov / 2013 Revision ・Addition / lead H for ball screw drive
No.LEF-OM00405 May / 2015 Revision ・Addition / Stroke for ball screw drive

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