

# Electric Grippers

## Easy setting

Data can be set with only **2** items:  
position and force.

Data	Axis 1
Step No.	0
Posn	12.00 mm
Force	40%

\* Teaching box screen



- **Drop prevention function is provided.**  
(Self-lock mechanism is provided for all series.)  
Gripping force of the work pieces is maintained when stopped or restarted.  
The work pieces can be removed by hand.
- **Energy-saving**  
Power consumption reduced by self-lock mechanism
- **Compact body sizes and long stroke variations**  
Can achieve the gripping force equivalent to the widely used air grippers.

- **Gripping check function is provided.**  
Identify work pieces with different dimensions/detect mounting and removal of the work pieces.
- **Possible to set position, speed and force. (64 points)**



**Compact and light** .....  
**Various gripping forces**

**Long stroke, can hold** .....  
**various types of work pieces.**



Series LEHZ

Body size	Stroke/ both sides [mm]	Gripping force [N]	
		Basic	Compact
10	4	6 to 14	2 to 6
16	6		3 to 8
20	10	16 to 40	11 to 28
25	14		—
32	22	52 to 130	—
40	30	84 to 210	—



Series LEHF

Body size	Stroke/ both sides [mm]	Gripping force [N]
10	16 (32)	3 to 7
20	24 (48)	11 to 28
32	32 (64)	48 to 120
40	40 (80)	72 to 180

( ) : Long stroke

**NEW 3-finger type is added!**

Can hold round work pieces. ....



Series LEHS

Body size	Stroke/ diameter [mm]	Gripping force [N]	
		Basic	Compact
10	4	2.2 to 5.5	1.4 to 3.5
20	6	9 to 22	7 to 17
32	8	36 to 90	—
40	12	52 to 130	—

**Series LEH**



CAT.EUS100-77B-UK

# Electric Gripper 2-Finger Type

Series **LEHZ** / Body Size: 10, 16, 20, 25, 32, 40

Series **LEHF** / Body Size: 10, 20, 32, 40

- Compact and lightweight  
Various gripping forces

- Long stroke, can hold various types of work pieces.

Weight: **165 g**  
(LEHZ10)

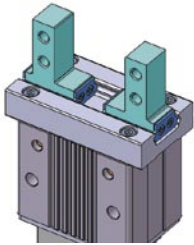
Compact  
Weight: **135 g**  
(LEHZ10L)

Stroke: Max. **40 mm**

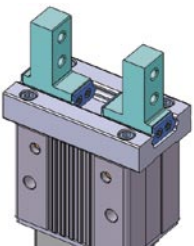
Long stroke  
Stroke: Max. **80 mm**



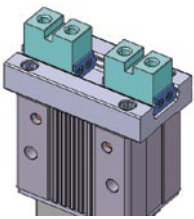
## Finger options



Side tapped mounting



Through-hole in opening/closing direction

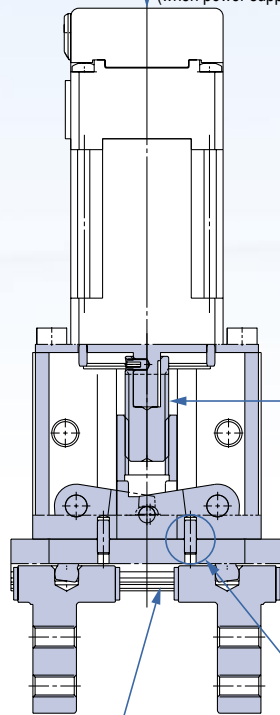


Flat fingers

## Series **LEHZ**

Manual override adjustment screw

For opening and closing the fingers (when power supply is turned off)



Slide screw

Friction resistance reduced by special treatment

Linear guide misalignment prevention

Misalignment of the linear guide is prevented with 2 positioning pins.

Linear guide

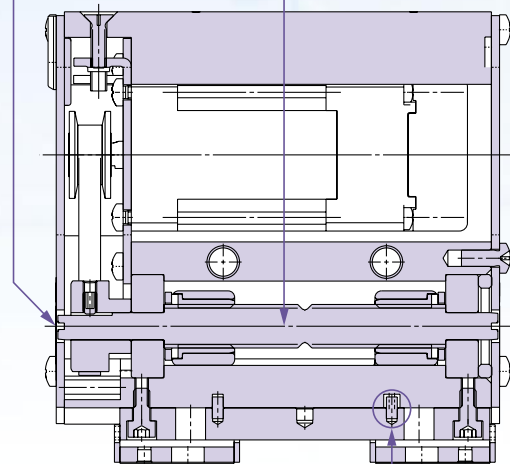
## Series **LEHF**

Manual override adjustment screw/Both sides

For opening and closing the fingers (when power supply is turned off)

Slide screw

Friction resistance reduced by special treatment



Linear guide

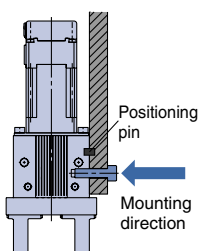
Linear guide misalignment prevention

Misalignment of the linear guide is prevented with 2 positioning pins.

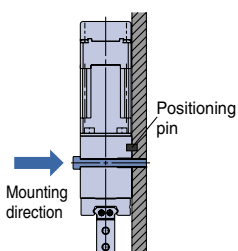
## Mounting Variations

### Series **LEHZ**

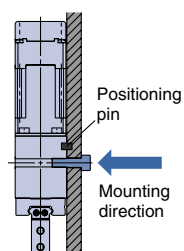
**A** When using the thread on the side of the body



**B** When using the thread on the mounting plate

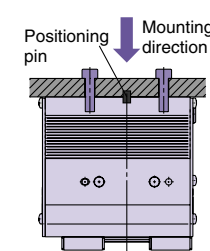


**C** When using the thread on the back of the body

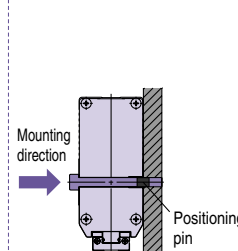


### Series **LEHF**

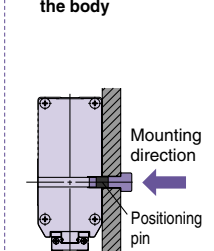
**A** When using the thread on the body



**B** When using the thread on the mounting plate



**C** When using the thread on the back of the body



# Electric Gripper 3-Finger Type

Series *LEHS* / Body Size: 10, 20, 32, 40

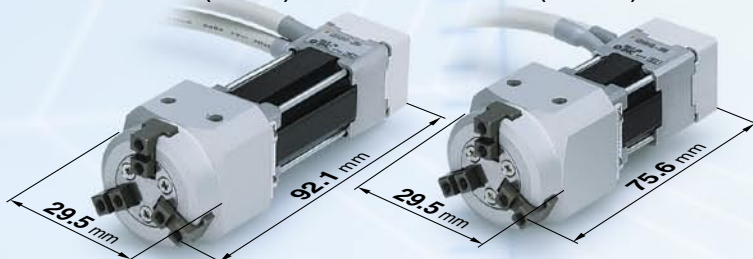
- Applicable to round work pieces



Compact

Weight: **185g**  
(LEHS10)

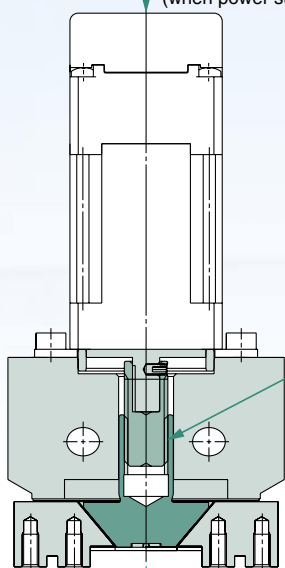
Weight: **150g**  
(LEHS10L)



## Series *LEHS*

Manual override adjustment screw

For opening and closing the fingers (when power supply is turned off)



Slide screw

Friction resistance reduced by special treatment

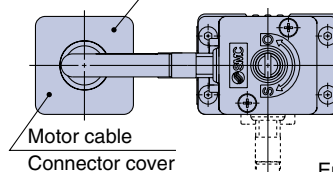
Wedge cam structure is employed

Compact and large gripping force can be obtained due to the wedge cam structure.

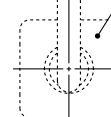
Motor cable mounting direction can be selected.

## Series *LEHZ*

Entry on the left side



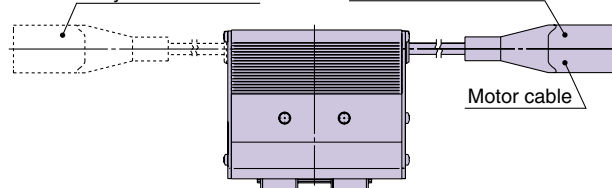
Entry on the front side



## Series *LEHF*

Entry on the left side

Entry on the right side

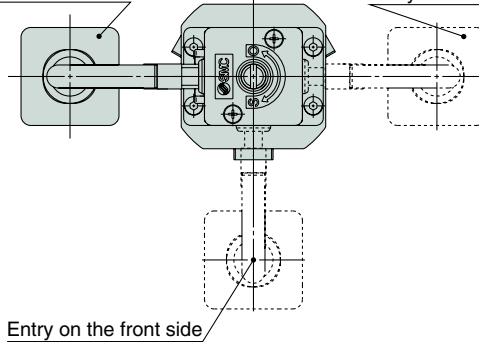


Motor cable

## Series *LEHS*

Entry on the left side

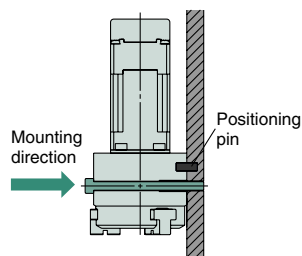
Entry on the right side



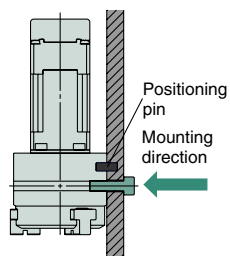
Entry on the front side

## Series *LEHS*

**A** When using the thread on the mounting plate

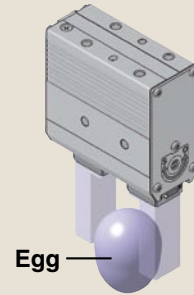
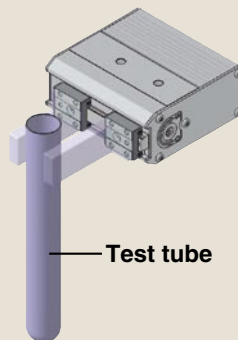
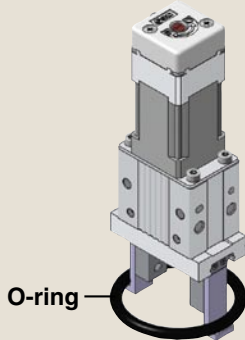


**B** When using the thread on the back of the body



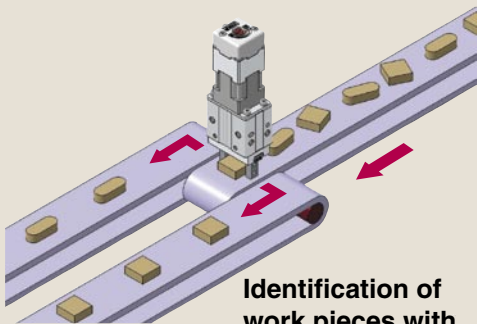
# Application Examples

## Gripping of components that are easily deformed or damaged



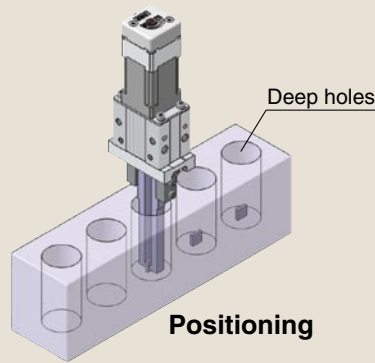
Speed and gripping force control and positioning

## Alignment and selection of randomly lined parts



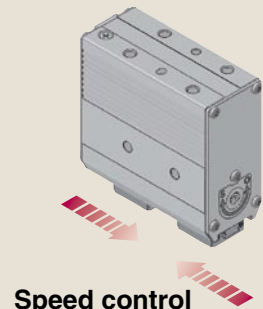
Identification of work pieces with different dimensions

## Gripping in a narrow space



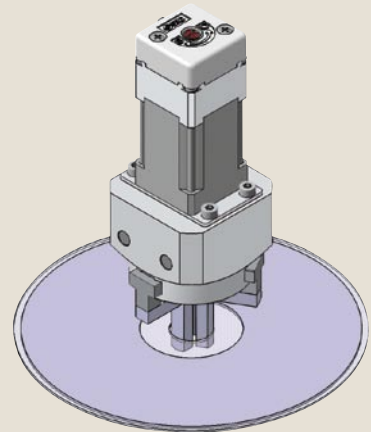
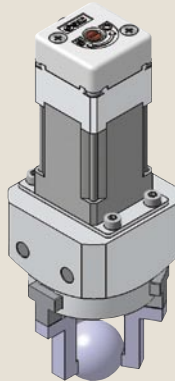
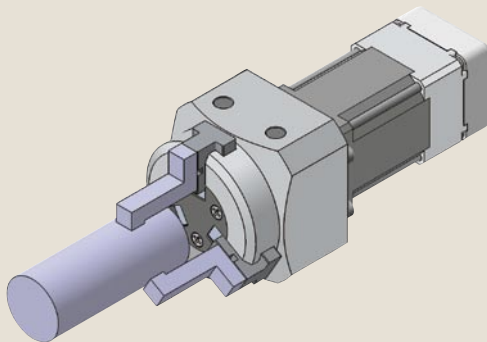
Positioning

## Soft touch/ High frequency



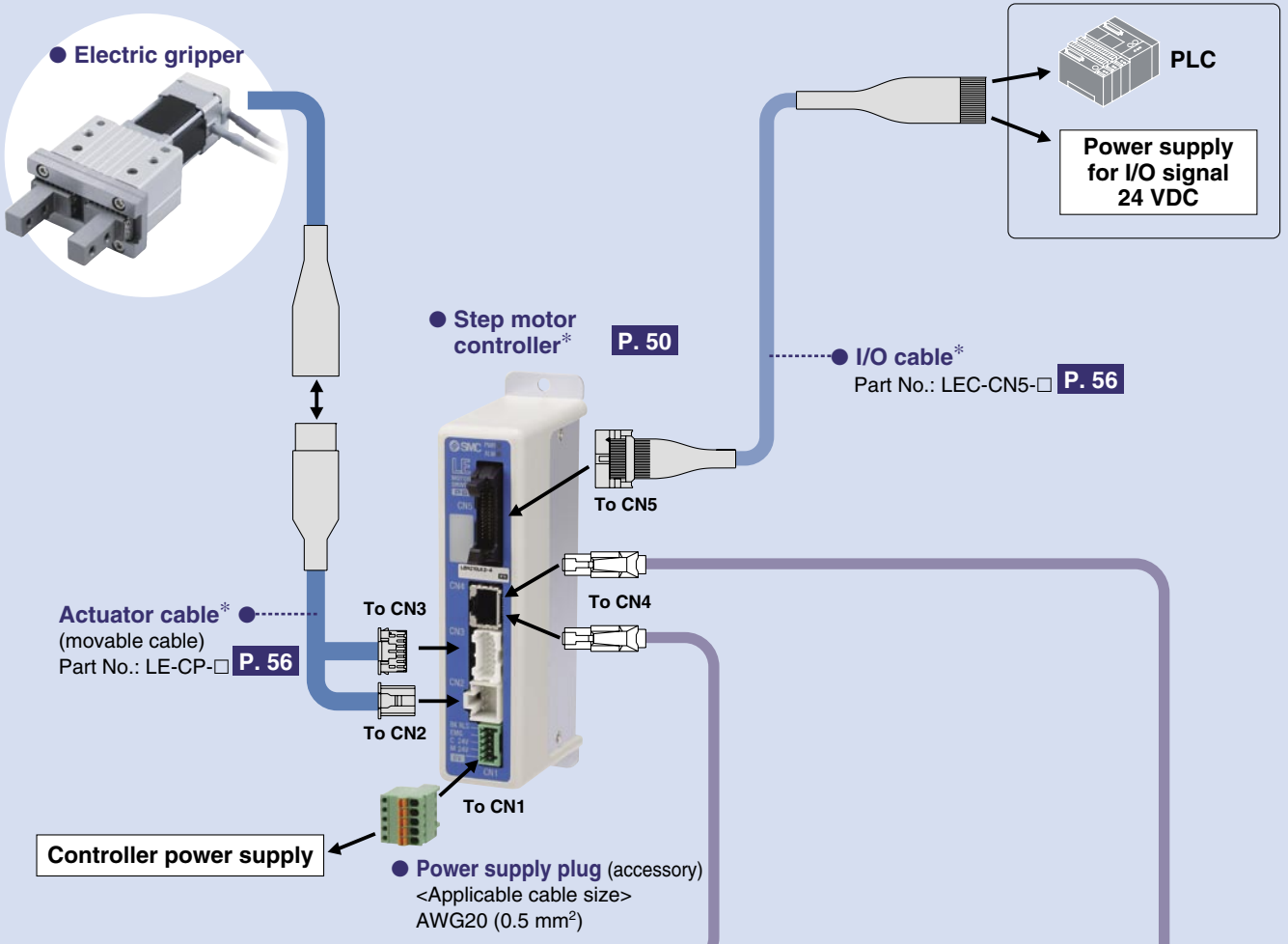
Speed control and positioning (Minimum stroke)

## Gripping of cylindrical and spherical parts



Speed and gripping force control

# System Construction



The components marked with \* are included depending on the model selection.

## Options

- **Teaching box P. 58**  
(with 3 m cable)  
Part No.: LEC-T1-3EG□



- **Controller setting software P. 57**  
(Communication cable, conversion unit and USB cable are included.)  
Part No.: LEC-W1



PC

● **Communication cable**

● **Conversion unit**

● **USB cable**  
(A-miniB type)

# Simple Setting to Use Straight Away Start-up Time Shortened

## ■ The controller is already set with the data of the actuator.

Refer to page 50 for details of the controller.

Initial parameters are already set when the controller is shipped.  
Possible to start up the controller in a short time with easy mode.

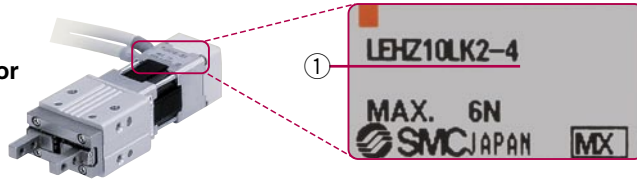
## The actuator and controller are sold as a package.

Confirm that the combination of the controller and the actuator is compatible.

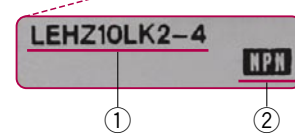
<Be sure to check the following before use.>

- ① Check that the actuator label for model number matches the controller.
- ② Check that the Parallel I/O configuration matches (NPN or PNP).

Actuator



Controller



## Simple Setting Easy Mode

### Easy operation and simple setting

#### <When using a Teaching Box>

- The iconized menu enables selection of functions.
- Allowing to set and display actuator step data such as position, speed, force, etc.
- Setting of position, etc., and monitoring of the operation can be performed on the second screen.
- The simple screen without scrolling promotes ease of setting and operating.



#### Example of setting the step data

1st screen

2nd screen

Data		Axis 1
Step No.	0	
Posn	123.45 mm	
Force	30%	

It can be registered by pressing the button "SET" after entering the values.

#### Example of checking the operation status

1st screen

2nd screen

Monitor		Axis 1
Step No.	1	
Posn	12.34 mm	
Force	50%	

Operation status can be checked.

#### Teaching box screen

- Data can be set with only two items. (Other conditions are already set.)

Data	Axis 1
Step No.	0
Posn	12.00 mm
Force	40%



Data	Axis 1
Step No.	0
Posn	5.00 mm
Force	60%

#### <When using a PC>

### Controller setting software

- Allowing to set and display actuator step data such as position, speed, force, etc.
- Setting of step data and testing of the drive can be performed on the same page.
- Can be used to jog and move at a constant rate.



Setting of jog and speed of the constant rate

Easy Mode

File Edit Comm Setting

ID: 01

Test Mode RTN ORIG Stop Servo ON

Step No. 0 Position 0.50 mm Speed 0 mm/s Force 30 %

Status: ALARM SVRE BUSY INP SETON

Step Data Table:

No.	Move M	Speed mm/s	Position mm	PushingF %	PushingSp %	In pos mm
0	Absolute	100	5.00	0	0	1.00
1	Absolute	100	10.00	0	0	1.00
2	Absolute	100	20.00	0	0	1.00
3	Absolute	200	30.00	0	0	1.00
4	Absolute	200	40.00	0	0	1.00
5	Absolute	300	50.00	0	0	1.00
6	Absolute	300	60.00	0	0	1.00
7	Absolute	400	70.00	0	0	1.00
8	Absolute	400	80.00	0	0	1.00
9	Absolute	500	90.00	0	0	1.00

Move Speed: 20 [mm/sec] Move distance: 0.50

Ready [-100.00 ~ 300.00]

Move jog

Start testing

Positioning data setting

Move for the constant rate

# Detail Setting Normal Mode

Select normal mode when detail setting is required.

- Step data can be set in detail.
- Signals and terminal status can be monitored.
- Parameters can be set.
- JOG and constant rate movement, return to origin, test operation and testing of compulsory output can be performed.

## <When using a PC> Controller setting software

- Every function is indicated in a different window.
- Function windows can be positioned in your desired positions on the screen.



Step data setup window

Parameter setup window

Monitoring window

Teaching window

## <When using a Teaching Box> Teaching box screen

- Step data and parameter can be saved/forwarded in this box.
- Test operation can be made after specifying 5 items of step data.
- Settings particular to the teaching box can be changed.



Main menu screen

Step data setup screen

Test screen

Monitoring screen

## Setting Items

PC: Controller setting software  
TB: Teaching box

Function	Contents	Easy mode		Normal mode
		PC	TB	PC, TB
Step data setting (Excerpt)	Speed	○	○	○
	Position	○	○	○
	Acceleration/Deceleration	○	○	○
	Pushing force	○	○	○
	Trigger LV	○	×	○
	Pushing speed	○	×	○
	Positioning force	○	×	○
Parameter setting (Excerpt)	In position	○	×	○
	Stroke (+)	×	×	○
	Stroke (-)	×	×	○
	ORIG speed	×	×	○
Test	ORIG ACC	×	×	○
	JOG	○	○	○
	MOVE	○	×	○
	Return to ORIG	○	○	○
	Test drive	○	○	○ (Continuous operation)
Monitor	Compulsory output	×	×	○
	DRV mon	○	○	○
ALM	In/Out mon	×	×	○
	Active ALM	○	○	○
File	ALM Log record	×	×	○
	Save/Load	×	×	○
Other	Language	○*3	○*2	○*2, *3

\*1 Every parameter is set to the recommended condition before shipment from the factory. Please 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 or Japanese version.



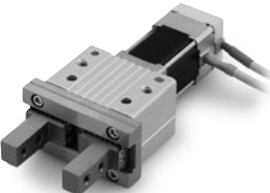



# Electric Gripper 2-Finger Type/Series **LEHZ/LEHF**

## Electric Gripper 3-Finger Type/Series **LEHS**

### Series Variations


#### 2-Finger Type

Series	Body size	Photo	Opening and closing stroke/ both sides (mm)	Gripping force [N]		Opening and closing speed (mm/s)	Weight [g]		Reference page
				Basic	Compact		Basic	Compact	
LEHZ	10		4	6 to 14	2 to 6	5 to 80	165	135	P. 2
	16		6		3 to 8		220	190	
	20		10	16 to 40	11 to 28	5 to 100	430	365	
	25		14				585	520	
	32		22	52 to 130	—	5 to 120	1120	—	
	40		30	84 to 210	—		1760	—	


Series	Body size	Photo	Opening and closing stroke/ both sides (mm)	Gripping force [N]	Opening and closing speed (mm/s)	Weight [g]	Reference page
LEHF	10		16 (32)	3 to 7	5 to 80	340 (370)	P. 19
	20		24 (48)	11 to 28		610 (750)	
	32		32 (64)	48 to 120	5 to 100	1625 (1970)	
	40		40 (80)	72 to 180		1980 (2500)	

( ): Long stroke

#### 3-Finger Type

Series	Body size	Photo	Opening and closing stroke/ diameter (mm)	Gripping force [N]		Opening and closing speed (mm/s)	Weight [g]		Reference page
				Basic	Compact		Basic	Compact	
LEHS	10		4	2.2 to 5.5	1.4 to 3.5	5 to 70	185	150	P. 34
	20		6	9 to 22	7 to 17	5 to 80	410	345	
	32		8	36 to 90	—	5 to 100	975	—	
	40		12	52 to 130	—	5 to 120	1265	—	

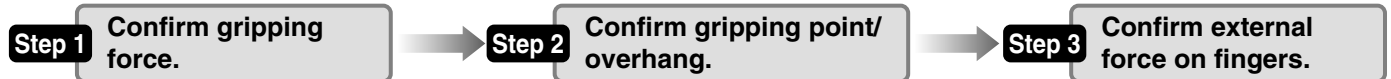
#### Step Motor Controller (Servo/24 VDC)

Series	Photo	Rated power supply	Parallel I/O		Positioning pattern points	Reference page
			Input	Output		
LECP6		24 VDC ±10%	11 inputs (Photo-coupler isolation)	13 outputs (Photo-coupler isolation)	64 points	P. 49

# Series LEHZ Model Selection

## Model Selection

### Selection Procedure



### Step 1 Confirmation of gripping force



### Example

Workpiece mass: 0.1 kg

#### Guidelines for the selection of the gripper with respect to workpiece mass

- Although conditions differ according to the workpiece shape and the coefficient of friction between the attachments and the workpiece, select a model that can provide a gripping force of 10 to 20 times <sup>Note)</sup> the workpiece weight, or more.

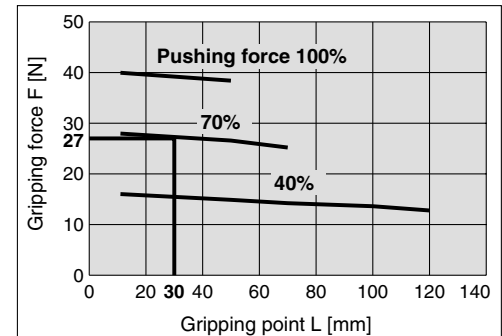
Note) For further details, refer to the calculation of the required gripping force.

- If high acceleration or impact forces are encountered during motion, a further margin of safety should be considered.

Example) When it is desired to set the gripping force at 20 times or more above the workpiece weight.

$$\text{Required gripping force} = 0.1 \text{ kg} \times 20 \times 9.8 \text{ m/s}^2 \approx 19.6 \text{ N or more}$$

#### LEHZ20



#### In the case of selecting LEHZ20

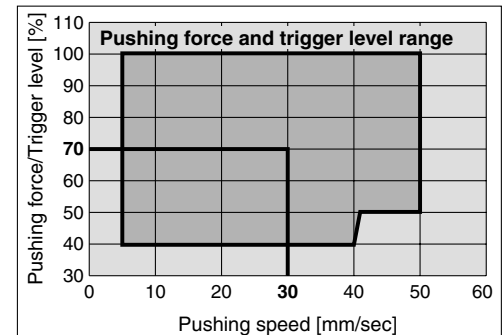
- A gripping force of 27 N is obtained from the intersection point of gripping point distance L = 30 mm and pushing force of 70%.
- Gripping force is 27.6 times greater than the workpiece weight, and therefore satisfies a gripping force setting value of 20 times or more.

Pushing force: 70%

Pushing force is one of the values of the step data that is input into the controller.

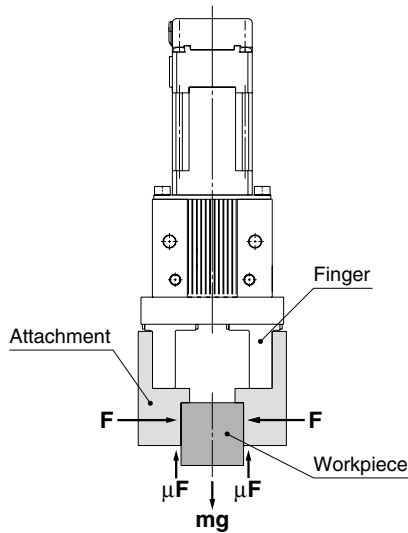
Gripping point distance: 30 mm

#### LEHZ20



- Pushing speed is satisfied at the point where 70% of the pushing force and 30 mm/sec of the pushing speed cross.

### Calculation of the required gripping force



When gripping a workpiece as in the figure to the left, and with the following definitions,

- F:** Gripping force (N)
- $\mu$ : Coefficient of friction between the attachments and the workpiece
- m:** Workpiece mass (kg)
- g:** Gravitational acceleration (= 9.8 m/s<sup>2</sup>)
- mg:** Workpiece weight (N)

the conditions under which the workpiece will not drop are

$$\frac{2 \times \mu F}{\text{Number of fingers}} > mg$$

and therefore,  $F > \frac{mg}{2 \times \mu}$

With “a” representing the extra margin, “F” is determined by the following formula:

$$F = \frac{mg}{2 \times \mu} \times a$$

(Reference) Coefficient of friction  $\mu$  (depends on the operating environment, contact pressure, etc.)

Coefficient of friction $\mu$	Attachment – Material of work pieces (guideline)
0.1	Metal (surface roughness Rz3.2 or less)
0.2	Metal
0.2 or more	Rubber, Resin, etc.

- Note)
- Even in cases where the coefficient of friction is greater than  $\mu = 0.2$ , for reasons of safety, select a gripping force which is at least 10 to 20 times greater than the workpiece weight, as recommended by SMC.
  - If high acceleration or impact forces are encountered during motion, a further margin of safety should be considered.

### “Gripping force at least 10 to 20 times the workpiece weight”

- The “10 to 20 times or more of the workpiece weight” recommended by SMC is calculated with a safety margin of  $a = 4$ , which allows for impacts that occur during normal transportation, etc.

When $\mu = 0.2$	When $\mu = 0.1$
$F = \frac{mg}{2 \times 0.2} \times 4 = 10 \times mg$	$F = \frac{mg}{2 \times 0.1} \times 4 = 20 \times mg$

10 x Workpiece weight

20 x Workpiece weight

# Series LEHZ

## Model Selection

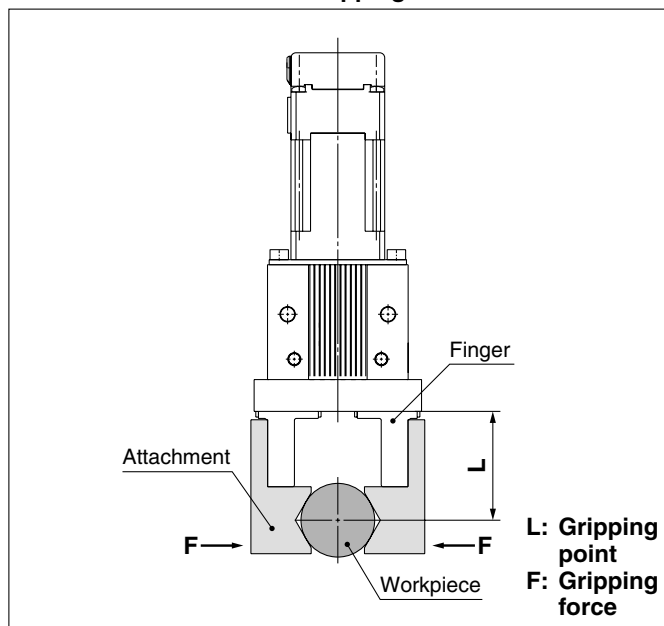
### Step 1 Confirmation of the gripping force: Series LEHZ

#### ● Indication of the gripping force

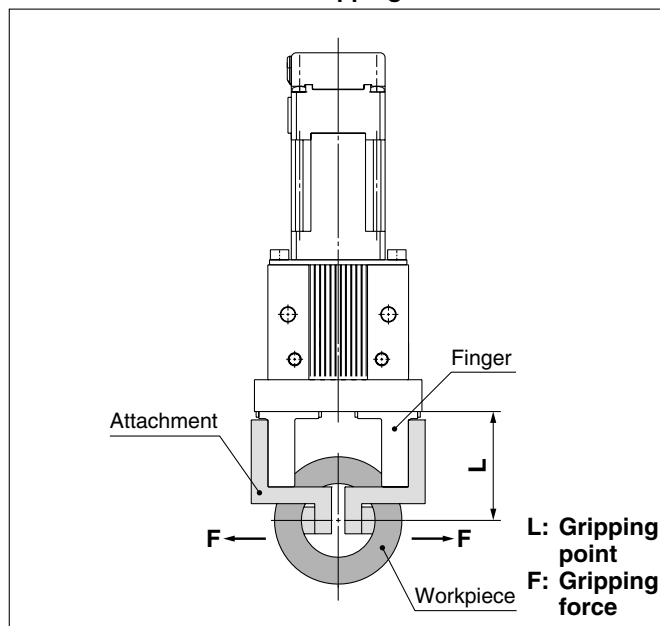
The gripping force shown in the below graphs is expressed as “F”, which is the thrust of one finger, when both fingers and attachments are in full contact with the workpiece as shown in the below figure.

● Set the workpiece gripping point “L” so that it is within the range shown in the below figure.

**External Gripping State**



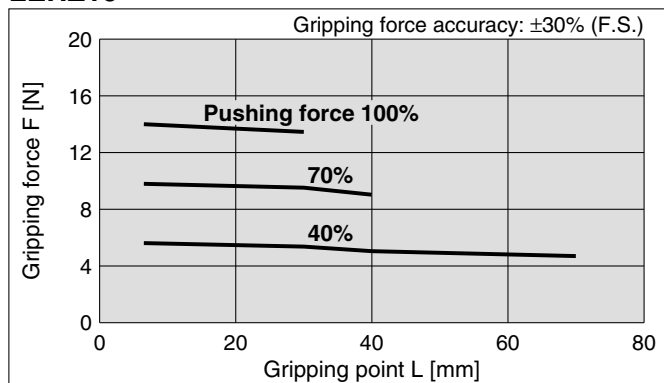
**Internal Gripping State**



### Basic

\* Pushing force is one of the values of step data that is input into the controller.

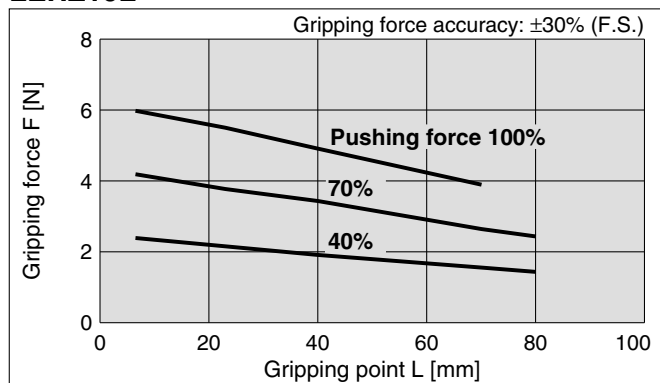
#### LEHZ10



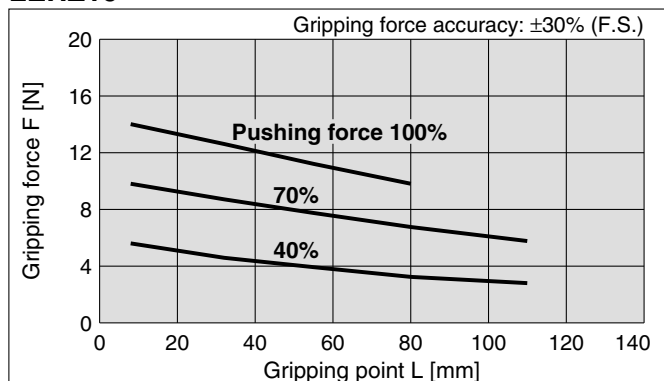
### Compact

\* Pushing force is one of the values of step data that is input into the controller.

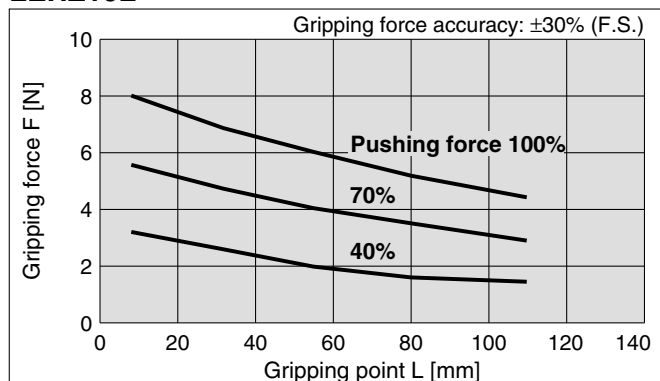
#### LEHZ10L



#### LEHZ16



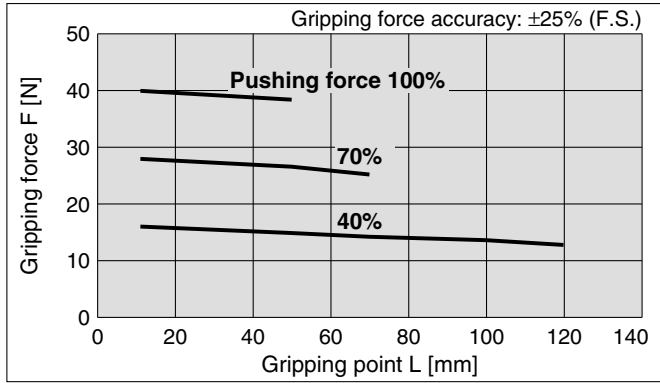
#### LEHZ16L



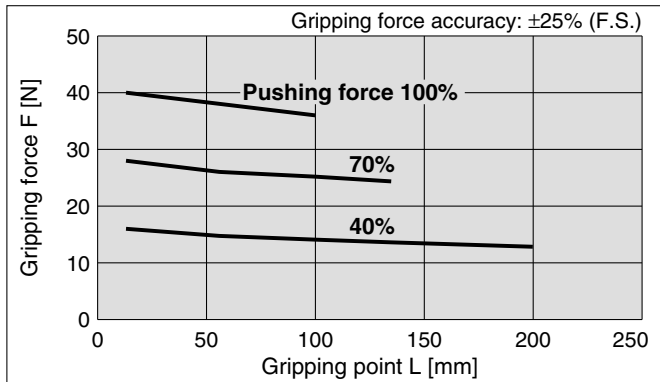
## Basic

\* Pushing force is one of the values of step data that is input into the controller.

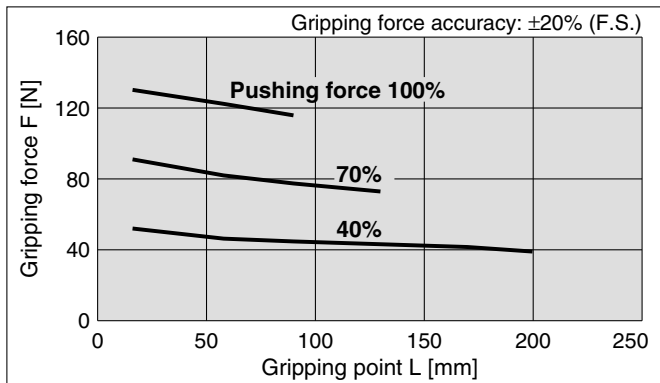
### LEHZ20



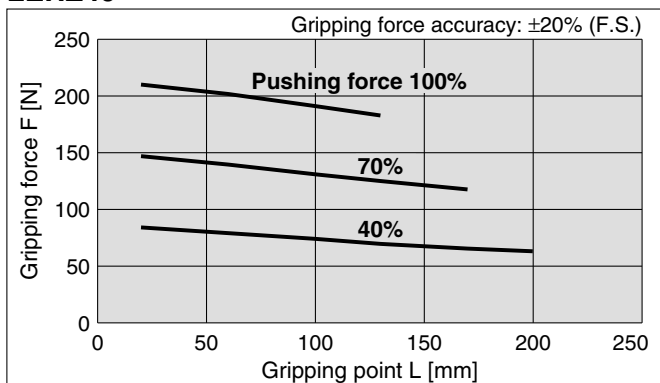
### LEHZ25



### LEHZ32



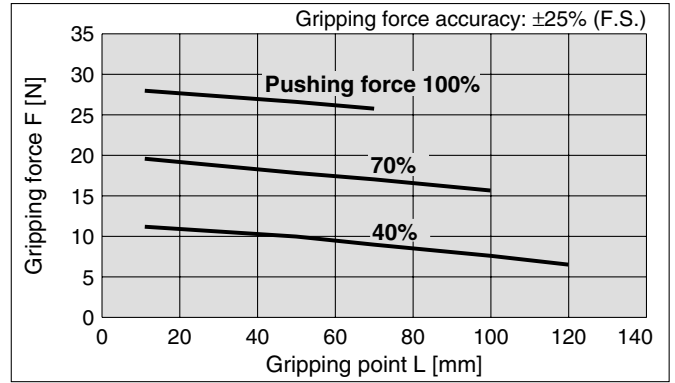
### LEHZ40



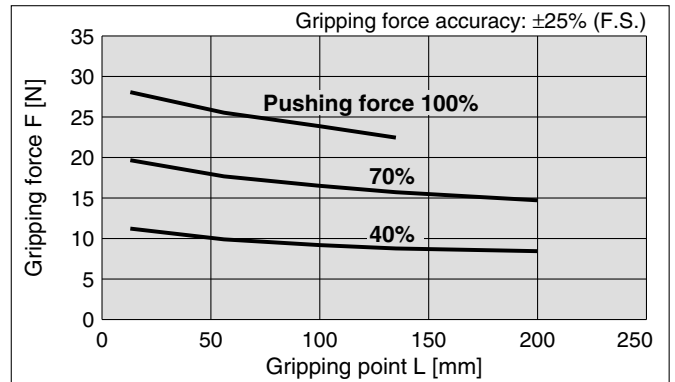
## Compact

\* Pushing force is one of the values of step data that is input into the controller.

### LEHZ20L



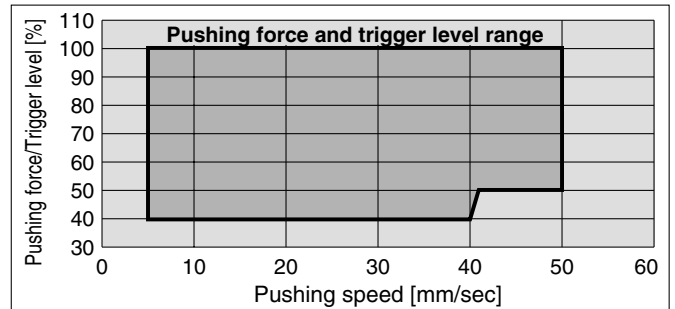
### LEHZ25L



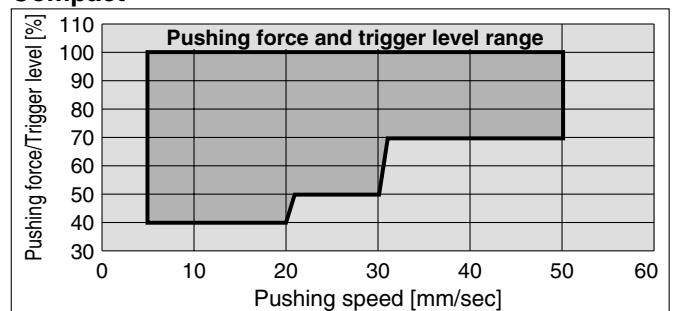
## Selection of the Pushing Speed

- Set the [Pushing force] and the [Trigger LV] within the range shown in the below figure.

### Basic



### Compact



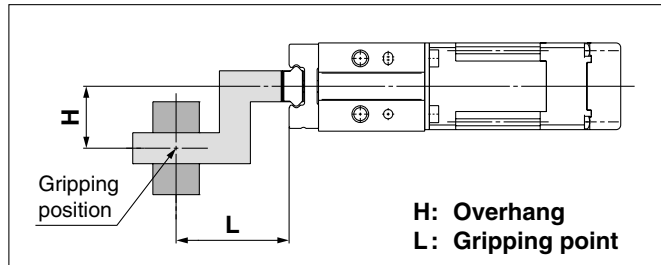
# Series LEHZ

## Model Selection

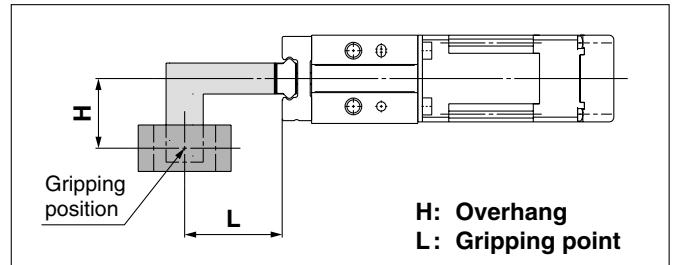
### Step 2 Confirmation of the gripping point and overhang: Series LEHZ

- Decide the gripping position of the workpiece so that the amount of overhang "H" stays within the range shown in the below figure.
- If the gripping position is out of the limit, it may shorten the life expectancy of the electric gripper.

**External Gripping State**



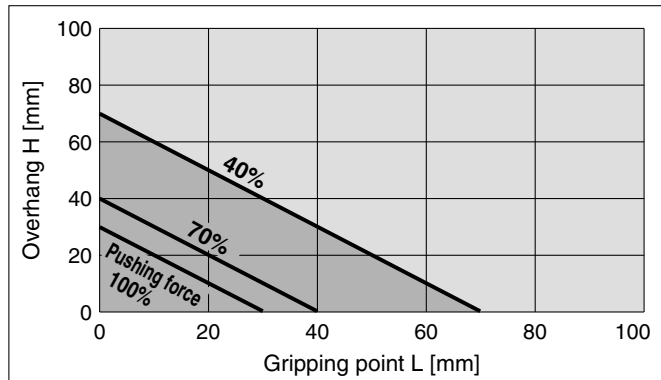
**Internal Gripping State**



### Basic

\* Pushing force is one of the values of step data that is input into the controller.

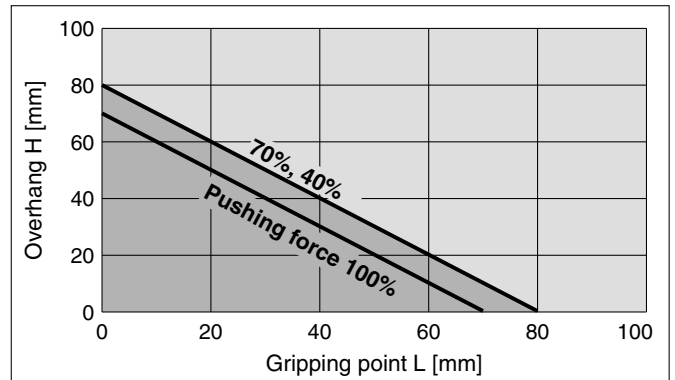
#### LEHZ10



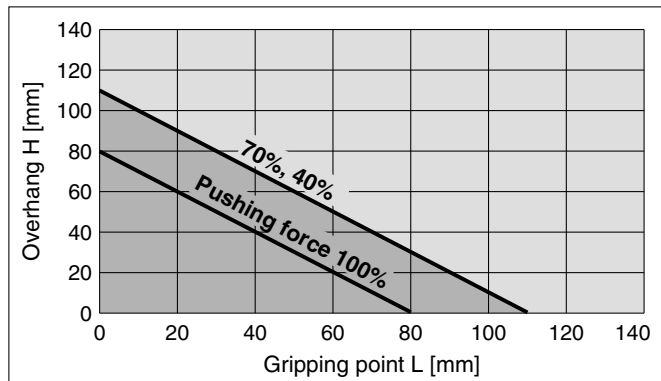
### Compact

\* Pushing force is one of the values of step data that is input into the controller.

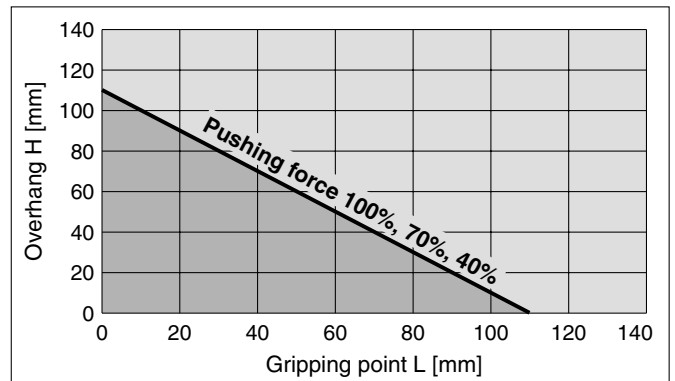
#### LEHZ10L



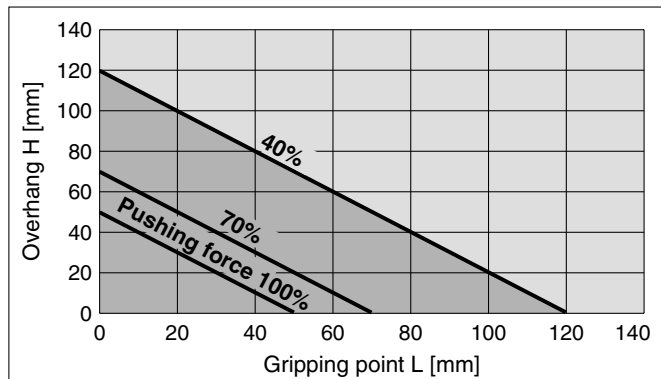
#### LEHZ16



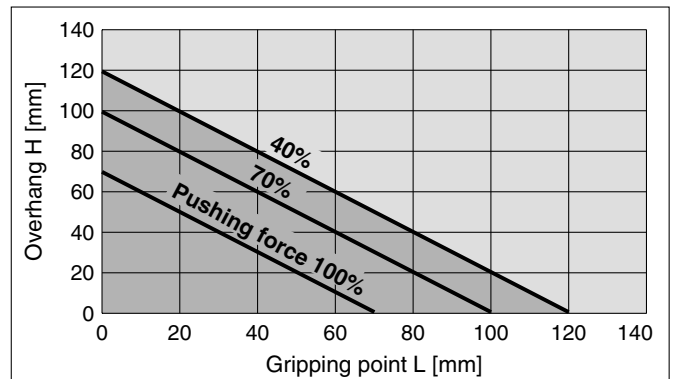
#### LEHZ16L



#### LEHZ20



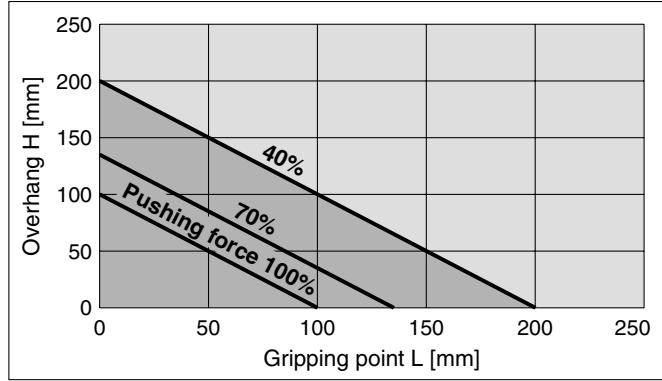
#### LEHZ20L



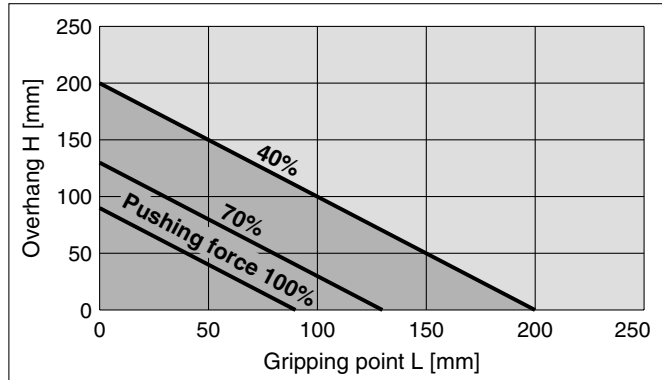
**Basic**

\* Pushing force is one of the values of step data that is input into the controller.

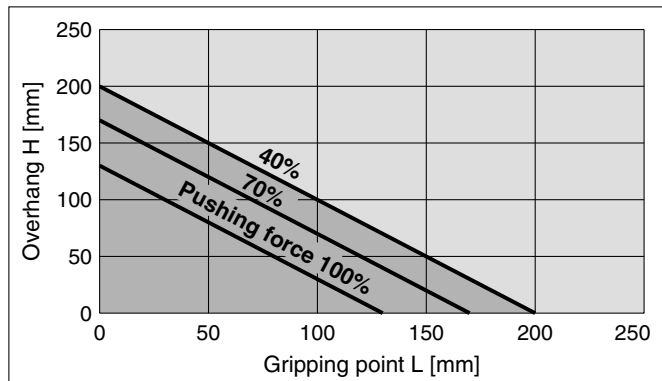
**LEHZ25**



**LEHZ32**



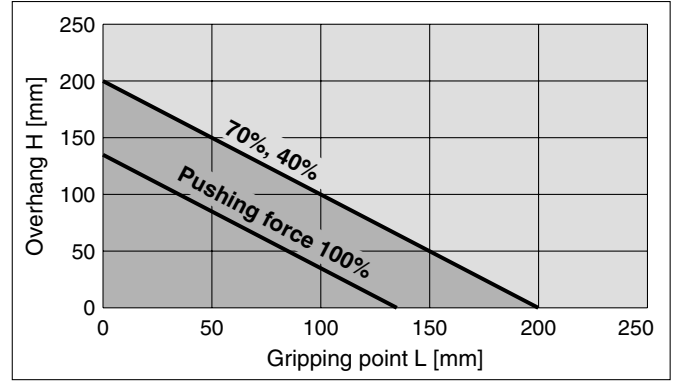
**LEHZ40**



**Compact**

\* Pushing force is one of the values of step data that is input into the controller.

**LEHZ25L**



LEHZ

LEHF

LEHS

Specific Product Precautions

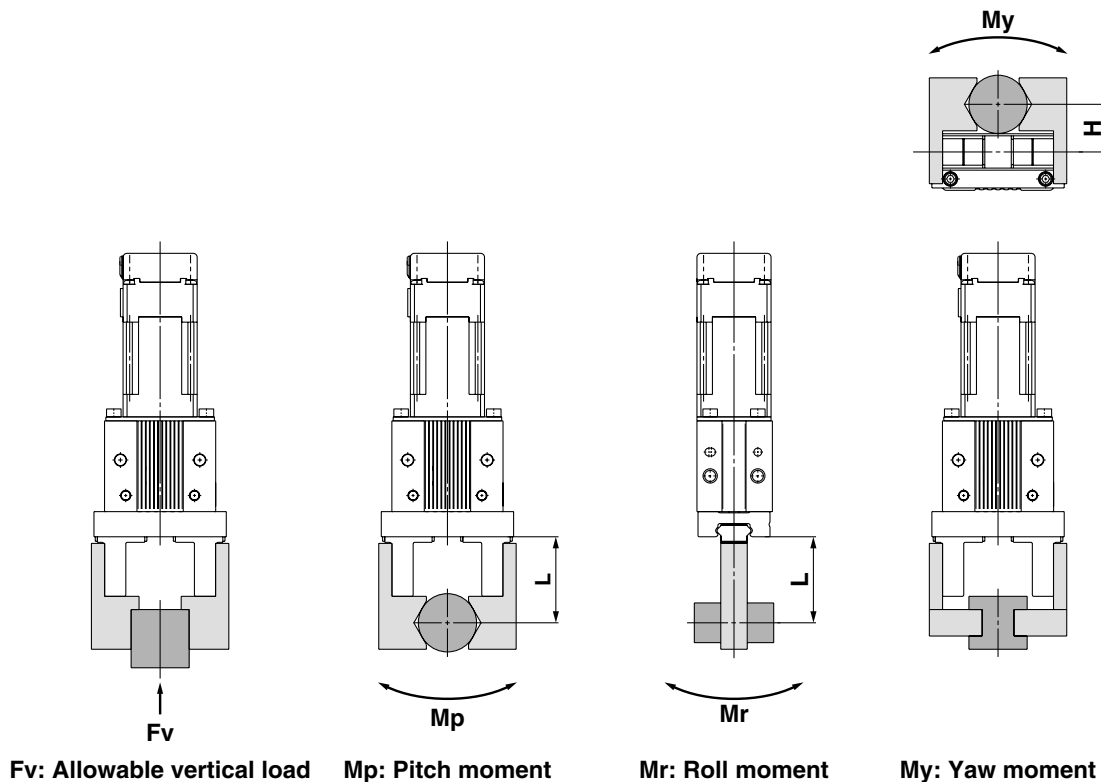
LECP6

Specific Product Precautions

# Series LEHZ

## Model Selection

### Step 3 Confirmation of the external force on fingers: Series LEHZ



H, L: Distance to the point at which the load is applied (mm)

Model	Allowable vertical load Fv (N)	Static allowable moment		
		Pitch moment: Mp (N·m)	Yaw moment: My (N·m)	Roll moment: Mr (N·m)
LEHZ10(L)K2-4	58	0.26	0.26	0.53
LEHZ16(L)K2-6	98	0.68	0.68	1.36
LEHZ20(L)K2-10	147	1.32	1.32	2.65
LEHZ25(L)K2-14	255	1.94	1.94	3.88
LEHZ32(L)K2-22	343	3	3	6
LEHZ40(L)K2-30	490	4.5	4.5	9

Note) Values for load in the table indicate static values.

Calculation of allowable external force (when moment load is applied)	Calculation example
$\text{Allowable load } F \text{ (N)} = \frac{M \text{ (Static allowable moment) (N}\cdot\text{m)}}{L \times 10^{-3} \text{ }^*}$ <p>(*Constant for unit conversion)</p>	<p>When a static load of <math>f = 10 \text{ N}</math> is operating, which applies pitch moment to point <math>L = 30 \text{ mm}</math> from the LEHZ16K2-6 guide. Therefore, it can be used.</p> $\text{Allowable load } F = \frac{0.68}{30 \times 10^{-3}}$ $= 22.7 \text{ (N)}$ <p><b>Load <math>f = 10 \text{ (N)} &lt; 22.7 \text{ (N)}</math></b></p>



# Electric Gripper 2-Finger Type

## Series LEHZ

### LEHZ10, 16, 20, 25, 32, 40



### How to Order

LEHZ 10 K 2 - 4 - R 1 6N 1

#### Body size

10
16
20
25
32
40

#### Motor size

—	Basic
L (Note)	Compact

Note) Body size: 10, 16, 20, 25 only

#### Controller mounting

—	Screw mounting
D (Note)	DIN rail mounting

Note) DIN rail is not included. Order it separately. (Refer to page 51.)

#### I/O cable length

Without cable	
1	1.5 m
3	3 m
5	5 m

#### Controller type (Note)

—	Without controller
6N	With controller (NPN)
6P	With controller (PNP)

Note) Refer to page 50 for the detailed specifications of the controller itself.

#### Actuator cable length

Without cable			
1	1.5 m	A	8 m (Note)
3	3 m	B	10 m (Note)
5	5 m	C	15 m (Note)
			20 m (Note)

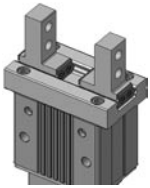
Note) Produced upon receipt of order

#### Actuator cable type

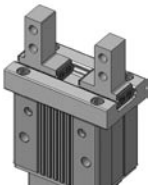
—	Without cable
R	Robotic cable (Flexible cable)

#### Finger options

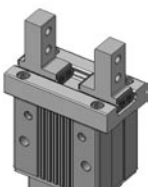
Nil: Basic (Tapped in the direction of opening/closing)



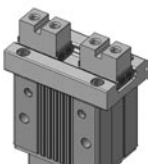
A: Side tapped mounting



B: Through-hole in opening/closing direction



C: Flat fingers



#### Lead

K	Basic
---	-------

#### 2-finger type

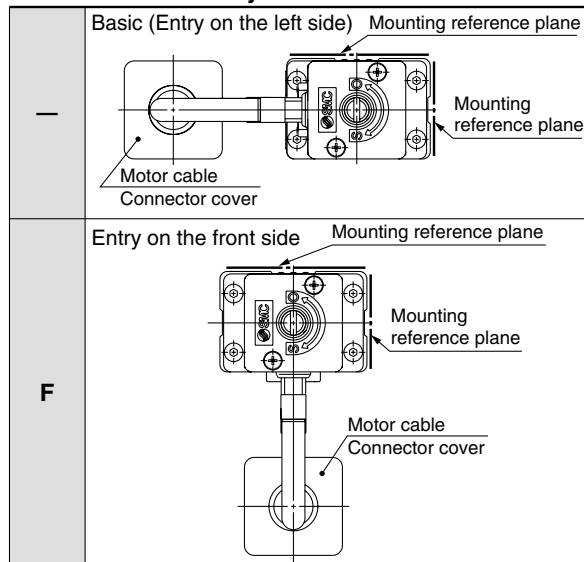
#### Stroke

Stroke/both sides (mm)	Body size
4	10
6	16
10	20
14	25
22	32
30	40

#### Finger option

—	Basic (Tapped in the direction of opening/closing)
A	Side tapped mounting
B	Through-hole in opening/closing direction
C	Flat fingers

#### Motor cable entry

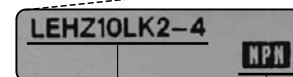


**The actuator and controller are sold as a package.** (Controller → Page 50)

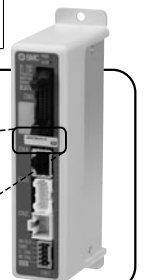
Confirm that the combination of the controller and the actuator is compatible.

<Be sure to check the following before use.>

- Check that the actuator label for model number matches the controller.
- Check that the Parallel I/O configuration matches (NPN or PNP).



① ②



\* Refer to the operation manual for using the products. Please download it via our website. <http://www.smcworld.com/>

## Specifications



Model		LEHZ10	LEHZ16	LEHZ20	LEHZ25	LEHZ32	LEHZ40	
Actuator specifications	Stroke/both sides (mm)	4	6	10	14	22	30	
	Gripping force (N) <sup>Note 1)</sup>	Basic	6 to 14		16 to 40		52 to 130	84 to 210
		Compact	2 to 6	3 to 8	11 to 28		—	—
	Opening and closing speed/ Pushing speed (mm/s) <sup>Note 2)</sup>	5 to 80/5 to 50		5 to 100/5 to 50		5 to 120/5 to 50		
	Drive method	Slide screw + Slide cam						
	Finger guide type	Linear guide (No circulation)						
	Repeatability (mm) <sup>Note 3)</sup>	±0.02						
	Repeated length determination accuracy (mm) <sup>Note 4)</sup>	±0.05						
	Finger backlash/ both sides (mm) <sup>Note 5)</sup>	0.5 or less				1.0 or less		
	Impact resistance/ Vibration resistance (m/s <sup>2</sup> ) <sup>Note 6)</sup>	150/30						
	Max. operating frequency (C.P.M)	60						
	Operating temperature range (°C)	5 to 40 (No condensation and freezing)						
	Operating humidity range (%)	35 to 85 (No condensation and freezing)						
	Weight (g)	Basic	165	220	430	585	1120	1760
Compact		135	190	365	520	—	—	
Electric specifications	Motor size	□20		□28		□42		
	Motor type	Step motor (Servo 24 VDC)						
	Encoder	Incremental A/B phase (800 pulse/rotation)						
	Rated voltage (V)	24 VDC ±10%						
	Power consumption/ Standby power consumption when operating (W) <sup>Note 7)</sup>	Basic	11/7		28/15		34/13	36/13
		Compact	8/7		22/12		—	—
	Momentary max. power consumption (W) <sup>Note 8)</sup>	Basic	19		51		57	61
Compact		14		42		—	—	
Controller weight (g)	150 (Screw mounting)							

Note 1) Gripping force should be from 10 to 20 times the weight of the object to be conveyed. Positioning force should be 150% when releasing the workpiece. Gripping force accuracy should be ±30% (F.S.) for LEHZ10/16  
±25% (F.S.) for LEHZ20/25  
±20% (F.S.) for LEHZ32/40

Note 2) Pushing speed should be set within the range during pushing (gripping) operation. Otherwise, it may cause malfunction.  
Note 3) Repeatability means the variation of the gripping position (workpiece position) when the gripping operation is repeatedly performed by the same sequence for the same workpiece.

Note 4) Repeated length determination accuracy means dispersion (value on the controller monitor) when the workpiece is repeatedly held in the same position.

Note 5) There will be no influence of backlash during pushing (gripping) operation. Make the stroke longer for the amount of backlash when opening.

Note 6) Impact resistance: No malfunction occurred when the gripper was tested with a drop tester in both an axial direction and a perpendicular direction to the lead screw. (Test was performed with the gripper in the initial state.)

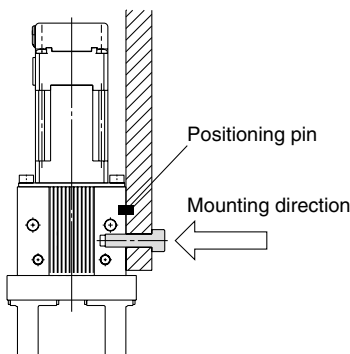
Vibration resistance: No malfunction occurred in a test ranging between 45 to 2000 Hz. Test was performed in both an axial direction and a perpendicular direction to the lead screw. (Test was performed with the gripper in the initial state.)

Note 7) Power consumption (including the controller) is for when the actuator is operating.  
Standby power consumption when operating is for when the actuator is stopped in the set position during operation, including the energy saving mode when gripping.

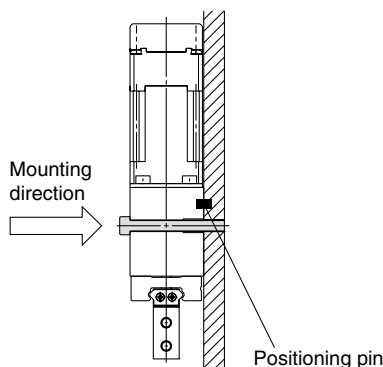
Note 8) Momentary max. power consumption (including the controller) is for when the actuator is operating. This value can be used for the selection of the power supply.

## How to Mount

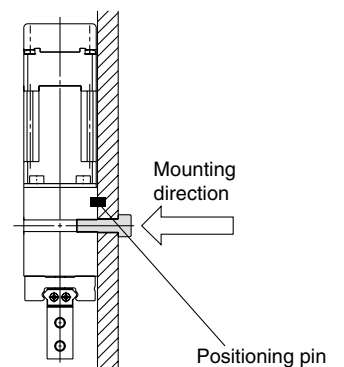
a) When using the thread on the side of the body



b) When using the thread on the mounting plate

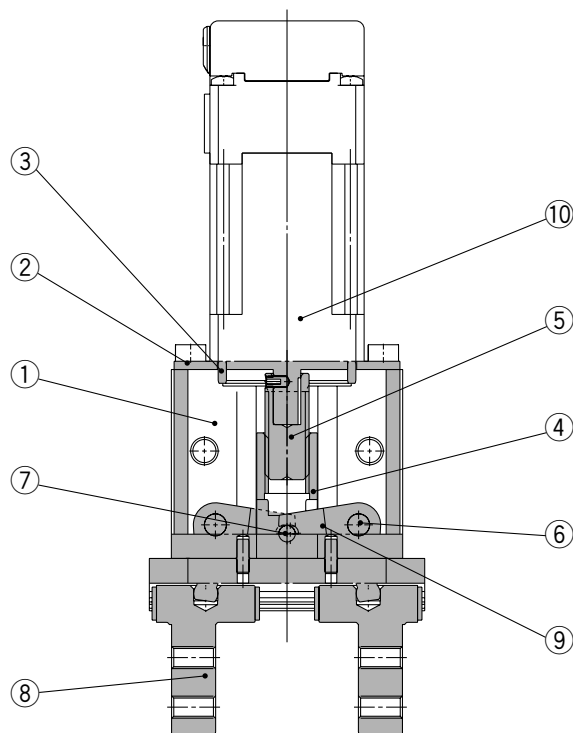


c) When using the thread on the back of the body



**Construction**

**Series LEHZ**



**Component Parts**

No.	Description	Material	Note
1	<b>Body</b>	Aluminum alloy	Anodised
2	<b>Motor plate</b>	Aluminum alloy	Anodised
3	<b>Guide ring</b>	Aluminum alloy	
4	<b>Slide nut</b>	Stainless steel	Heat treatment + Special treatment
5	<b>Slide bolt</b>	Stainless steel	Heat treatment + Special treatment
6	<b>Needle roller</b>	High carbon chromium bearing steel	
7	<b>Needle roller</b>	High carbon chromium bearing steel	
8	<b>Finger assembly</b>	—	
9	<b>Lever</b>	Special stainless steel	
10	<b>Step motor (Servo/24 VDC)</b>	—	

**Replacement Parts ⑧ Finger Assembly**

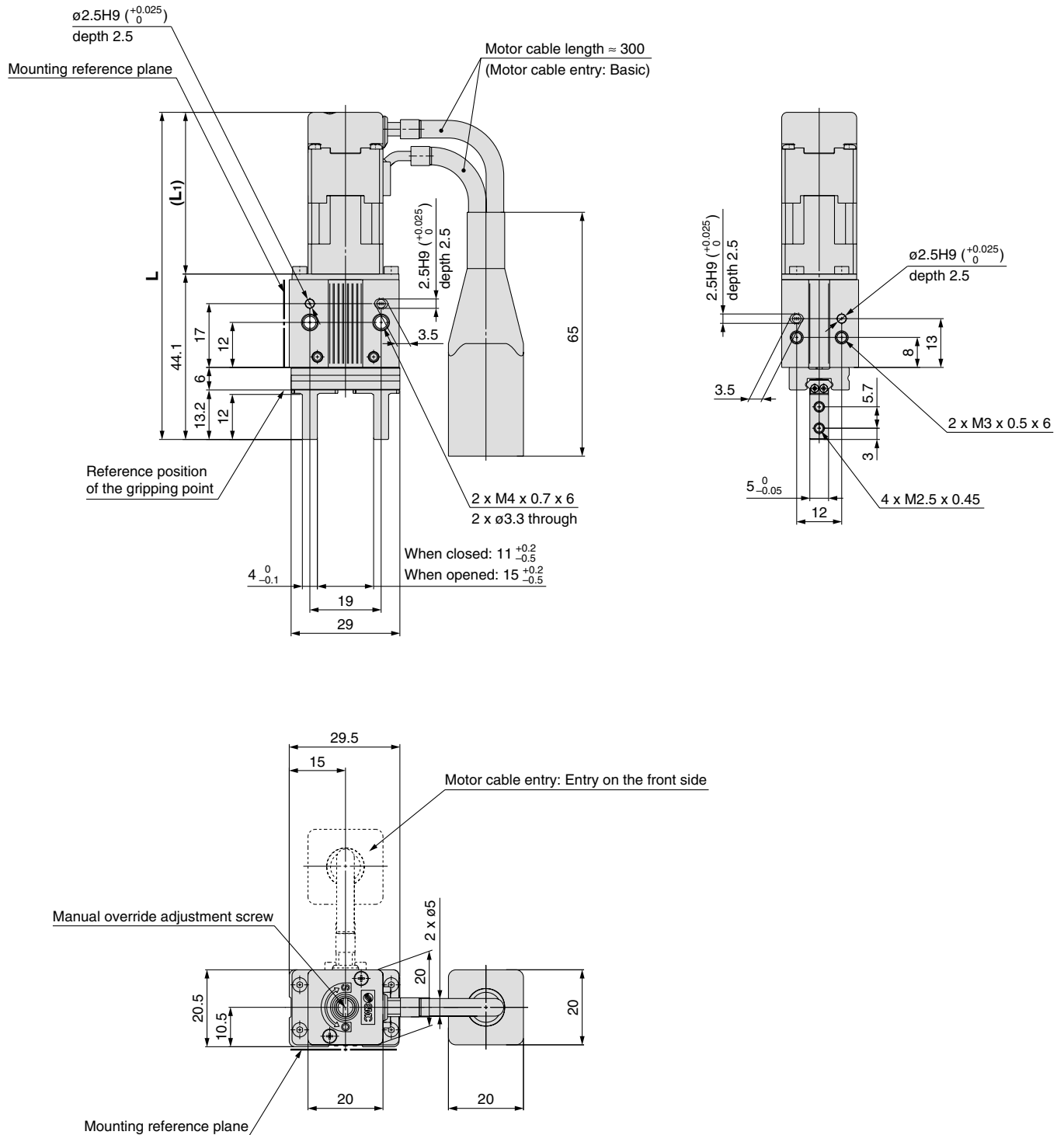
Body size	Basic (Nil)	Side tapped mounting (A)	Through-hole in opening/ closing direction (B)	Flat fingers (C)
10	MHZ-A1002	MHZ-A1002-1	MHZ-A1002-2	MHZ-A1002-3
16	MHZ-A1602	MHZ-A1602-1	MHZ-A1602-2	MHZ-A1602-3
20	MHZ-A2002	MHZ-A2002-1	MHZ-A2002-2	MHZ-A2002-3
25	MHZ-A2502	MHZ-A2502-1	MHZ-A2502-2	MHZ-A2502-3
32	MHZ-A3202	MHZ-A3202-1	MHZ-A3202-2	MHZ-A3202-3
40	MHZ-A4002	MHZ-A4002-1	MHZ-A4002-2	MHZ-A4002-3

# Series LEHZ

## Dimensions

### LEHZ10(L)K2-4

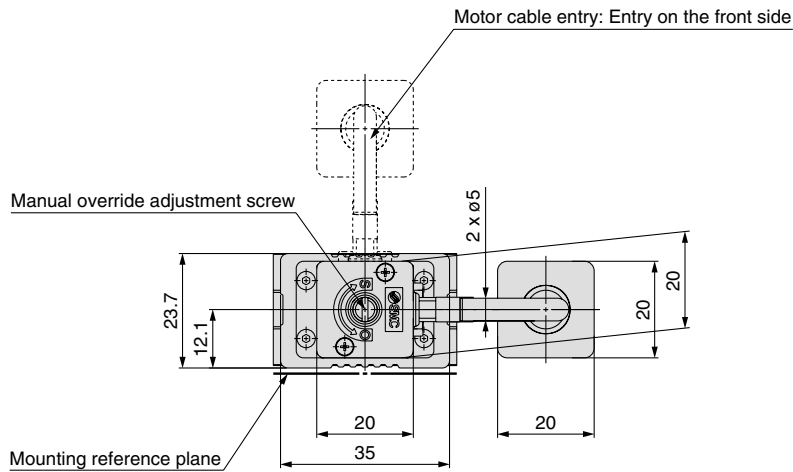
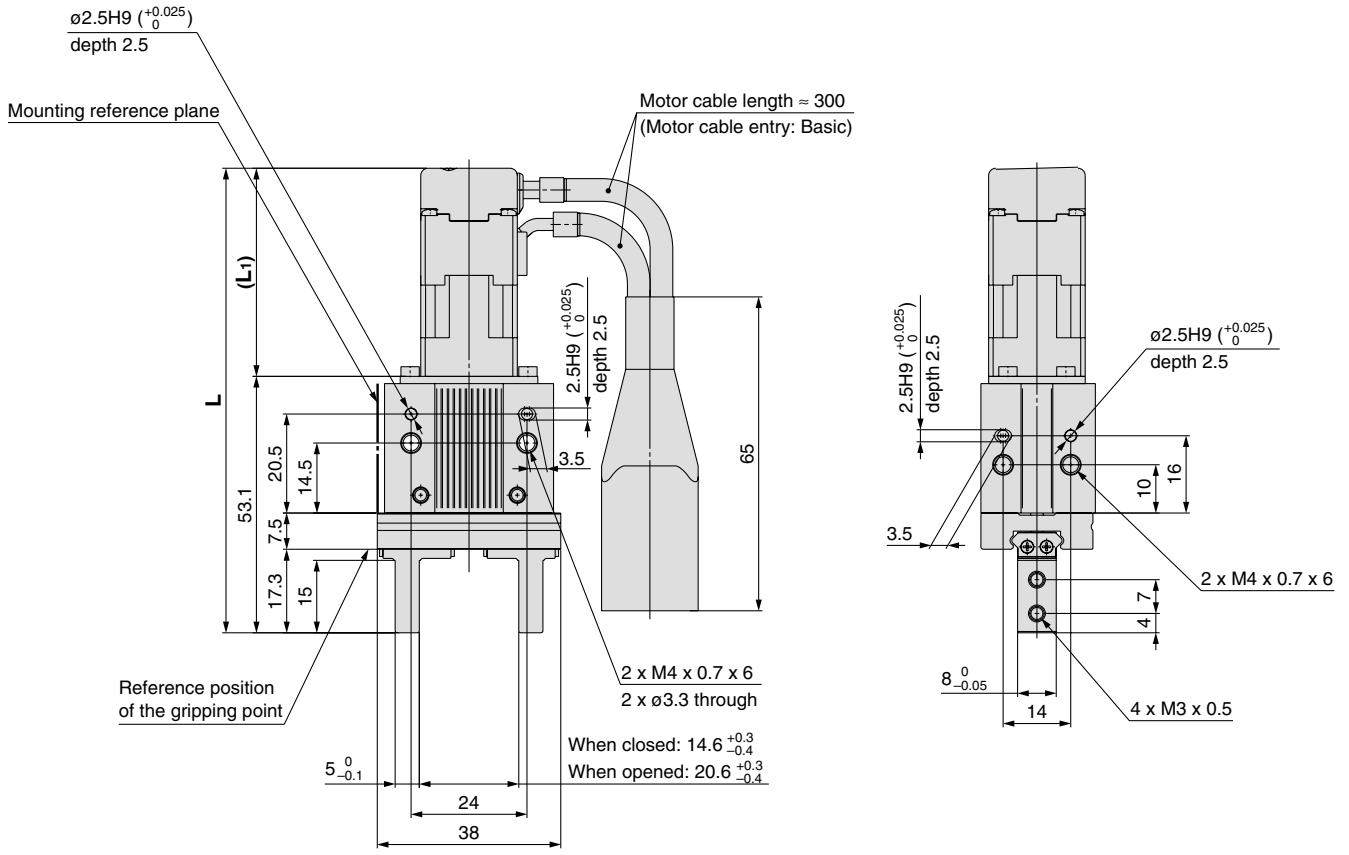
Model	L	(L1)
LEHZ10K2-4□	103.8	(59.7)
LEHZ10LK2-4□	87.2	(43.1)



**Dimensions**

**LEHZ16(L)K2-6**

Model	L	(L1)
LEHZ16K2-6□	112.8	(59.7)
LEHZ16LK2-6□	96.2	(43.1)



LEHZ

LEHF

LEHS

Specific Product Precautions

LECP6

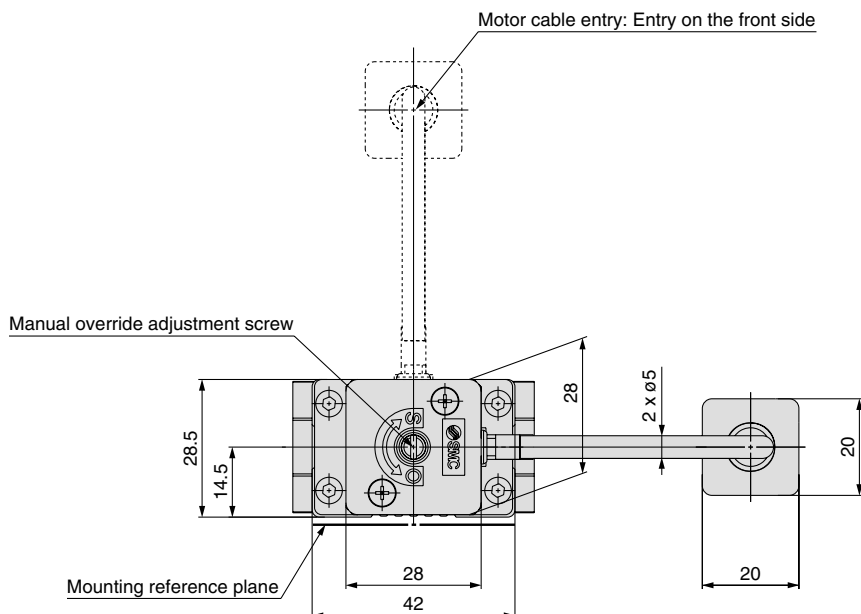
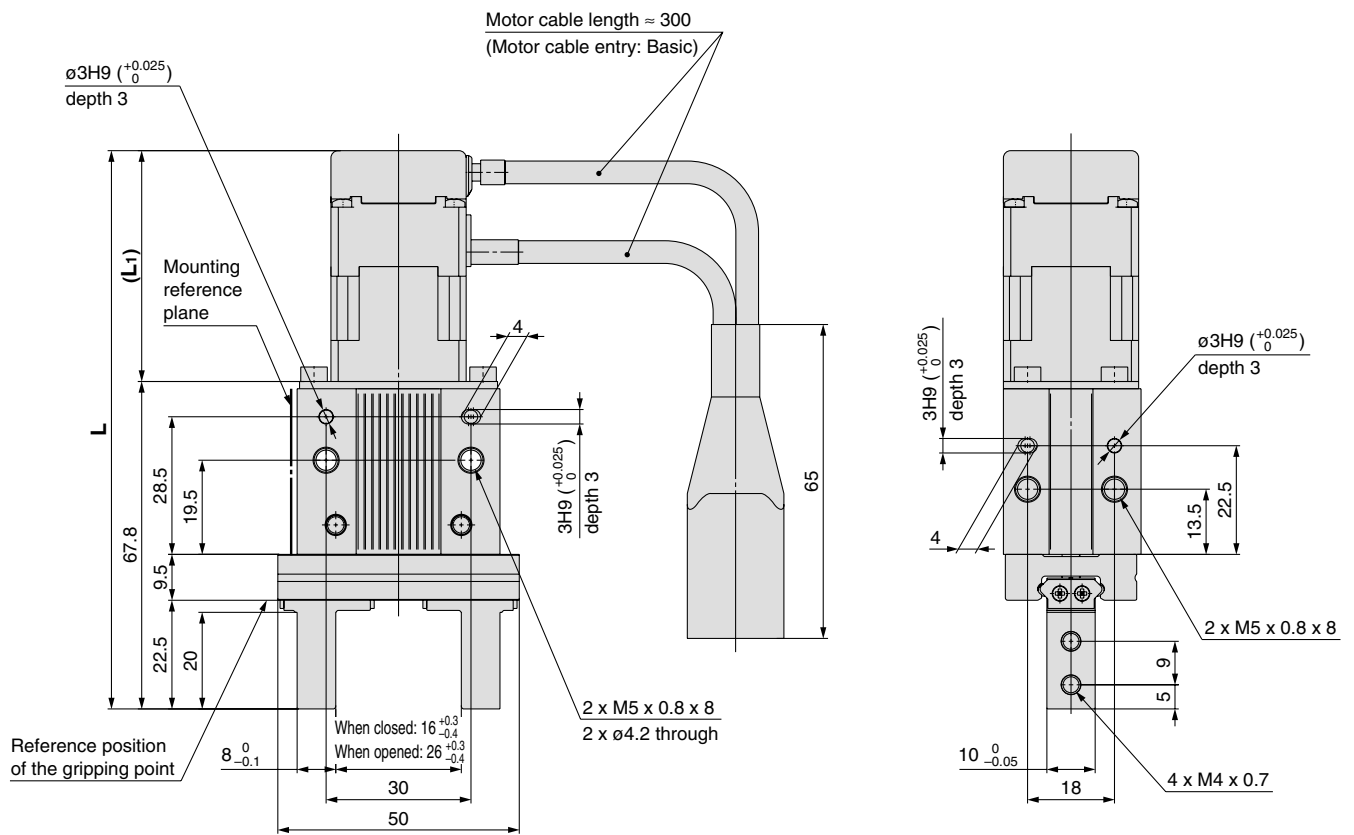
Specific Product Precautions

# Series LEHZ

## Dimensions

### LEHZ20(L)K2-10

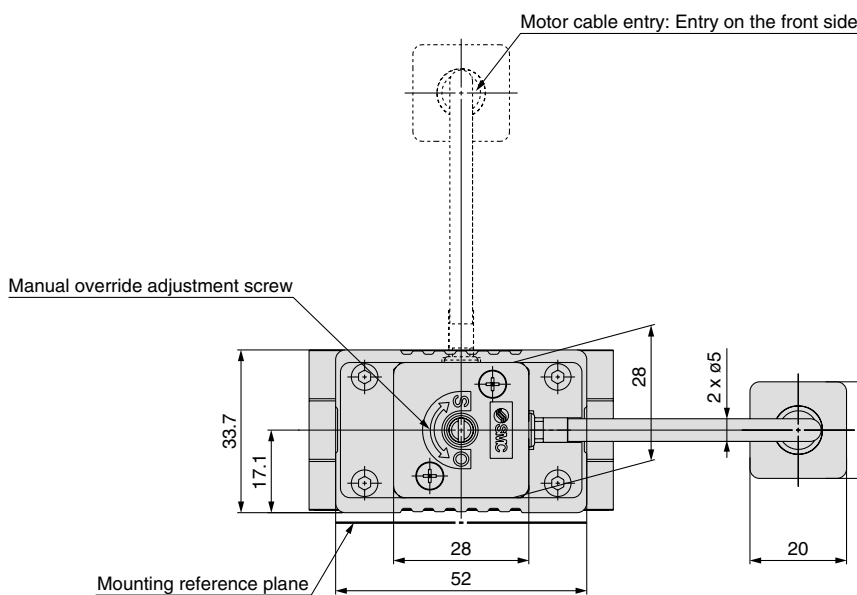
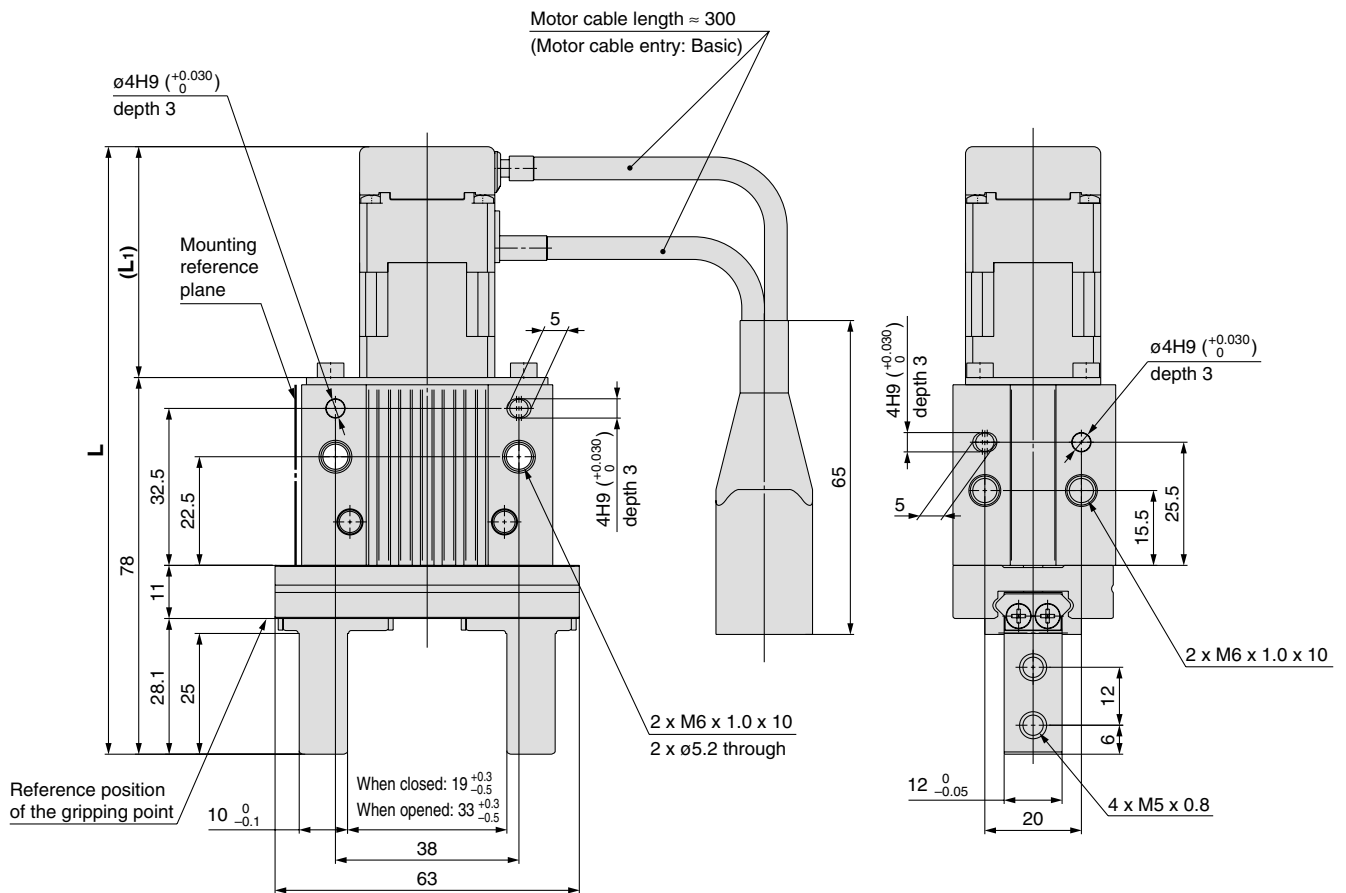
Model	L	(L1)
LEHZ20K2-10□	129.6	(61.8)
LEHZ20LK2-10□	115.6	(47.8)



**Dimensions**

**LEHZ25(L)K2-14**

Model	L	(L1)
LEHZ25K2-14□	139.8	(61.8)
LEHZ25LK2-14□	125.8	(47.8)



LEHZ

LEHF

LEHS

Specific Product Precautions

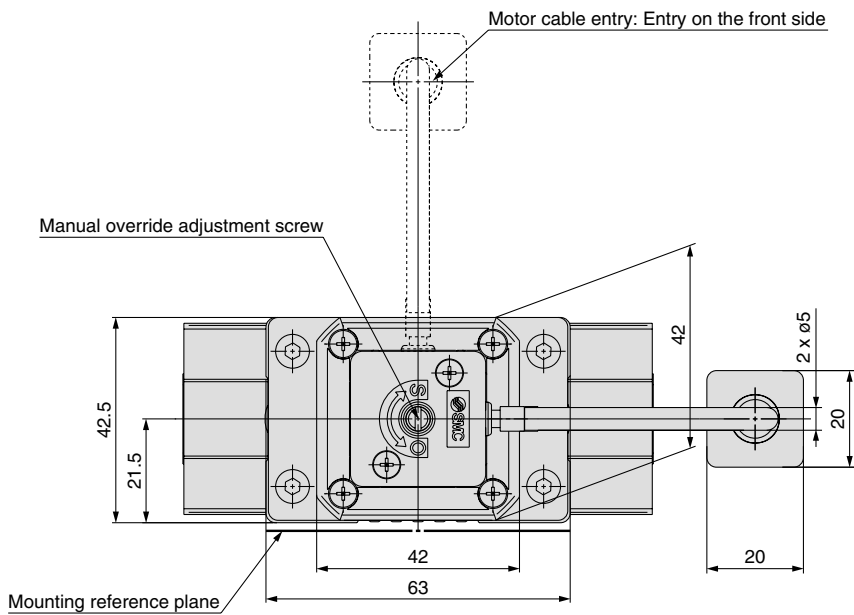
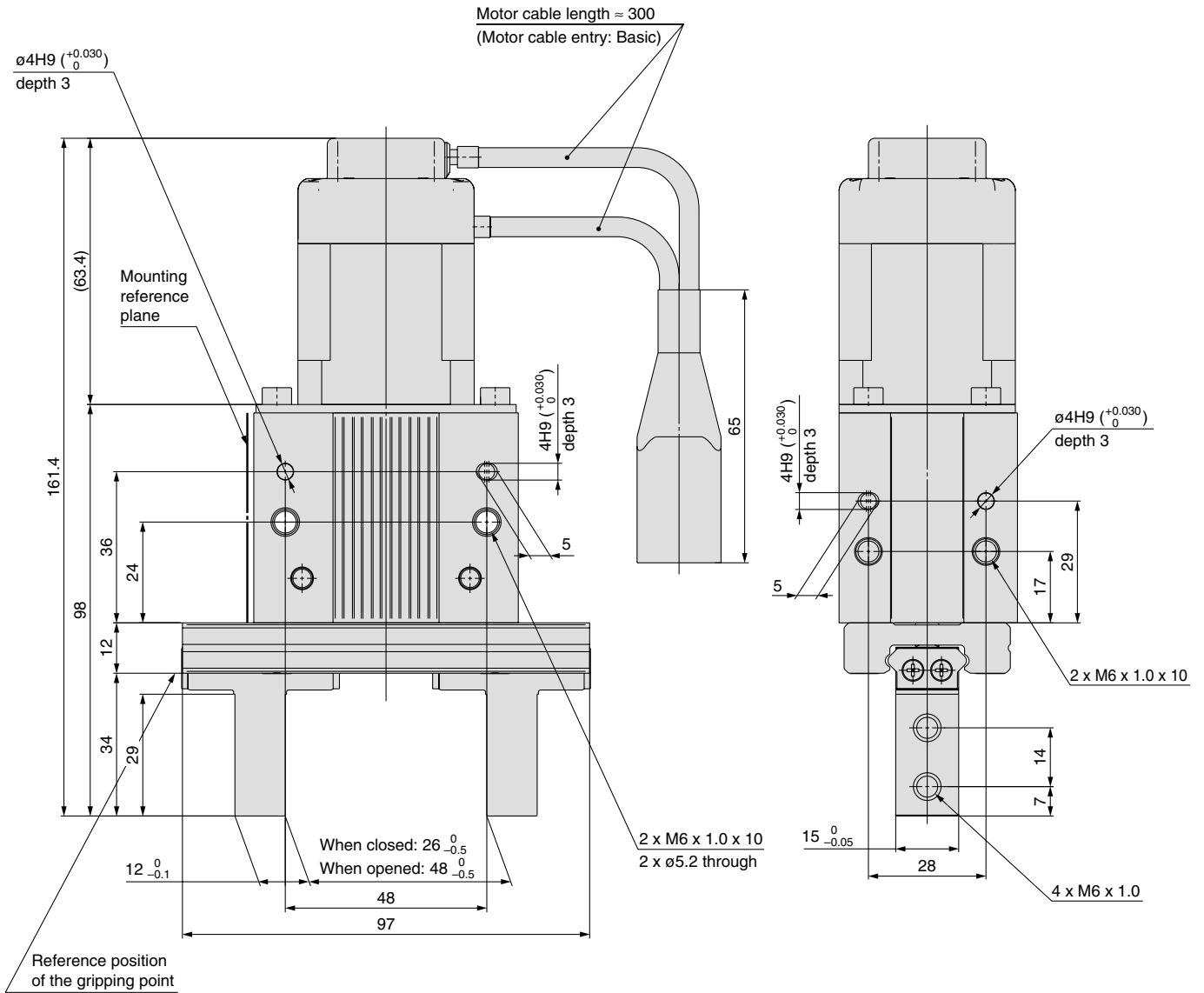
LECP6

Specific Product Precautions

# Series LEHZ

## Dimensions

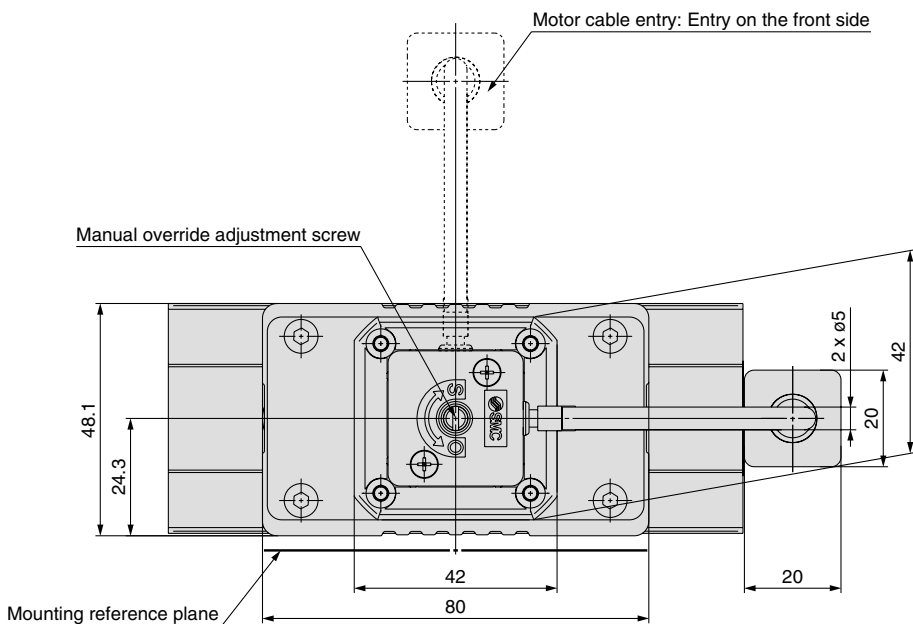
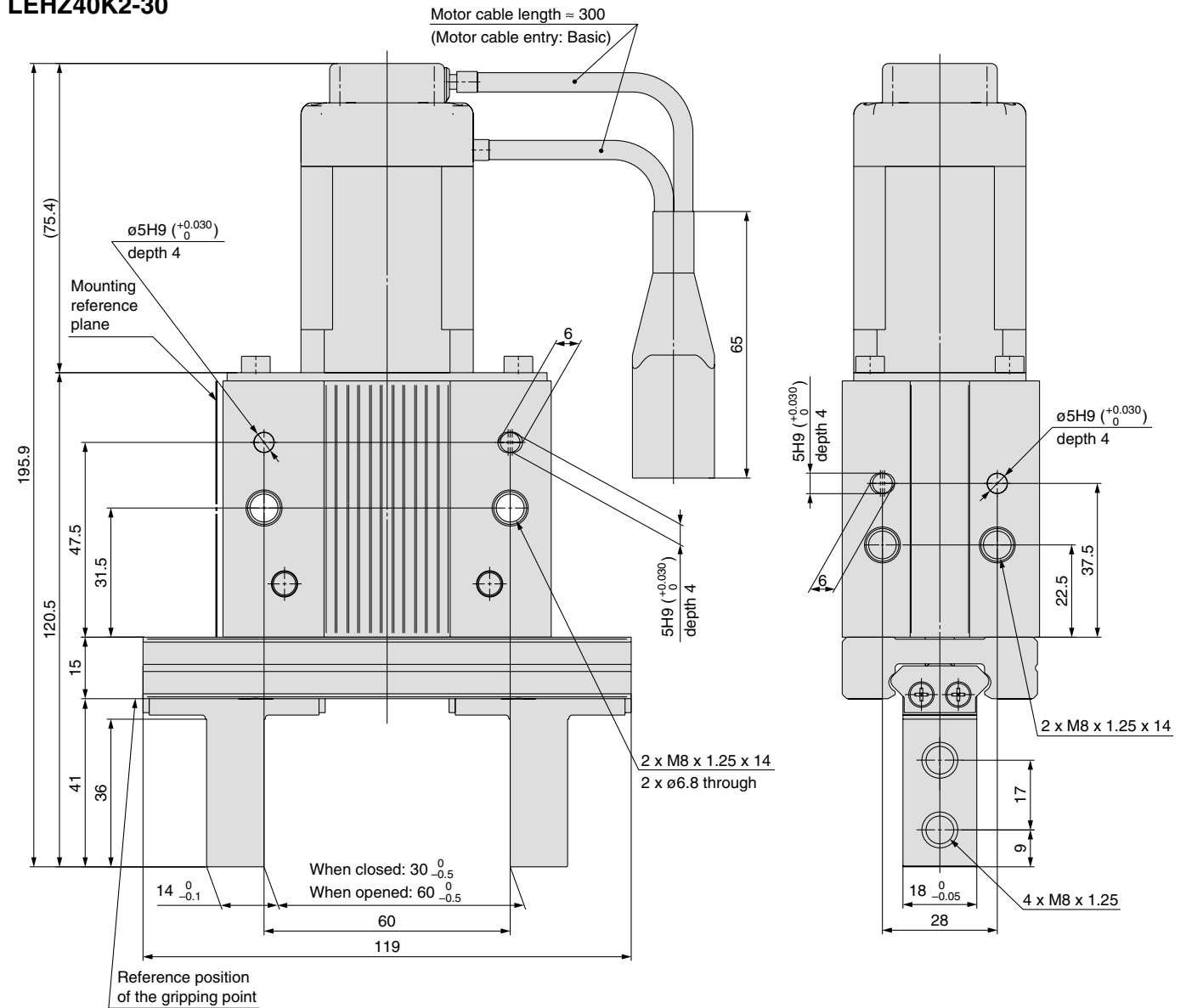
### LEHZ32K2-22





**Dimensions**

**LEHZ40K2-30**



LEHZ

LEHF

LEHS

Specific Product Precautions

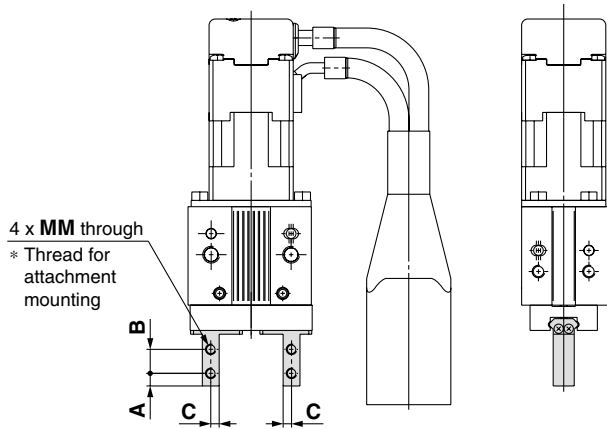
LECP6

Specific Product Precautions

# Series LEHZ

## Finger Options

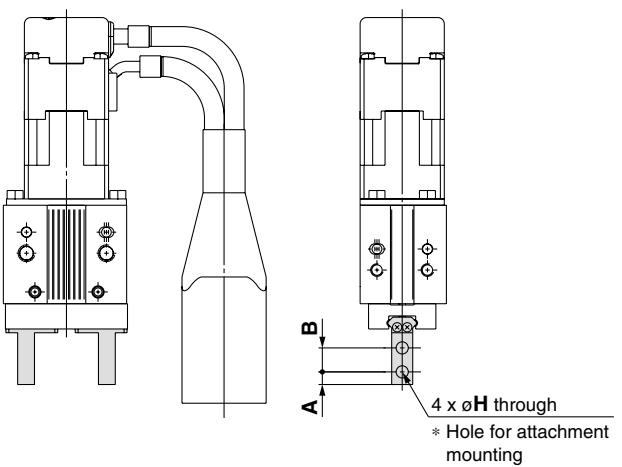
### Side Tapped Mounting (A)



Unit: mm

Model	A	B	C	MM
LEHZ10(L)K2-4A□	3	5.7	2	M2.5 x 0.45
LEHZ16(L)K2-6A□	4	7	2.5	M3 x 0.5
LEHZ20(L)K2-10A□	5	9	4	M4 x 0.7
LEHZ25(L)K2-14A□	6	12	5	M5 x 0.8
LEHZ32K2-22A□	7	14	6	M6 x 1
LEHZ40K2-30A□	9	17	7	M8 x 1.25

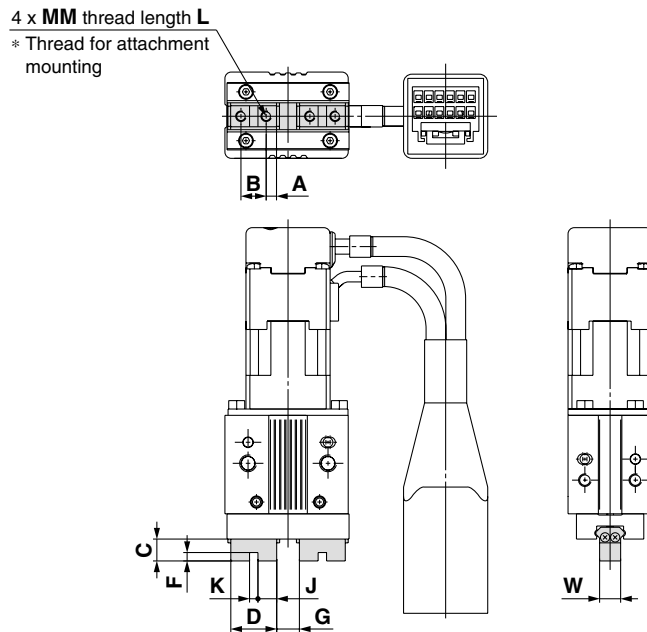
### Through-hole in Opening/Closing Direction (B)



Unit: mm

Model	A	B	H
LEHZ10(L)K2-4B□	3	5.7	2.9
LEHZ16(L)K2-6B□	4	7	3.4
LEHZ20(L)K2-10B□	5	9	4.5
LEHZ25(L)K2-14B□	6	12	5.5
LEHZ32K2-22B□	7	14	6.6
LEHZ40K2-30B□	9	17	9

### Flat Fingers (C)



Unit: mm

Model	A	B	C	D	F	G		J	K	MM	L	W	Weight (g)
						When opened	When closed						
LEHZ10K2-4C□													165
LEHZ10LK2-4C□	2.45	6	5.2	10.9	2	5.4 <sup>0</sup> <sub>-0.2</sub>	1.4 <sup>0</sup> <sub>-0.2</sub>	4.45	2H9 <sup>+0.025</sup> <sub>0</sub>	M2.5 x 0.45	5	5 <sup>0</sup> <sub>-0.05</sub>	135
LEHZ16K2-6C□													220
LEHZ16LK2-6C□	3.05	8	8.3	14.1	2.5	7.4 <sup>0</sup> <sub>-0.2</sub>	1.4 <sup>0</sup> <sub>-0.2</sub>	5.8	2.5H9 <sup>+0.025</sup> <sub>0</sub>	M3 x 0.5	6	8 <sup>0</sup> <sub>-0.05</sub>	190
LEHZ20K2-10C□													430
LEHZ20LK2-10C□	3.95	10	10.5	17.9	3	11.6 <sup>0</sup> <sub>-0.2</sub>	1.6 <sup>0</sup> <sub>-0.2</sub>	7.45	3H9 <sup>+0.025</sup> <sub>0</sub>	M4 x 0.7	8	10 <sup>0</sup> <sub>-0.05</sub>	365
LEHZ25K2-14C□													575
LEHZ25LK2-14C□	4.9	12	13.1	21.8	4	16 <sup>0</sup> <sub>-0.2</sub>	2 <sup>0</sup> <sub>-0.2</sub>	8.9	4H9 <sup>+0.030</sup> <sub>0</sub>	M5 x 0.8	10	12 <sup>0</sup> <sub>-0.05</sub>	510
LEHZ32K2-22C□													1145
LEHZ32LK2-22C□	7.3	20	18	34.6	5	25 <sup>0</sup> <sub>-0.2</sub>	3 <sup>0</sup> <sub>-0.2</sub>	14.8	5H9 <sup>+0.030</sup> <sub>0</sub>	M6 x 1	12	15 <sup>0</sup> <sub>-0.05</sub>	1145
LEHZ40K2-30C□													1820
LEHZ40LK2-30C□	8.7	24	22	41.4	6	33 <sup>0</sup> <sub>-0.2</sub>	3 <sup>0</sup> <sub>-0.2</sub>	17.7	6H9 <sup>+0.030</sup> <sub>0</sub>	M8 x 1.25	16	18 <sup>0</sup> <sub>-0.05</sub>	1820

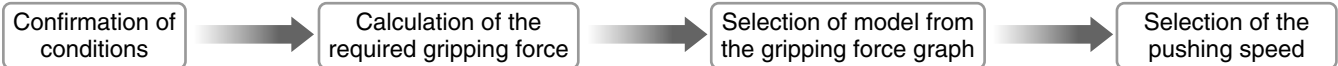
# Series LEHF Model Selection

## Model Selection

### Selection Procedure



### Step 1 Confirmation of the gripping force



#### Example

Workpiece mass: 0.1 kg

#### Guidelines for the selection of the gripper with respect to workpiece mass

- Although conditions differ according to the workpiece shape and the coefficient of friction between the attachments and the workpiece, select a model that can provide a gripping force of 10 to 20 times <sup>Note)</sup> the workpiece weight, or more.

Note) For further details, refer to the model selection illustration.

- If high acceleration or impact forces are encountered during motion, a further margin of safety should be considered.

Example) When it is desired to set the gripping force at 20 times or more above the workpiece weight.

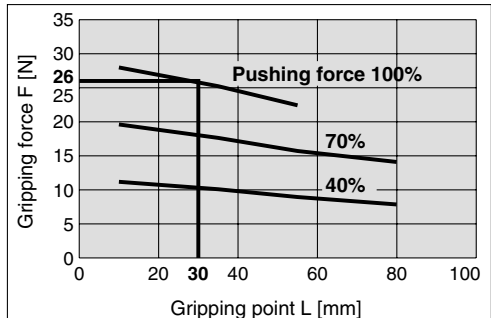
Required gripping force  
= 0.1 kg x 20 x 9.8 m/s<sup>2</sup> ≈ 19.6 N or more

Pushing force: 100%

Gripping point distance: 30 mm

Pushing speed: 20 mm/sec

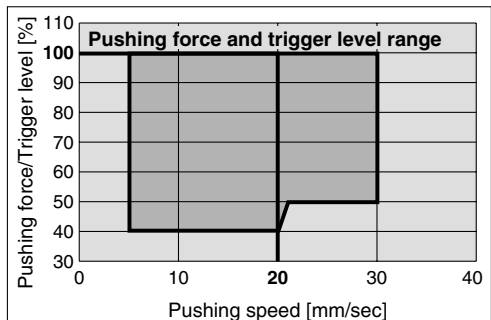
#### LEHF20



#### In the case of selecting LEHF20

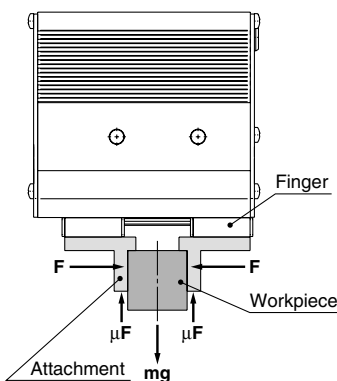
- A gripping force of 26 N is obtained from the intersection point of gripping point distance L = 30 mm and pushing force of 100%.
- Gripping force is 26.5 times greater than the workpiece weight, and therefore satisfies a gripping force setting value of 20 times or more.

#### LEHF20



- Pushing speed is satisfied at the point where 100% of the pushing force and 20 mm/sec of the pushing speed cross.

### Calculation of the required gripping force



When gripping a workpiece as in the figure to the left, and with the following definitions,

- F: Gripping force (N)
- μ: Coefficient of friction between the attachments and the workpiece
- m: Workpiece mass (kg)
- g: Gravitational acceleration (= 9.8 m/s<sup>2</sup>)
- mg: Workpiece weight (N)

the conditions under which the workpiece will not drop are

$$2 \times \mu F > mg$$

Number of fingers  
and therefore,  $F > \frac{mg}{2 \times \mu}$

With "a" representing the extra margin, "F" is determined by the following formula:

$$F = \frac{mg}{2 \times \mu} \times a$$

#### "Gripping force at least 10 to 20 times the workpiece weight"

- The "10 to 20 times or more of the workpiece weight" recommended by SMC is calculated with a safety margin of a = 4, which allows for impacts that occur during normal transportation, etc.

When μ = 0.2	When μ = 0.1
$F = \frac{mg}{2 \times 0.2} \times 4 = 10 \times mg$	$F = \frac{mg}{2 \times 0.1} \times 4 = 20 \times mg$

10 x Workpiece weight

20 x Workpiece weight

(Reference) Coefficient of friction μ (depends on the operating environment, contact pressure, etc.)

Coefficient of friction μ	Attachment – Material of work pieces (guideline)
0.1	Metal (surface roughness Rz3.2 or less)
0.2	Metal
0.2 or more	Rubber, Resin, etc.

- Note) • Even in cases where the coefficient of friction is greater than μ = 0.2, for reasons of safety, select a gripping force which is at least 10 to 20 times greater than the workpiece weight, as recommended by SMC.  
• If high acceleration or impact forces are encountered during motion, a further margin of safety should be considered.

# Series LEHF

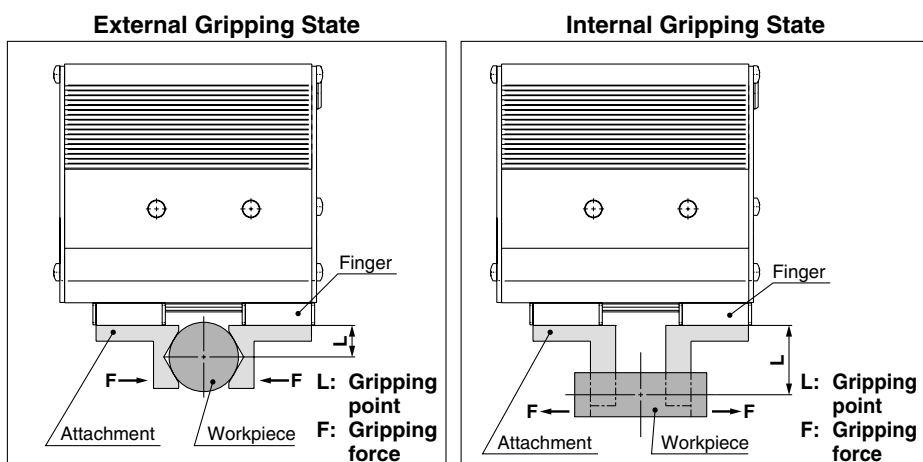
## Model Selection

### Step 1 Confirmation of the gripping force: Series LEHF

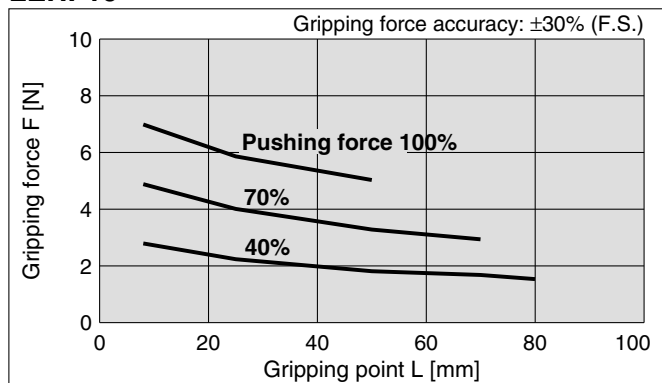
#### ● Indication of the gripping force

Gripping force shown in the below graphs is expressed as “F”, which is the thrust of one finger, when both fingers and attachments are in full contact with the workpiece as shown in the below figure.

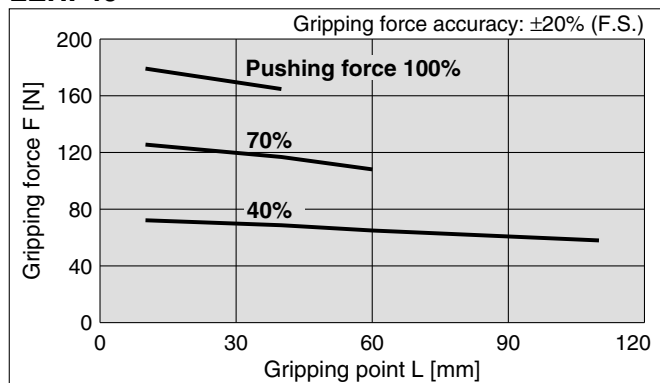
- Set the workpiece gripping point “L” so that it is within the range shown in the below figure.



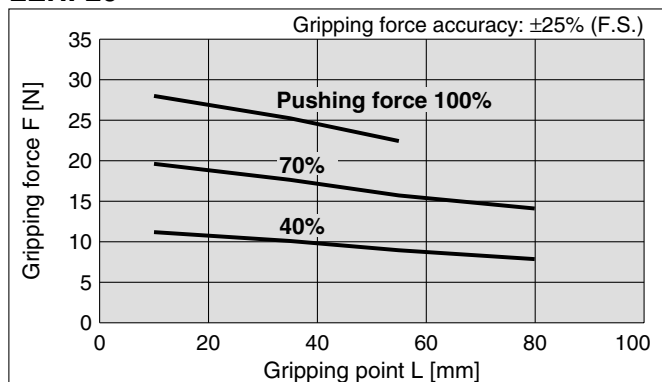
#### LEHF10



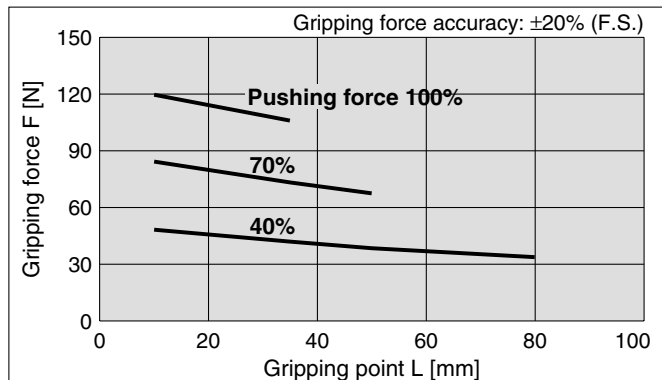
#### LEHF40



#### LEHF20

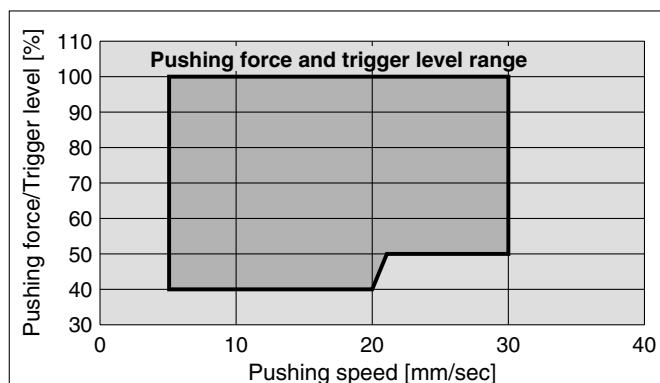


#### LEHF32



### Selection of the Pushing Speed

- Set the [Pushing force] and the [Trigger LV] within the range shown in the below figure.



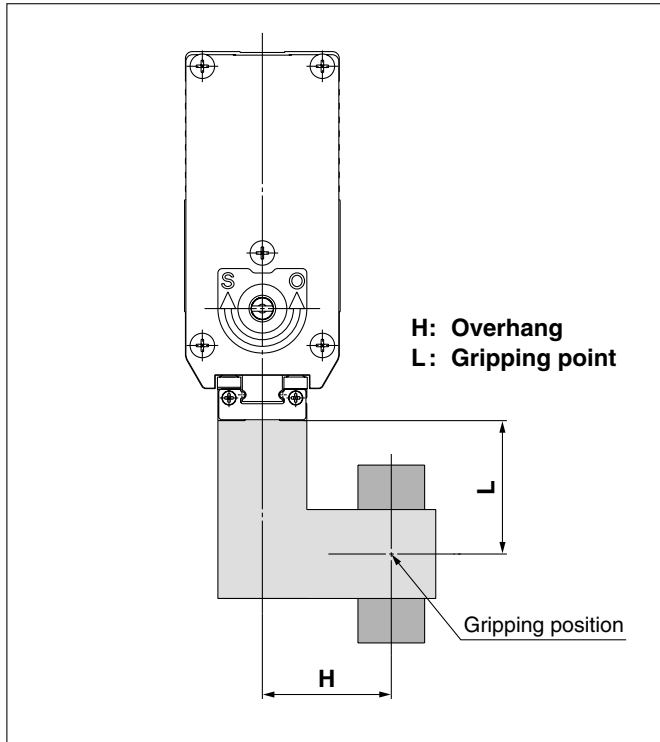
\* Pushing force is one of the values of step data that is input into the controller.

**Model Selection**

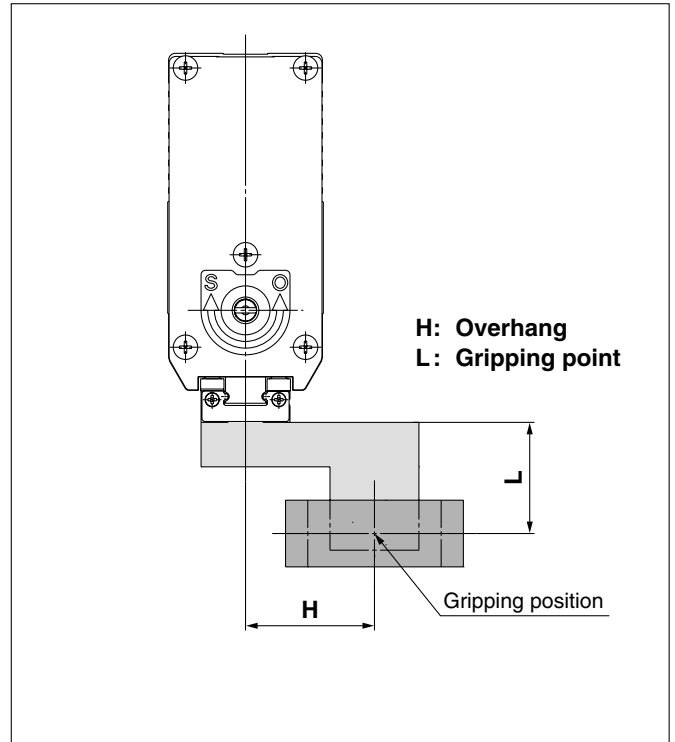
**Step 2 Confirmation of the gripping point and overhang: Series LEHF**

- Decide the gripping position of the workpiece so that the amount of overhang “H” stays within the range shown in the below figure.
- If the gripping position is out of the limit, it may shorten the life expectancy of the electric gripper.

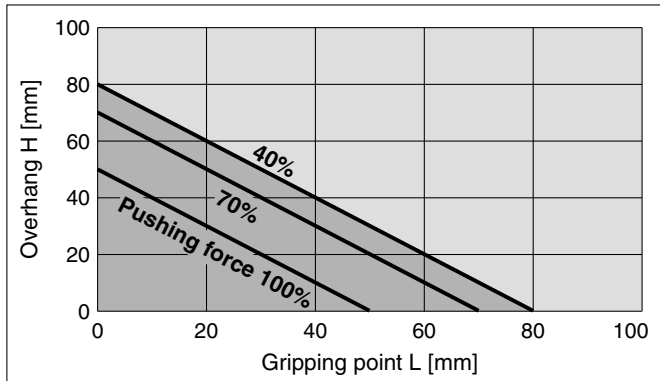
**External Gripping State**



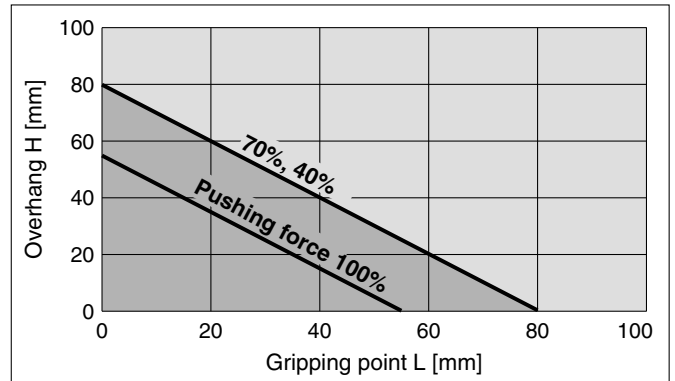
**Internal Gripping State**



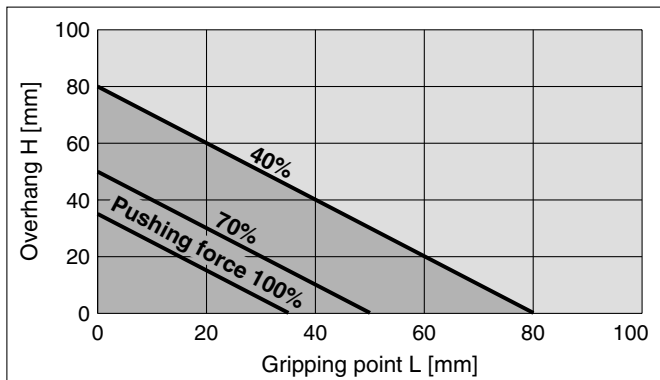
**LEHF10**



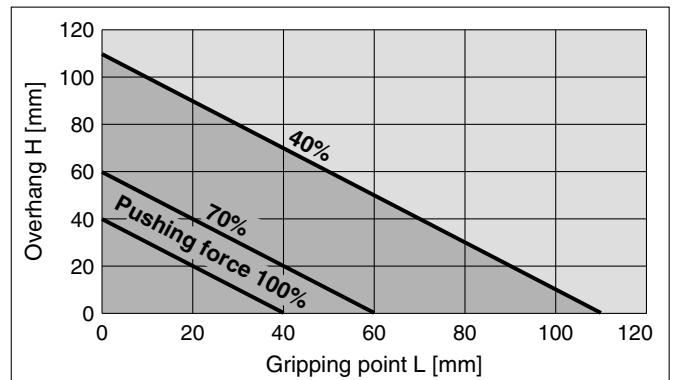
**LEHF20**



**LEHF32**



**LEHF40**

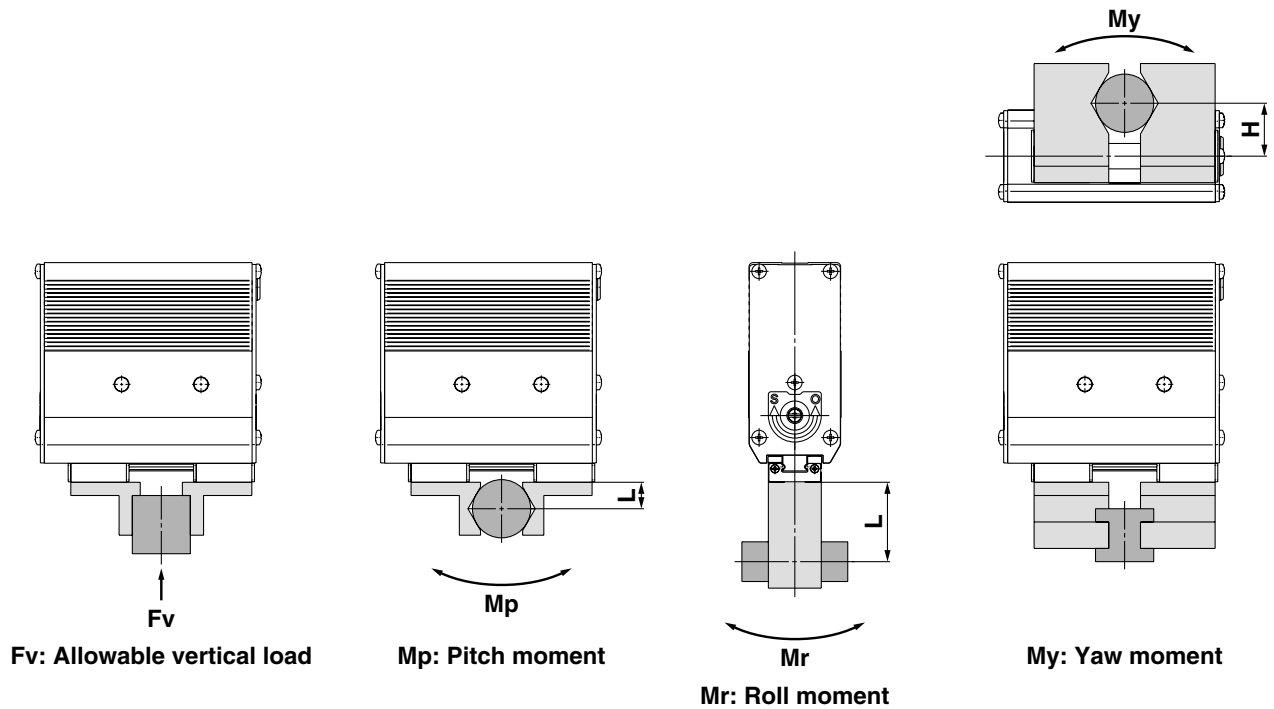


\* Pushing force is one of the values of step data that is input into the controller.

# Series LEHF

## Model Selection

### Step 3 Confirmation of the external force on fingers: Series LEHF



H, L: Distance to the point at which the load is applied (mm)

Model	Allowable vertical load Fv (N)	Static allowable moment		
		Pitch moment: Mp (N·m)	Yaw moment: My (N·m)	Roll moment: Mr (N·m)
LEHF10K2-□	58	0.26	0.26	0.53
LEHF20K2-□	98	0.68	0.68	1.4
LEHF32K2-□	176	1.4	1.4	2.8
LEHF40K2-□	294	2	2	4

Note) Values for load in the table indicate static values.

Calculation of allowable external force (when moment load is applied)	Calculation example
$\text{Allowable load } F \text{ (N)} = \frac{M \text{ (Static allowable moment) (N·m)}}{L \times 10^{-3} \text{ (*)}}$ <p>(*Constant for unit conversion)</p>	<p>When a static load of <math>f = 10 \text{ N}</math> is operating, which applies pitch moment to point <math>L = 30 \text{ mm}</math> from the LEHF20K2-□ guide. Therefore, it can be used.</p> $\text{Allowable load } F = \frac{0.68}{30 \times 10^{-3}}$ $= 22.7 \text{ (N)}$ <p>Load <math>f = 10 \text{ (N)} &lt; 22.7 \text{ (N)}</math></p>

# Electric Gripper 2-Finger Type

## Series **LEHF**

### LEHF10, 20, 32, 40



### How to Order

**LEHF 10 K 2 - 16 - R 1 6N 1**

#### Body size

10
20
32
40

#### Lead

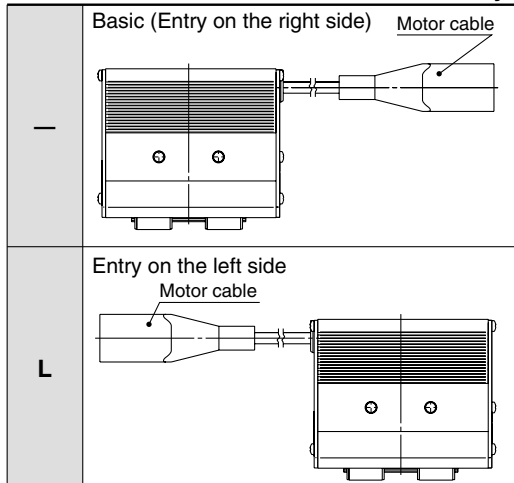
<b>K</b>	Basic
----------	-------

#### 2-finger type

#### Stroke

Stroke/both sides (mm)		Body size
Basic	Long stroke	
16	32	10
24	48	20
32	64	32
40	80	40

#### Motor cable entry



#### Controller mounting

—	Screw mounting
<b>D</b> (Note)	DIN rail mounting

Note) DIN rail is not included. Order it separately. (Refer to page 51.)

#### I/O cable length

—	Without cable
<b>1</b>	1.5 m
<b>3</b>	3 m
<b>5</b>	5 m

#### Controller type <sup>Note)</sup>

—	Without controller
<b>6N</b>	With controller (NPN)
<b>6P</b>	With controller (PNP)

Note) Refer to page 50 for the detailed specifications of the controller itself.

#### Actuator cable length

—	Without cable	<b>8</b>	8 m (Note)
<b>1</b>	1.5 m	<b>A</b>	10 m (Note)
<b>3</b>	3 m	<b>B</b>	15 m (Note)
<b>5</b>	5 m	<b>C</b>	20 m (Note)

Note) Produced upon receipt of order

#### Actuator cable type

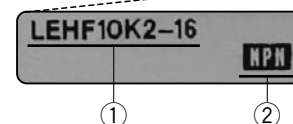
—	Without cable
<b>R</b>	Robotic cable (Flexible cable)

**The actuator and controller are sold as a package.** (Controller → Page 50)

Confirm that the combination of the controller and the actuator is compatible.

<Be sure to check the following before use.>

- ① Check that the actuator label for model number matches the controller.
- ② Check that the Parallel I/O configuration matches (NPN or PNP).



\* Refer to the operation manual for using the products. Please download it via our website. <http://www.smcworld.com/>

## Specifications



Model		LEHF10	LEHF20	LEHF32	LEHF40
Stroke/both sides (mm)	Basic	16	24	32	40
	Long stroke	32	48	64	80
Gripping force (N) <sup>Note 1)</sup>		3 to 7	11 to 28	48 to 120	72 to 180
Opening and closing speed/ Pushing speed (mm/s) <sup>Note 2)</sup>		5 to 80/5 to 20		5 to 100/5 to 30	
Drive method		Slide screw + Belt bending			
Finger guide type		Linear guide (No circulation)			
Repeatability (mm) <sup>Note 3)</sup>		±0.05			
Repeated length determination accuracy (mm) <sup>Note 4)</sup>		±0.05			
Finger backlash/both sides (mm) <sup>Note 5)</sup>		1.0 or less			
Impact resistance/ Vibration resistance (m/s <sup>2</sup> ) <sup>Note 6)</sup>		150/30			
Max. operating frequency (C.P.M)		60			
Operating temperature range (°C)		5 to 40 (No condensation and freezing)			
Operating humidity range (%)		35 to 85 (No condensation and freezing)			
Weight (g)	Basic	340	610	1625	1980
	Long stroke	370	750	1970	2500
Motor size		□20	□28	□42	
Motor type		Step motor (Servo 24 VDC)			
Encoder		Incremental A/B phase (800 pulse/rotation)			
Rated voltage (V)		24 VDC ±10%			
Power consumption/Standby power consumption when operating (W) <sup>Note 7)</sup>		11/7	28/15	34/13	36/13
Momentary max. power consumption (W) <sup>Note 8)</sup>		19	51	57	61
Controller weight (g)		150 (Screw mounting)			

Note 1) Gripping force should be from 10 to 20 times the weight of the object to be conveyed. Positioning force should be 150% when releasing the workpiece. Gripping force accuracy should be ±30% (F.S.) for LEHF10  
±25% (F.S.) for LEHF20  
±20% (F.S.) for LEHF32/40

Note 2) Pushing speed should be set within the range during pushing (gripping) operation. Otherwise, it may cause malfunction.

Note 3) Repeatability means the variation of the gripping position (workpiece position) when the gripping operation is repeatedly performed by the same sequence for the same workpiece.

Note 4) Repeated length determination accuracy means dispersion (value on the controller monitor) when the workpiece is repeatedly held in the same position.

Note 5) There will be no influence of backlash during pushing (gripping) operation. Make the stroke longer for the amount of backlash when opening.

Note 6) Impact resistance: No malfunction occurred when the gripper was tested with a drop tester in both an axial direction and a perpendicular direction to the lead screw. (Test was performed with the gripper in the initial state.)

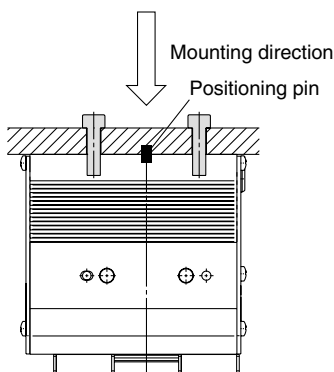
Vibration resistance: No malfunction occurred in a test ranging between 45 to 2000 Hz. Test was performed in both an axial direction and a perpendicular direction to the lead screw. (Test was performed with the gripper in the initial state.)

Note 7) Power consumption (including the controller) is for when the actuator is operating. Standby power consumption when operating is for when the actuator is stopped in the set position during operation, including the energy saving mode when gripping.

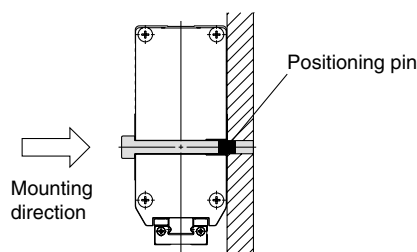
Note 8) Momentary max. power consumption (including the controller) is for when the actuator is operating. This value can be used for the selection of the power supply.

## How to Mount

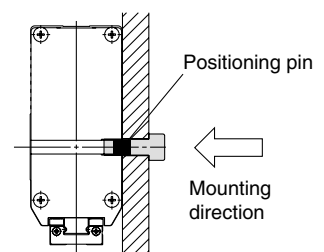
a) When using the thread on the body



b) When using the thread on the mounting plate



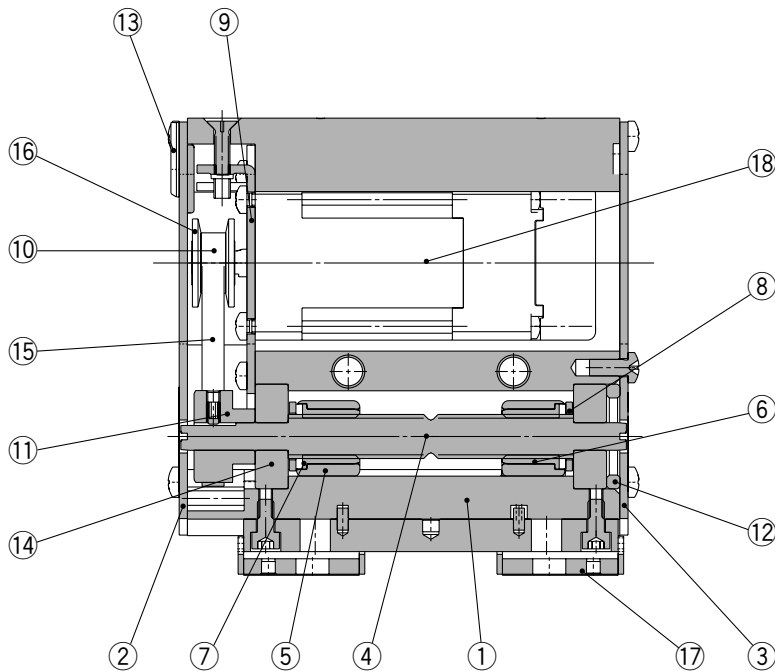
c) When using the thread on the back of the body





**Construction**

**Series LEHF**



**Component Parts**

No.	Description	Material	Note
1	<b>Body</b>	Aluminum alloy	Anodised
2	<b>Side plate A</b>	Aluminum alloy	Anodised
3	<b>Side plate B</b>	Aluminum alloy	Anodised
4	<b>Slide shaft</b>	Stainless steel	Heat treatment + Special treatment
5	<b>Slide bushing</b>	Stainless steel	
6	<b>Slide nut</b>	Stainless steel	Heat treatment + Special treatment
7	<b>Slide nut</b>	Stainless steel	Heat treatment + Special treatment
8	<b>Fixed plate</b>	Stainless steel	
9	<b>Motor plate</b>	Carbon steel	
10	<b>Pulley A</b>	Aluminum alloy	
11	<b>Pulley B</b>	Aluminum alloy	
12	<b>Bearing stopper</b>	Aluminum alloy	
13	<b>Rubber bushing</b>	NBR	
14	<b>Bearing</b>	—	
15	<b>Belt</b>	—	
16	<b>Flange</b>	—	
17	<b>Finger assembly</b>	—	
18	<b>Step motor (Servo/24 VDC)</b>	—	

LEHZ

LEHF

LEHS

Specific Product Precautions

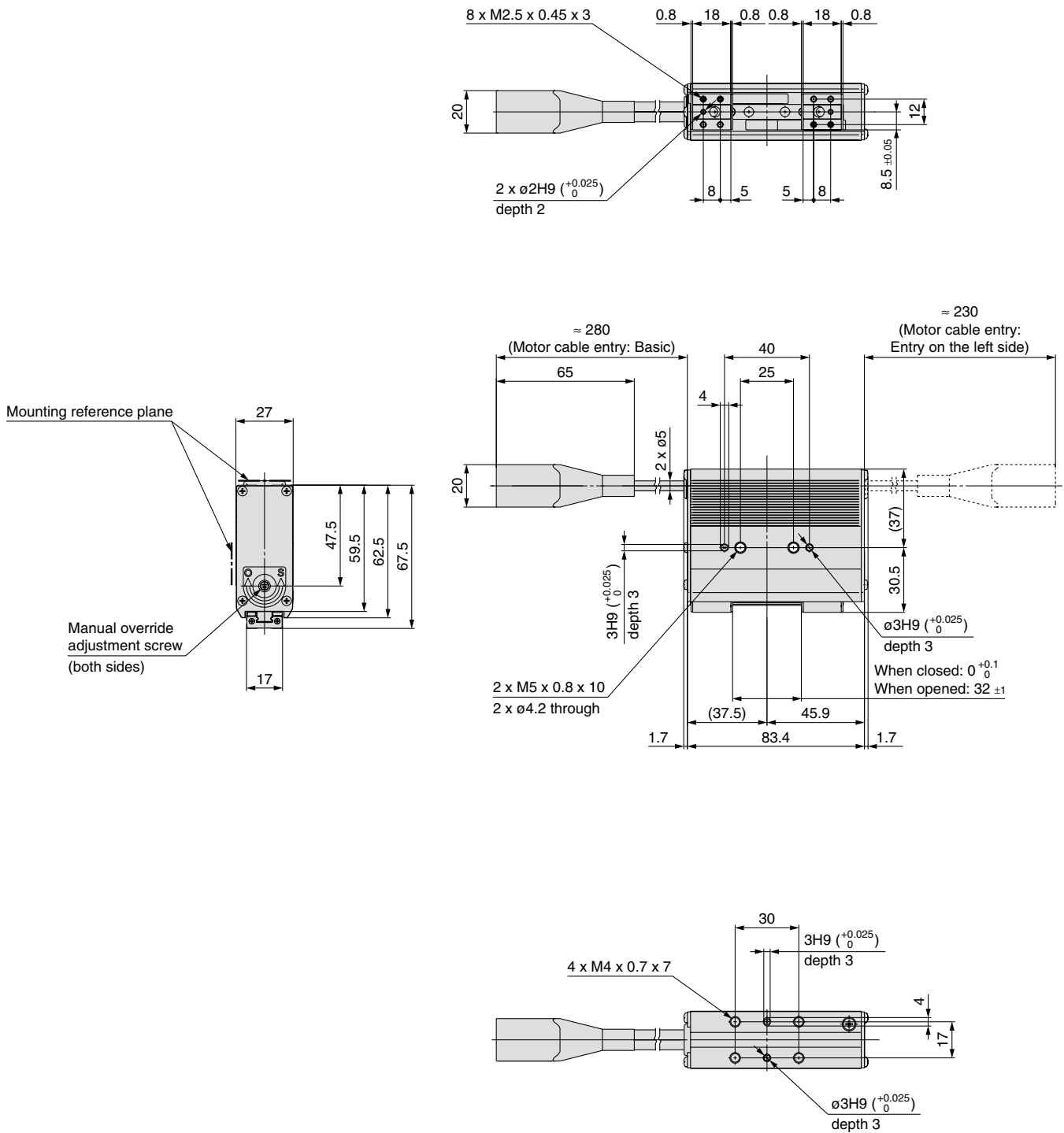
LECP6

Specific Product Precautions



**Dimensions**

**LEHF10K2-32/Long Stroke**



LEHZ

LEHF

LEHS

Specific Product Precautions

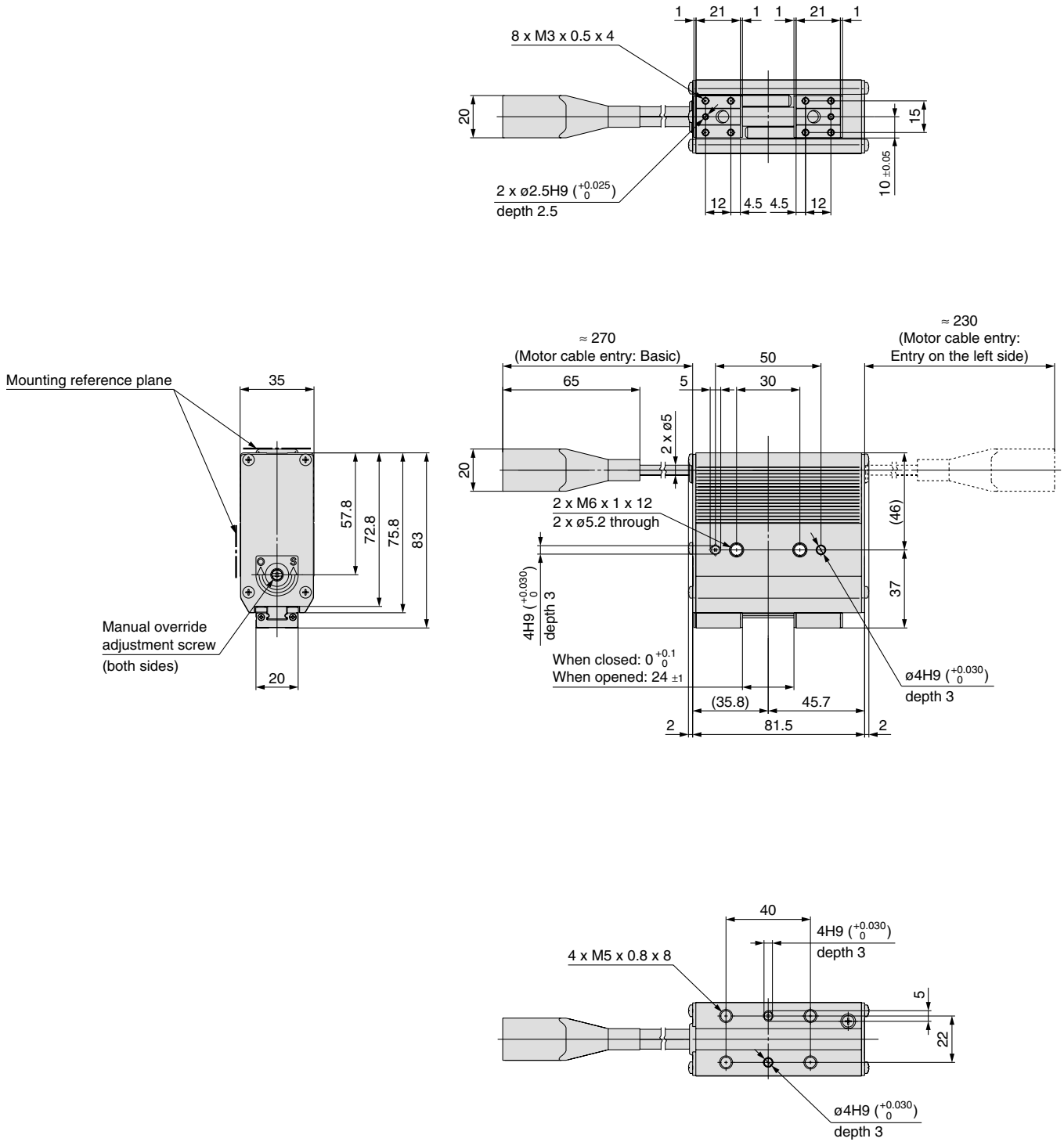
LECP6

Specific Product Precautions

# Series LEHF

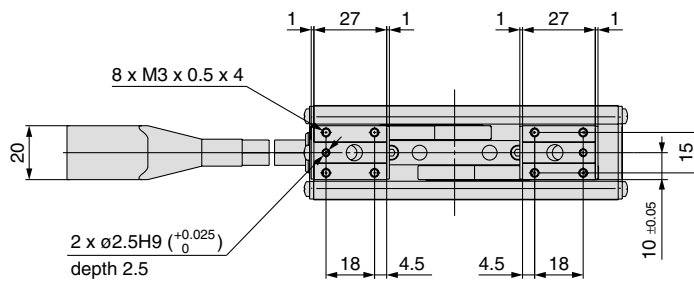
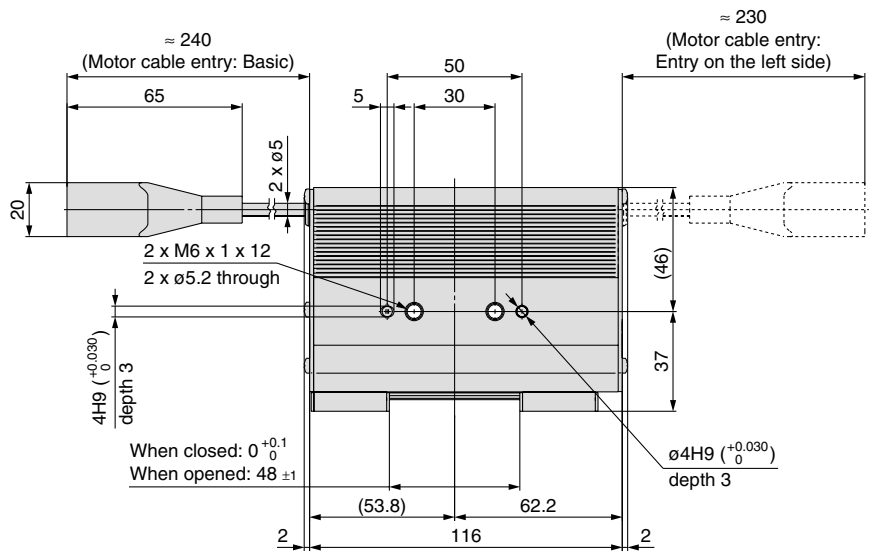
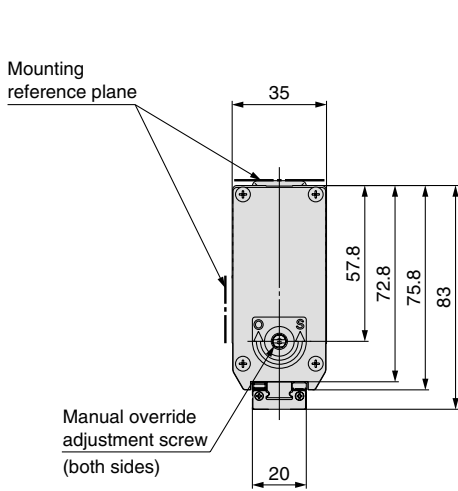
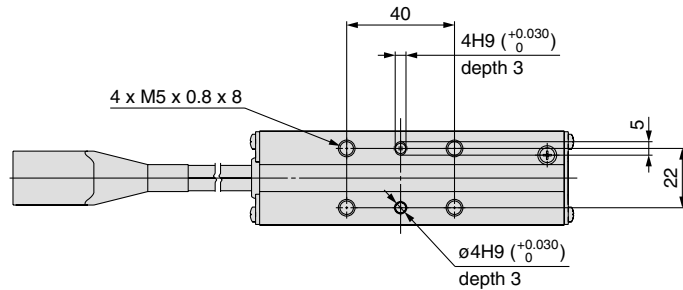
## Dimensions

### LEHF20K2-24/Basic



**Dimensions**

**LEHF20K2-48/Long Stroke**



LEHZ

LEHF

LEHS

Specific Product Precautions

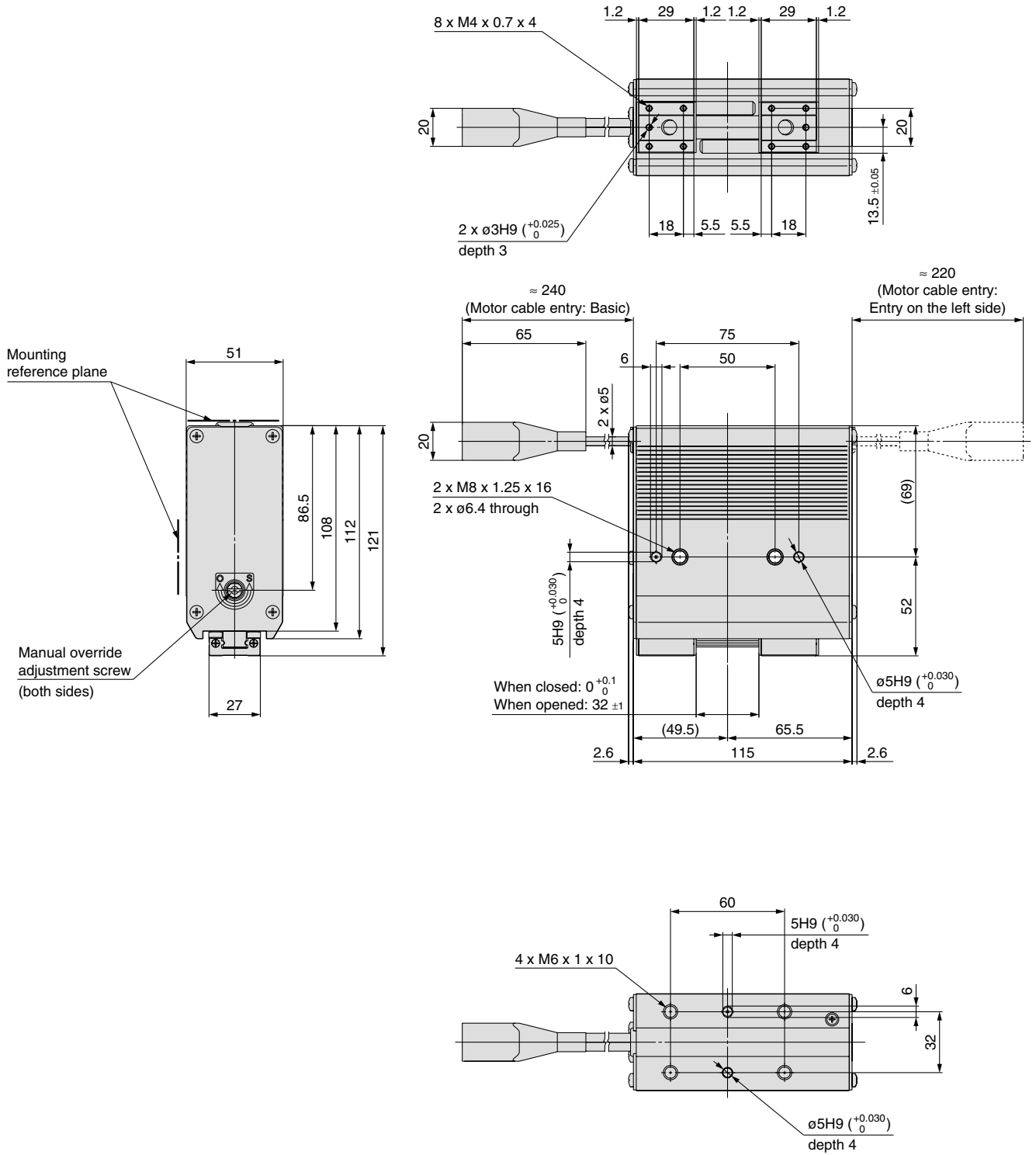
LECP6

Specific Product Precautions

# Series LEHF

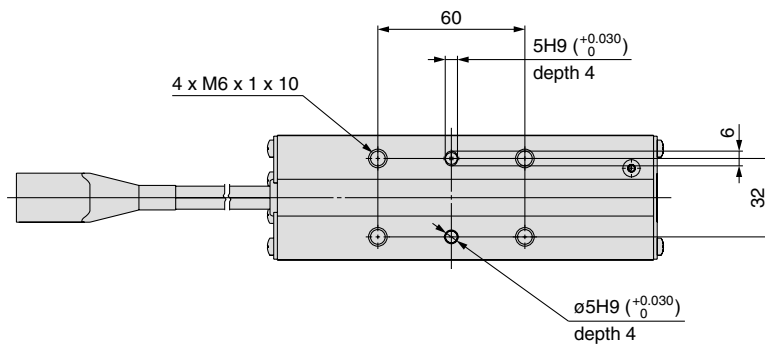
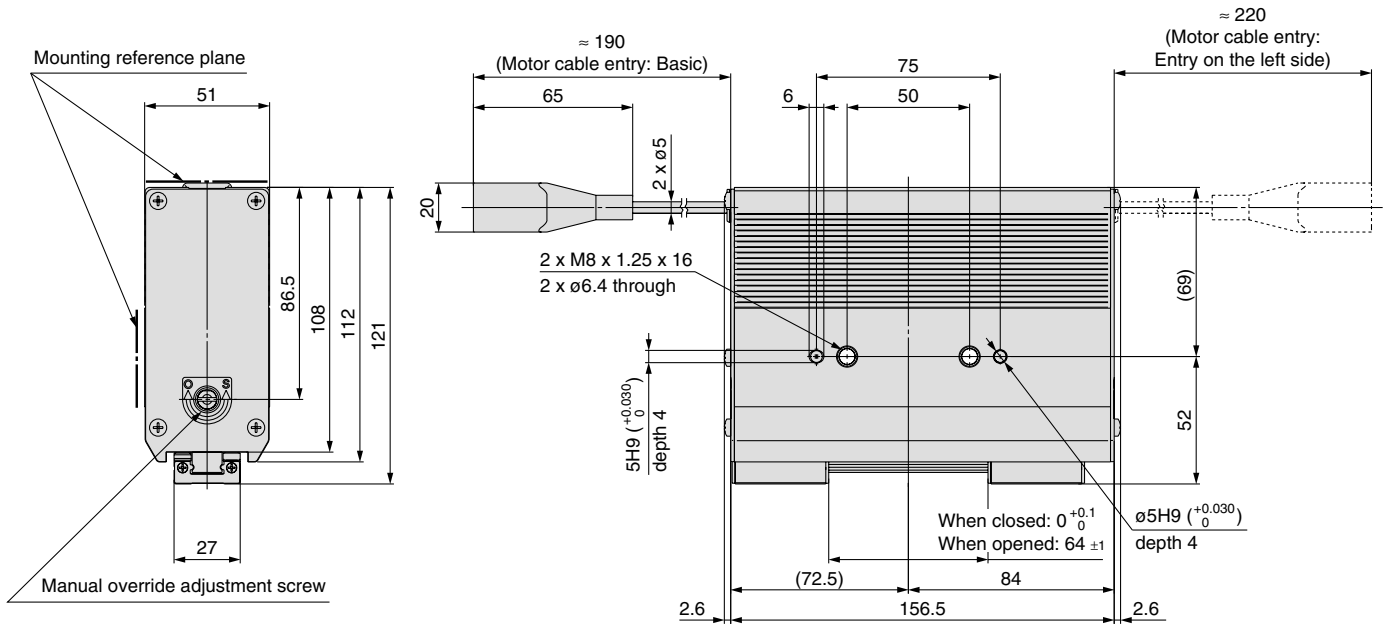
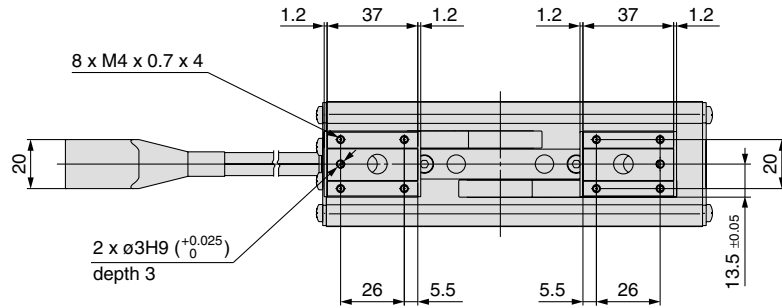
## Dimensions

### LEHF32K2-32/Basic



**Dimensions**

**LEHF32K2-64/Long Stroke**



LEHZ

LEHF

LEHS

Specific Product Precautions

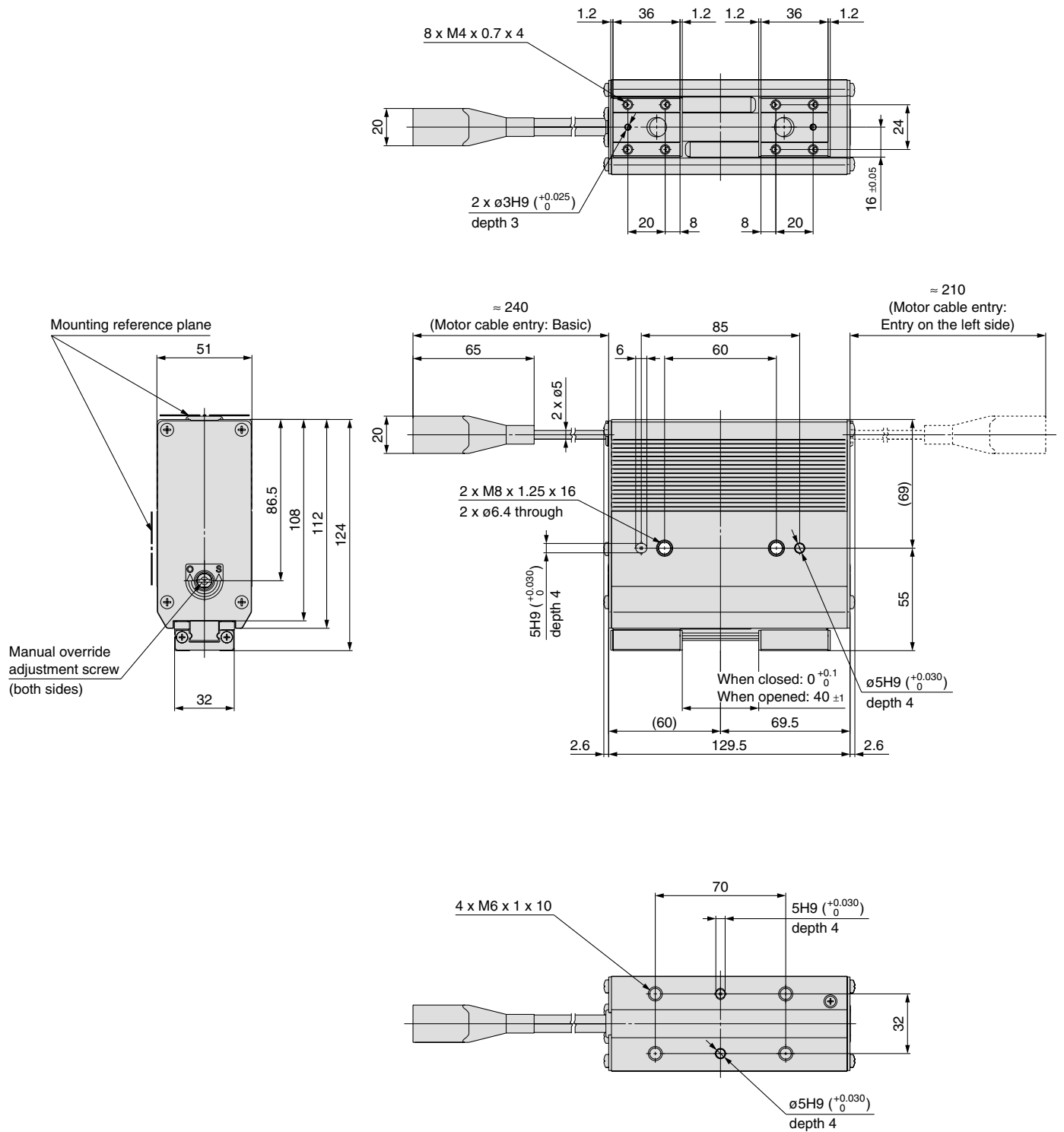
LECP6

Specific Product Precautions

# Series LEHF

## Dimensions

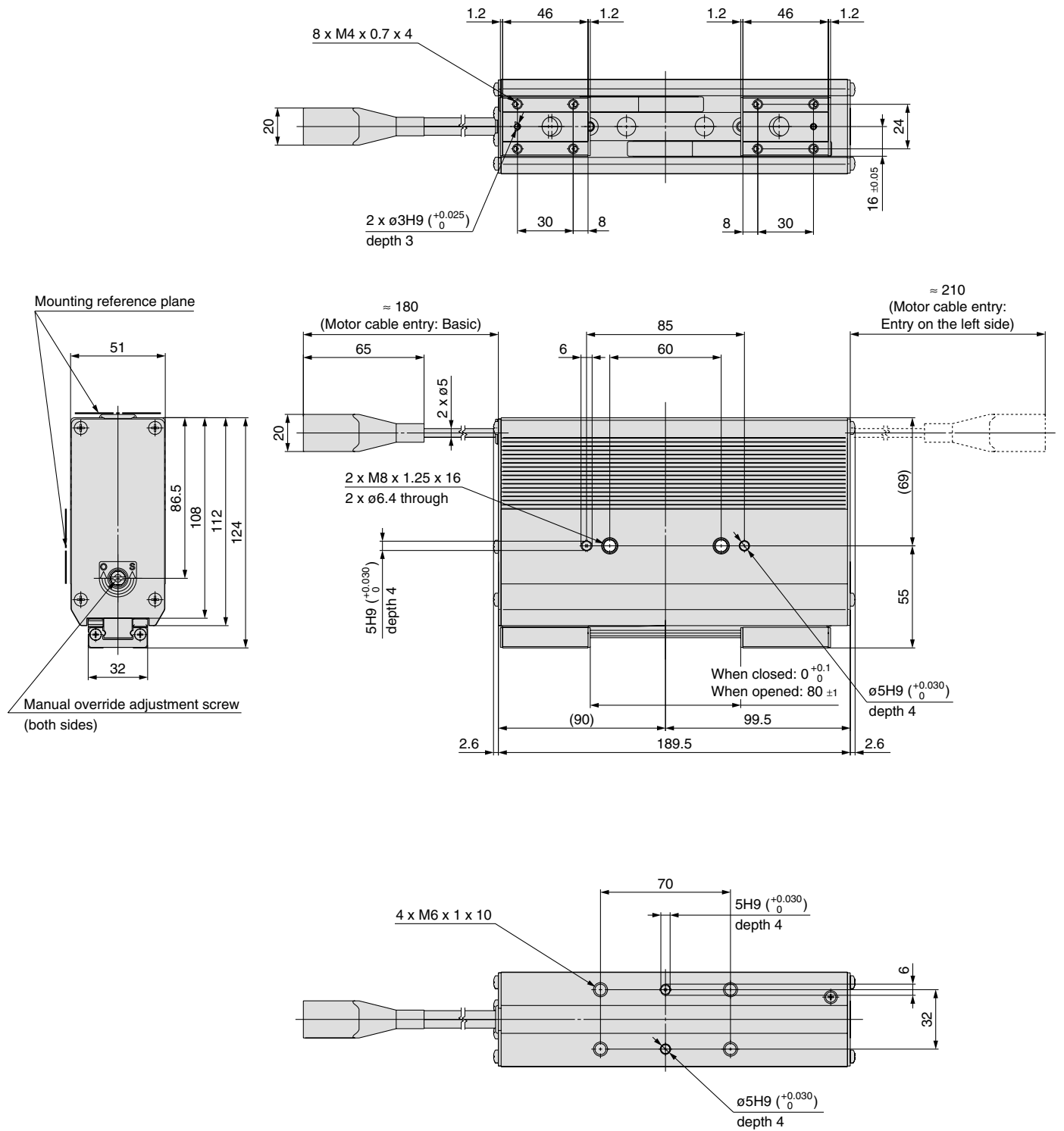
### LEHF40K2-40/Basic





**Dimensions**

**LEHF40K2-80/Long Stroke**



LEHZ

LEHF

LEHS

Specific Product Precautions

LECP6

Specific Product Precautions

# Series LEHS Model Selection

## Model Selection

### Selection Procedure

#### Step Confirmation of the gripping force

Confirmation of conditions

Calculation of the required gripping force

Selection of model from the gripping force graph

Selection of the pushing speed

#### Example

Workpiece mass: 0.1 kg

#### Guidelines for the selection of the gripper with respect to workpiece mass

- Although conditions differ according to the workpiece shape and the coefficient of friction between the attachments and the workpiece, select a model that can provide a gripping force of 7 to 13 times <sup>Note)</sup> the workpiece weight, or more.

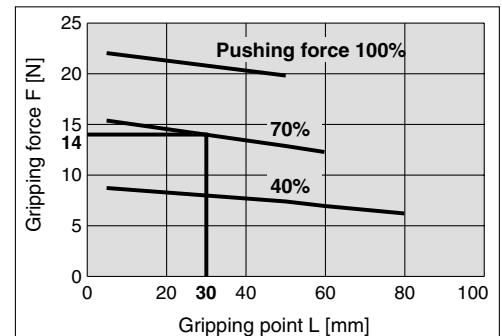
Note) For further details, refer to the calculation of required gripping force.

- If high acceleration or impact forces are encountered during motion, a further margin of safety should be considered.

Example) When it is desired to set the gripping force at 13 times or more above the workpiece weight.

Required gripping force  
= 0.1 kg x 13 x 9.8 m/s<sup>2</sup> ≈ 12.7 N or more

#### LEHS20



#### In the case of selecting LEHS20

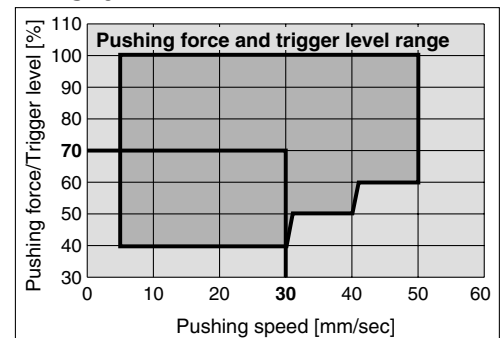
- A gripping force of 14 N is obtained from the intersection point of gripping point distance L = 30 mm and pushing force of 70%.
- Gripping force is 14 times greater than the workpiece weight, and therefore satisfies a gripping force setting value of 13 times or more.

Pushing force: 70%

Gripping point distance: 30 mm

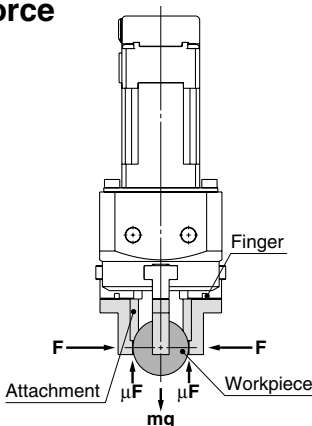
Pushing speed: 30 mm/sec

#### LEHS20



- Pushing speed is satisfied at the point where 70% of the pushing force and 30 mm/sec of the pushing speed cross.

#### Calculation of the required gripping force



When gripping a workpiece as in the figure to the left, and with the following definitions,

- F: Gripping force (N)
- μ: Coefficient of friction between the attachments and the workpiece
- m: Workpiece mass (kg)
- g: Gravitational acceleration (= 9.8 m/s<sup>2</sup>)
- mg: Workpiece weight (N)

the conditions under which the workpiece will not drop are

$$3 \times \mu F > mg$$

Number of fingers

and therefore,  $F > \frac{mg}{3 \times \mu}$

With "a" representing the extra margin, "F" is determined by the following formula:

$$F = \frac{mg}{3 \times \mu} \times a$$

#### "Gripping force at least 7 to 13 times the workpiece weight"

- The "7 to 13 times or more of the workpiece weight" recommended by SMC is calculated with a safety margin of a = 4, which allows for impacts that occur during normal transportation, etc.

When μ = 0.2	When μ = 0.1
$F = \frac{mg}{3 \times 0.2} \times 4 = 6.7 \times mg$	$F = \frac{mg}{3 \times 0.1} \times 4 = 13.3 \times mg$

7 x Workpiece weight

13 x Workpiece weight

(Reference) Coefficient of friction μ (depends on the operating environment, contact pressure, etc.)

Coefficient of friction μ	Attachment - Material of work pieces (guideline)
0.1	Metal (surface roughness Rz3.2 or less)
0.2	Metal
0.2 or more	Rubber, Resin, etc.

- Note) • Even in cases where the coefficient of friction is greater than μ = 0.2, for reasons of safety, select a gripping force which is at least 7 to 13 times greater than the workpiece weight, as recommended by SMC.
- If high acceleration or impact forces are encountered during motion, a further margin of safety should be considered.

**Model Selection**

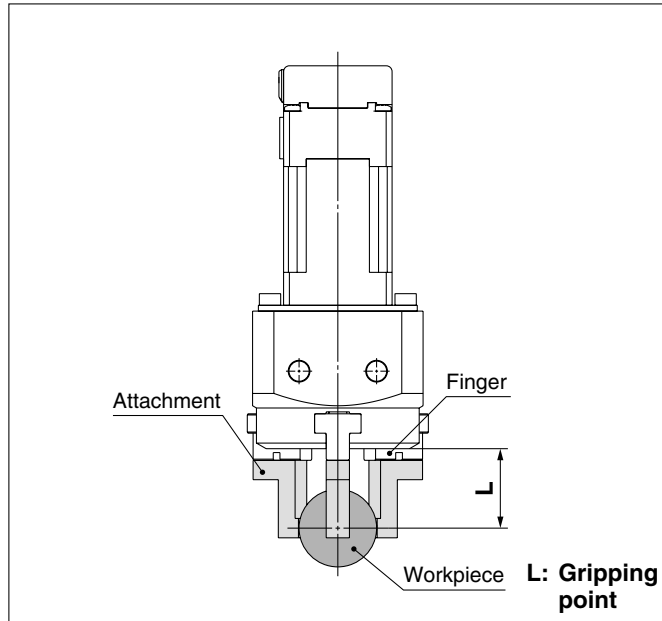
**Step Confirmation of the gripping force: Series LEHS**

● **Indication of the gripping force**

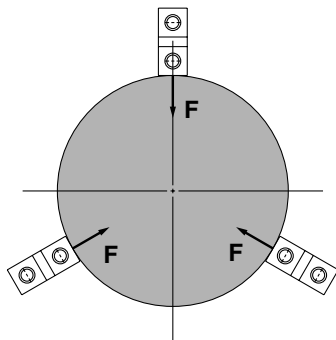
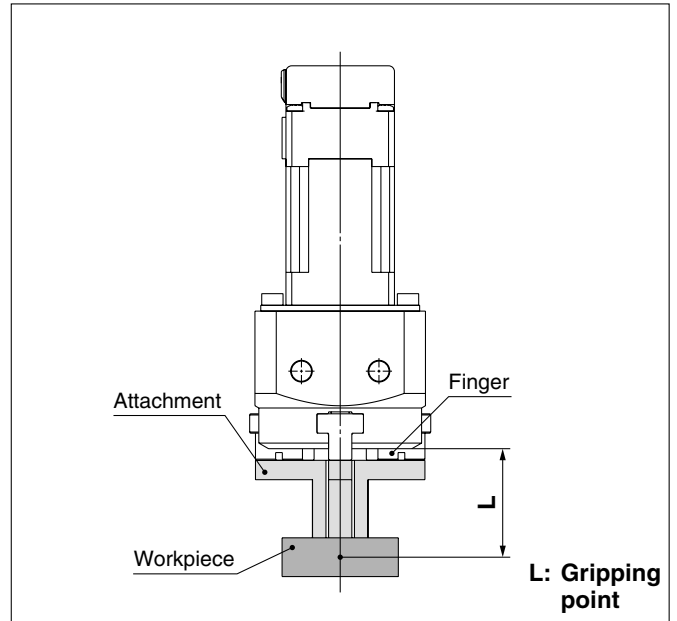
The gripping force shown in the graphs on page 36 is expressed as "F", which is the thrust of one finger, when three fingers and attachments are in full contact with the workpiece as shown in the below figure.

● Set the workpiece gripping point "L" so that it is within the range shown in the below figure.

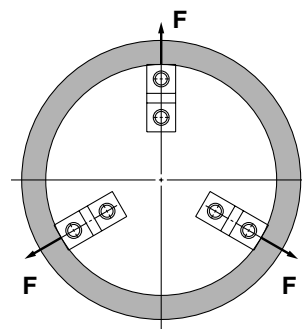
**External Gripping State**



**Internal Gripping State**



**F: Gripping force**



**F: Gripping force**

LEHZ

LEHF

LEHS

Specific Product Precautions

LECP6

Specific Product Precautions

# Series LEHS

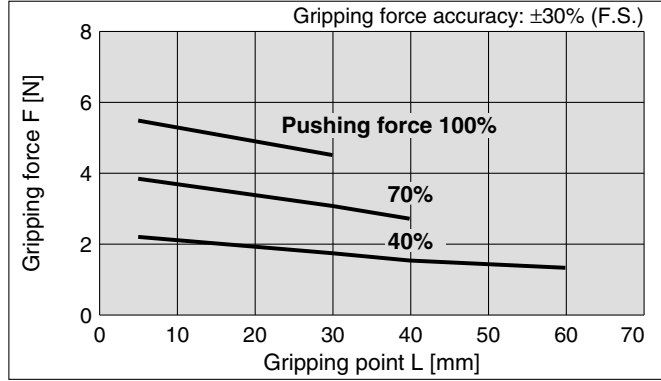
## Model Selection

### Step Confirmation of the gripping force: Series LEHS

#### Basic

\* Pushing force is one of the values of step data that is input into the controller.

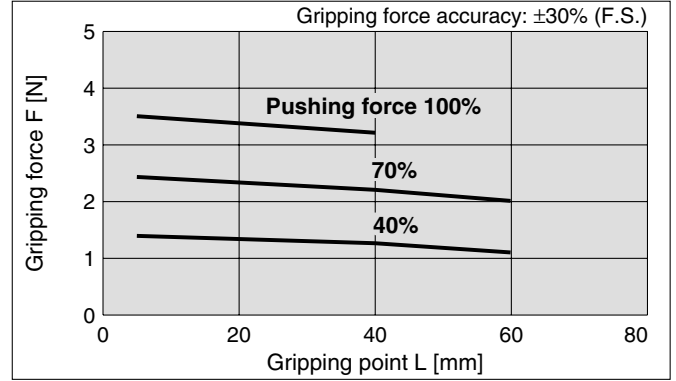
#### LEHS10



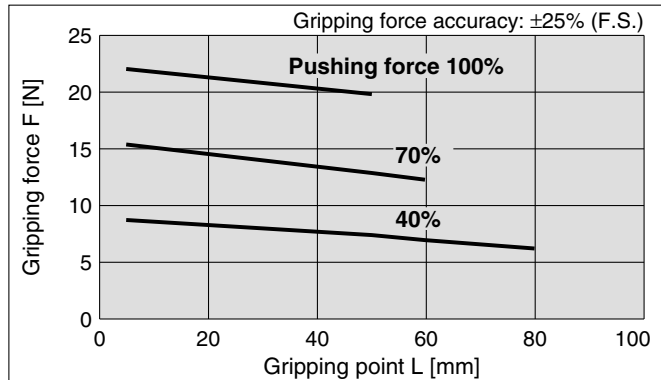
#### Compact

\* Pushing force is one of the values of step data that is input into the controller.

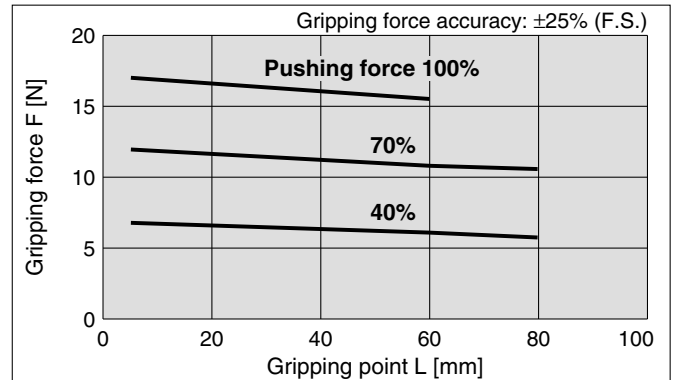
#### LEHS10L



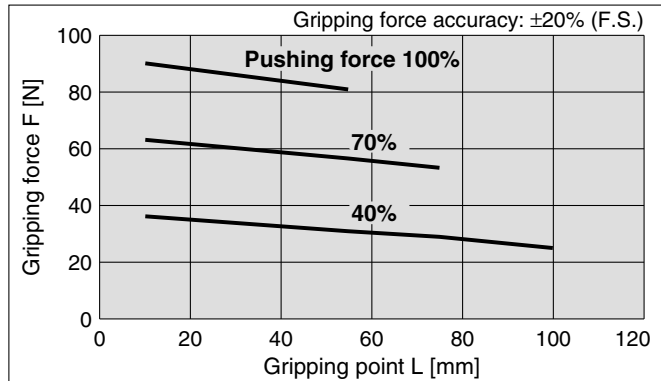
#### LEHS20



#### LEHS20L



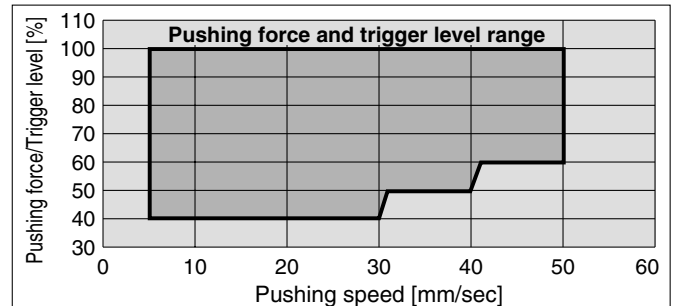
#### LEHS32



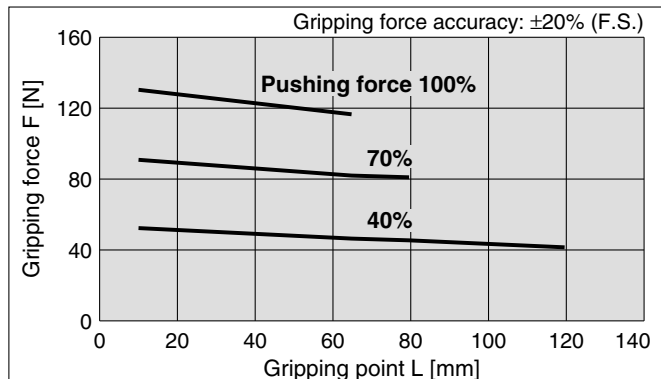
### Selection of the Pushing Speed

● Set the [Pushing force] and the [Trigger LV] within the range shown in the below figure.

#### Basic



#### LEHS40



#### Compact



# Electric Gripper 3-Finger Type

## Series **LEHS**

### LEHS10, 20, 32, 40



### How to Order

**LEHS 10 K 3 - 4 - R 1 6N 1**

**Body size**

10
20
32
40

**Motor size**

—	Basic
L (Note)	Compact

Note) Body size: 10, 20 only

**Lead**

K	Basic
---	-------

**3-finger type**

**Stroke**

Stroke/ diameter (mm)	Body size
4	10
6	20
8	32
12	40

**Motor cable entry**

—	Basic (Entry on the left side)	Mounting reference plane
F	Entry on the front side	Mounting reference plane
R	Entry on the right side	Mounting reference plane

**Controller mounting**

—	Screw mounting
D (Note)	DIN rail mounting

Note) DIN rail is not included. Order it separately. (Refer to page 51.)

**I/O cable length**

—	Without cable
1	1.5 m
3	3 m
5	5 m

**Controller type**

—	Without controller
6N	With controller (NPN)
6P	With controller (PNP)

Note) Refer to page 50 for the detailed specifications of the controller itself.

**Actuator cable length**

—	Without cable	8	8 m (Note)
1	1.5 m	A	10 m (Note)
3	3 m	B	15 m (Note)
5	5 m	C	20 m (Note)

Note) Produced upon receipt of order

**Actuator cable type**

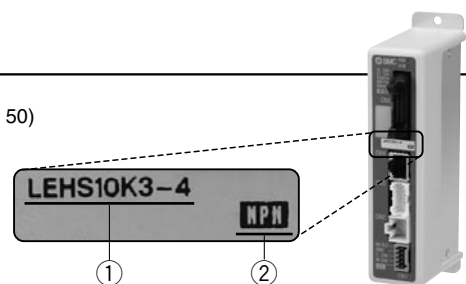
—	Without cable
R	Robotic cable (Flexible cable)

**The actuator and controller are sold as a package.** (Controller → Page 50)

Confirm that the combination of the controller and the actuator is compatible.

<Be sure to check the following before use.>

- Check that the actuator label for model number matches the controller label.
- Check that the Parallel I/O configuration matches (NPN or PNP).



\* Refer to the operation manual for using the products. Please download it via our website. <http://www.smcworld.com/>

## Specifications



Model		LEHS10	LEHS20	LEHS32	LEHS40
Stroke/diameter (mm)		4	6	8	12
Gripping force (N) <sup>Note 1)</sup>	Basic	2.2 to 5.5	9 to 22	36 to 90	52 to 130
	Compact	1.4 to 3.5	7 to 17	—	—
Opening and closing speed/ Pushing speed (mm/s) <sup>Note 2)</sup>		5 to 70/ 5 to 50	5 to 80/ 5 to 50	5 to 100/ 5 to 50	5 to 120/ 5 to 50
Drive method		Slide screw + Wedge cam			
Repeatability (mm) <sup>Note 3)</sup>		±0.02			
Repeated length determination accuracy (mm) <sup>Note 4)</sup>		±0.05			
Finger backlash/dia. (mm) <sup>Note 5)</sup>		0.5 or less			
Impact resistance/ Vibration resistance (m/s <sup>2</sup> ) <sup>Note 6)</sup>		150/30			
Max. operating frequency (C.P.M)		60			
Operating temperature range (°C)		5 to 40 (No condensation and freezing)			
Operating humidity range (%)		35 to 85 (No condensation and freezing)			
Weight (g)	Basic	185	410	975	1265
	Compact	150	345	—	—
Motor size		□20	□28	□42	
Motor type		Step motor (Servo 24 VDC)			
Encoder		Incremental A/B phase (800 pulse/rotation)			
Rated voltage (V)		24 VDC ±10%			
Power consumption/ Standby power consumption when operating (W) <sup>Note 7)</sup>	Basic	11/7	28/15	34/13	36/13
	Compact	8/7	22/12	—	—
Momentary max. power consumption (W) <sup>Note 8)</sup>	Basic	19	51	57	61
	Compact	14	42	—	—
Controller weight (g)		150 (Screw mounting)			

Note 1) Gripping force should be from 7 to 13 times the weight of the object to be conveyed. Positioning force should be 150% when releasing the workpiece. Gripping force accuracy should be ±30% (F.S.) for LEHS10  
±25% (F.S.) for LEHS20  
±20% (F.S.) for LEHS32/40

Note 2) Pushing speed should be set within the range during pushing (gripping) operation. Otherwise, it may cause malfunction.

Note 3) Repeatability means the variation of the gripping position (workpiece position) when the gripping operation is repeatedly performed by the same sequence for the same workpiece.

Note 4) Repeated length determination accuracy means dispersion (value on the controller monitor) when the workpiece is repeatedly held in the same position.

Note 5) There will be no influence of backlash during pushing (gripping) operation. Make the stroke longer for the amount of backlash when opening.

Note 6) Impact resistance: No malfunction occurred when the gripper was tested with a drop tester in both an axial direction and a perpendicular direction to the lead screw. (Test was performed with the gripper in the initial state.)

Vibration resistance: No malfunction occurred in a test ranging between 45 to 2000 Hz. Test was performed in both an axial direction and a perpendicular direction to the lead screw. (Test was performed with the gripper in the initial state.)

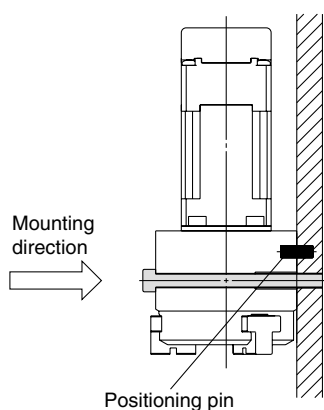
Note 7) Power consumption (including the controller) is for when the actuator is operating.

Standby power consumption when operating is for when the actuator is stopped in the set position during operation, including the energy saving mode when gripping.

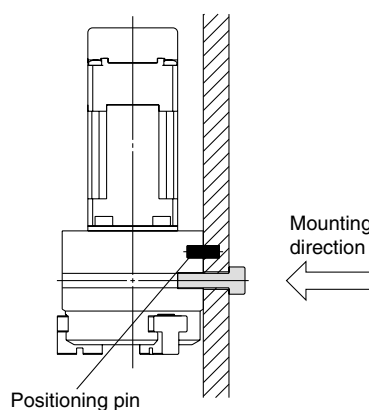
Note 8) Momentary max. power consumption (including the controller) is for when the actuator is operating. This value can be used for the selection of the power supply.

## How to Mount

a) Mounting A type  
(when using the thread on the mounting plate)

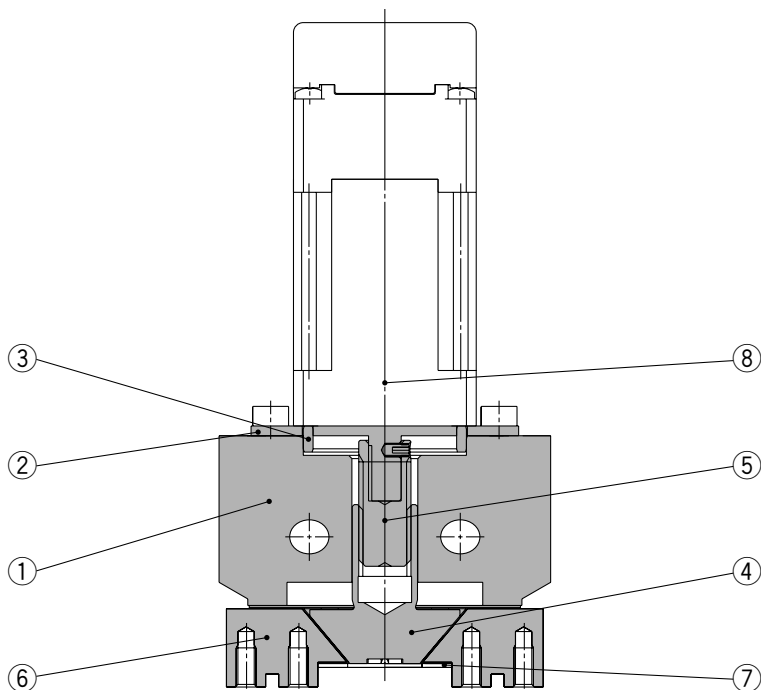


b) Mounting B type  
(when using the thread on the back of the body)



**Construction**

**Series LEHS**



**Component Parts**

No.	Description	Material	Note
1	<b>Body</b>	Aluminum alloy	Anodised
2	<b>Motor plate</b>	Aluminum alloy	Anodised
3	<b>Guide ring</b>	Aluminum alloy	
4	<b>Slide cam</b>	Stainless steel	Heat treatment + Special treatment
5	<b>Slide bolt</b>	Stainless steel	Heat treatment + Special treatment
6	<b>Finger</b>	Carbon steel	Heat treatment + Special treatment
7	<b>End plate</b>	Stainless steel	
8	<b>Step motor (Servo/24 VDC)</b>		

LEHZ

LEHF

LEHS

Specific Product Precautions

LECP6

Specific Product Precautions

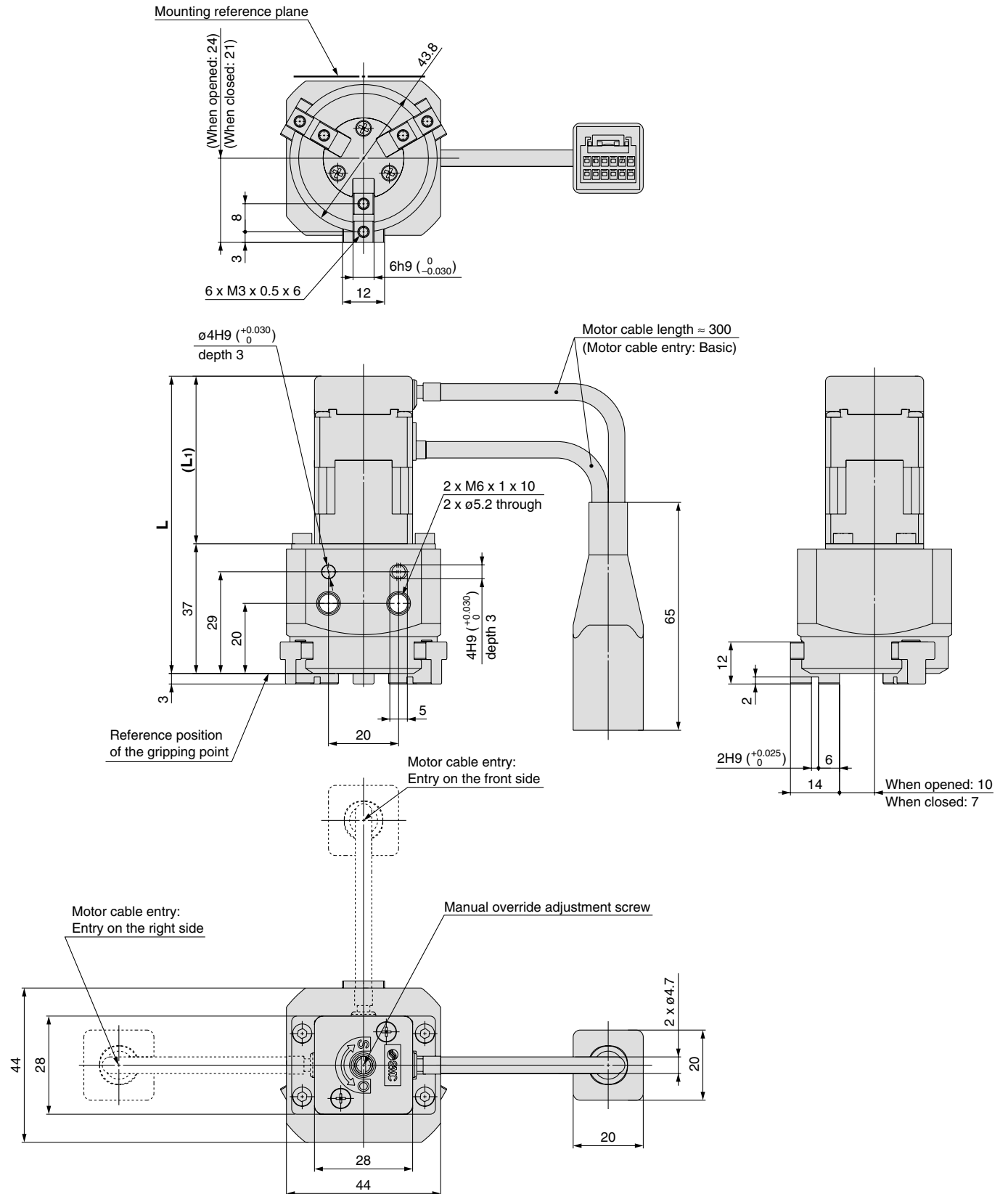




**Dimensions**

**LEHS20(L)K3-6**

Model	L	(L1)
LEHS20K3-6	98.8	(61.8)
LEHS20LK3-6	84.8	(47.8)



LEHZ

LEHF

LEHS

Specific Product Precautions

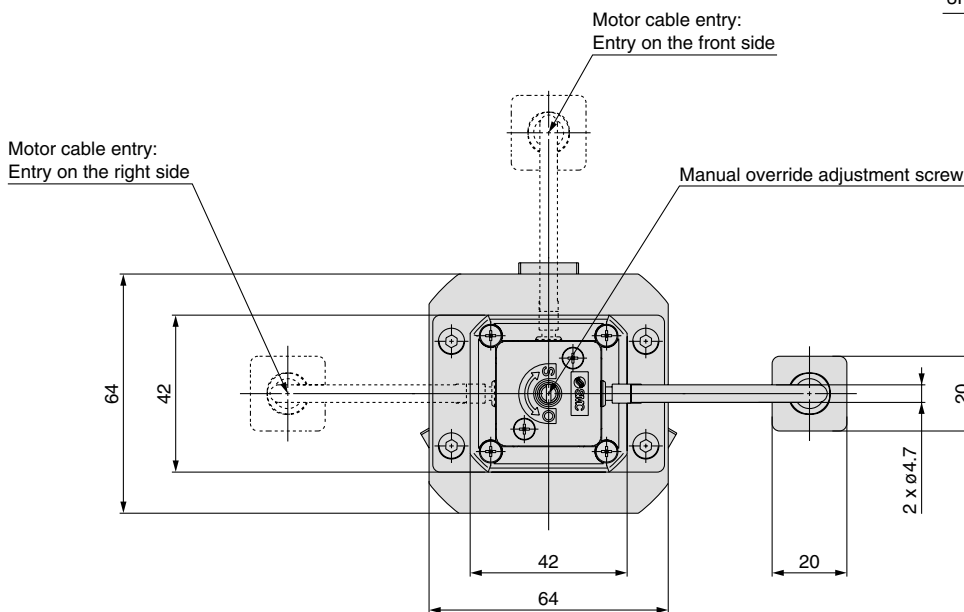
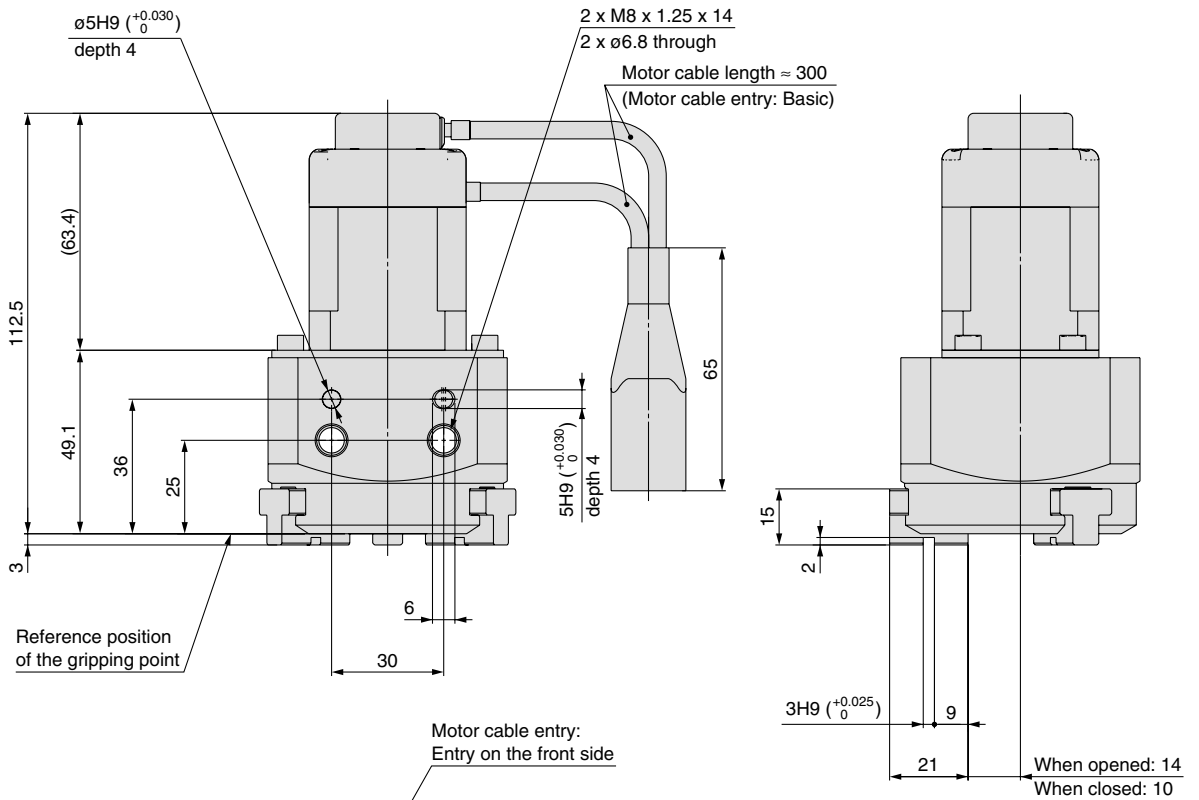
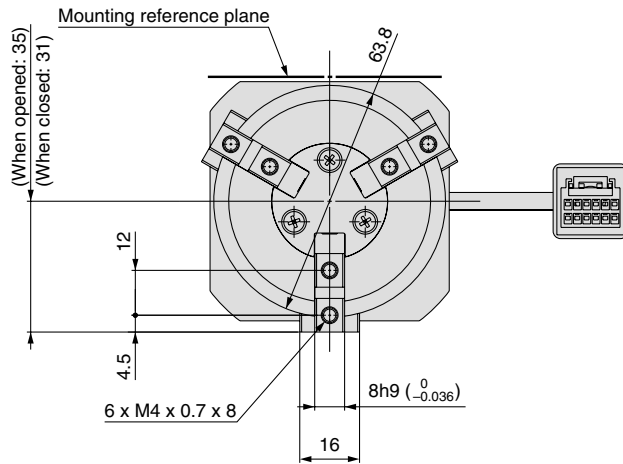
LECP6

Specific Product Precautions

# Series LEHS

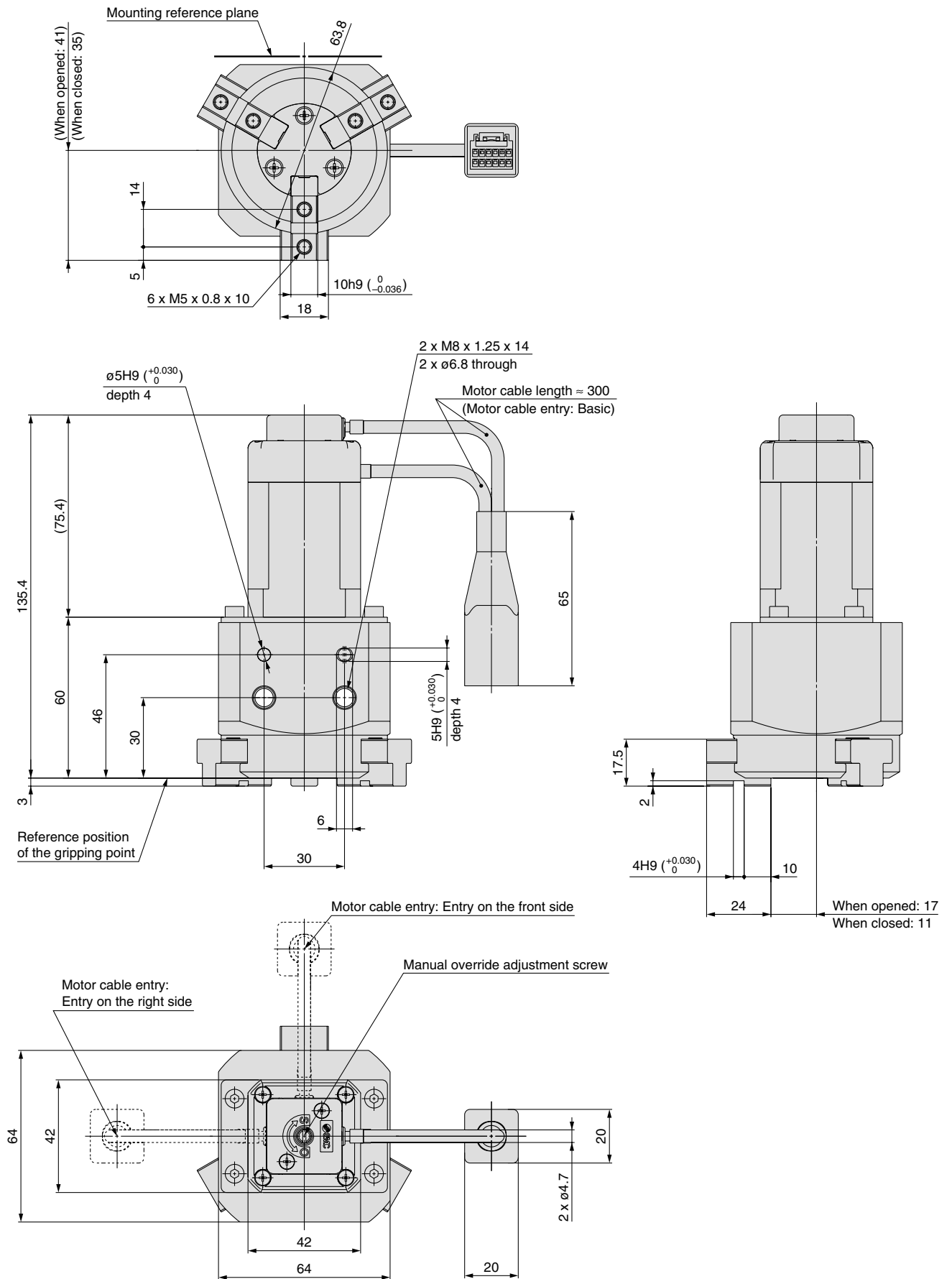
## Dimensions

### LEHS32K3-8



**Dimensions**

**LEHS40K3-12**



LEHZ

LEHF

LEHS

Specific Product Precautions

LECP6

Specific Product Precautions



# Series LEH Electric Grippers/ Specific Product Precautions 1

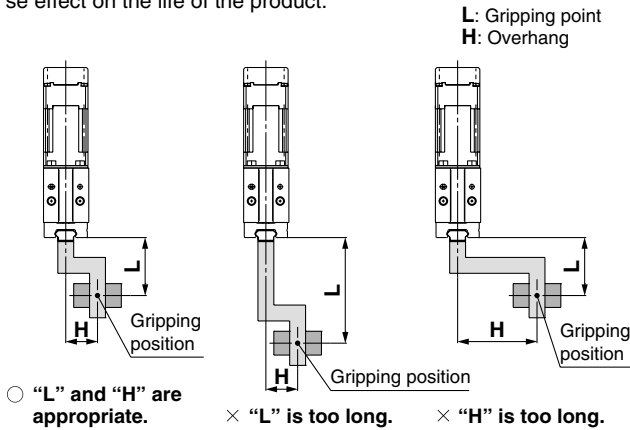
Be sure to read before handling. Refer to back page 1 for Safety Instructions and the operation manual for Electric Actuators Precautions.  
Please download it via our website. <http://www.smcworld.com/>

## Design/Selection

### Warning

#### 1. Keep the specified gripping point.

If the specified gripping range is exceeded, excessive moment is applied to the sliding part of the finger, which may have an adverse effect on the life of the product.



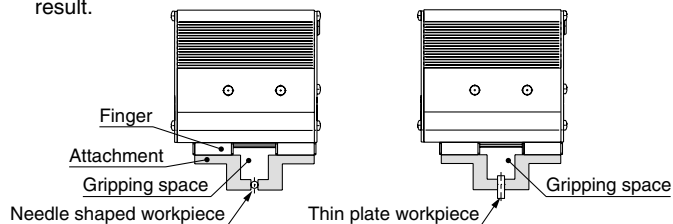
#### 2. Design the attachment to be lightweight and of minimum length.

A long and heavy attachment will increase inertia force when the product is opened or closed, which causes play at the finger. Even if the gripping point of the attachment is within a specified range, design it to be short and lightweight as possible.

For a long or large workpiece, select a model of a larger size or use two or more grippers together.

#### 3. Reserve a gripping space for attachment when a workpiece is extremely thin.

Without a gripping space, the product cannot perform stable gripping, and the displacement of a workpiece or gripping failure can result.



#### 4. Select the model that allows for gripping force in relation to the weight of a workpiece, as appropriate.

The selection of inappropriate model can cause dropping of a workpiece. Gripping force should be from 10 to 20 times (LEHZ, LEHF) or 7 to 13 times (LEHS) of the weight of the object to be conveyed.

#### Gripping Force Accuracy

LEHZ10	LEHZ16	LEHZ20	LEHZ25	LEHZ32	LEHZ40
±30% (F.S.)		±25% (F.S.)		±20% (F.S.)	
LEHF10	LEHF20	LEHF32	LEHF40		
±30% (F.S.)		±25% (F.S.)		±20% (F.S.)	
LEHS10	LEHS20	LEHS32	LEHS40		
±30% (F.S.)		±25% (F.S.)		±20% (F.S.)	

#### 5. Do not use the product in such a way impact force will be applied.

It may lead to breakage or galling, which causes operation failure. Do not apply impact and vibration outside of the specifications.

#### 6. Select the model that allows for opening and closing width relative to a workpiece.

The selection of an inappropriate model will cause gripping at unexpected positions due to variable opening and closing width of the product and the diameter of a workpiece the product can handle. It is also necessary to make a larger stroke to overcome backlash created when the product will open after gripping.

## Mounting

### Warning

#### 1. Do not drop or hit the gripper when mounting to avoid scratches and dents.

Even slight deformation can cause the deterioration of accuracy and operation failure.

#### 2. Tighten the attachment mounting screws to the specified torque.

Tightening to a torque over the specified range can cause operation failure, and insufficient torque can cause displacing or dropping of the attachment.

#### Mounting of Attachment to Finger

The attachment should be mounted at the torque specified in the following table by screwing the bolt into the finger mounting female thread and hole.

#### <Series LEHZ>

Model	Bolt	Max. tightening torque [N·m]
LEHZ10(L)	M2.5 x 0.45	0.3
LEHZ16(L)	M3 x 0.5	0.9
LEHZ20(L)	M4 x 0.7	1.4
LEHZ25(L)	M5 x 0.8	3.0
LEHZ32	M6 x 1	5.0
LEHZ40	M8 x 1.25	12.0

#### <Series LEHF>

Model	Bolt	Max. tightening torque [N·m]
LEHF10	M2.5 x 0.45	0.3
LEHF20	M3 x 0.5	0.9
LEHF32	M4 x 0.7	1.4
LEHF40	M4 x 0.7	1.4

#### <Series LEHS>

Model	Bolt	Max. tightening torque [N·m]
LEHS10(L)	M3 x 0.5	0.9
LEHS20(L)	M3 x 0.5	0.9
LEHS32	M4 x 0.7	1.4
LEHS40	M5 x 0.8	3.0



# Series LEH

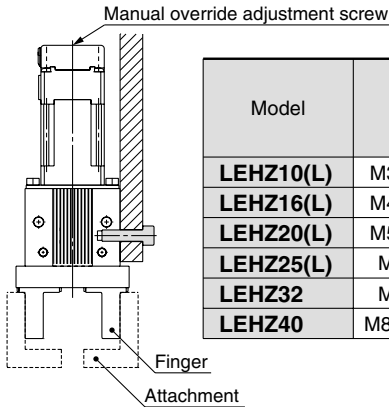
## Electric Grippers/ Specific Product Precautions 2

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### Mounting

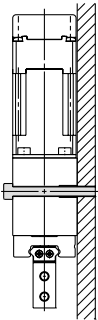
#### Mounting of Electric Gripper Series LEHZ

When using the thread on the side of the body



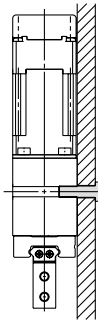
Model	Bolt	Max. tightening torque [N·m]	Max. screw-in depth L [mm]
LEHZ10(L)	M3 x 0.5	0.9	6
LEHZ16(L)	M4 x 0.7	1.4	6
LEHZ20(L)	M5 x 0.8	3.0	8
LEHZ25(L)	M6 x 1	5.0	10
LEHZ32	M6 x 1	5.0	10
LEHZ40	M8 x 1.25	12.0	14

When using the thread on the mounting plate



Model	Bolt	Max. tightening torque [N·m]
LEHZ10(L)	M3 x 0.5	0.9
LEHZ16(L)	M3 x 0.5	0.9
LEHZ20(L)	M4 x 0.7	1.4
LEHZ25(L)	M5 x 0.8	3.0
LEHZ32	M5 x 0.8	3.0
LEHZ40	M6 x 1	5.0

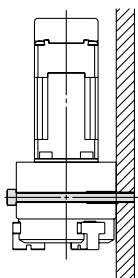
When using the thread on the back of the body



Model	Bolt	Max. tightening torque [N·m]	Max. screw-in depth L [mm]
LEHZ10(L)	M4 x 0.7	1.4	6
LEHZ16(L)	M4 x 0.7	1.4	6
LEHZ20(L)	M5 x 0.8	3.0	8
LEHZ25(L)	M6 x 1	5.0	10
LEHZ32	M6 x 1	5.0	10
LEHZ40	M8 x 1.25	12.0	14

#### Mounting of Electric Gripper Series LEHS

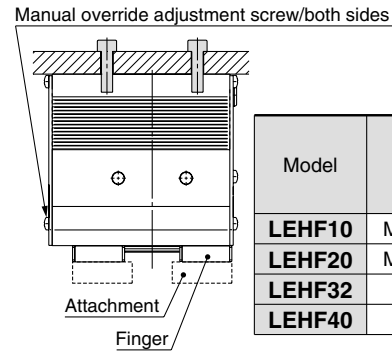
When using the thread on the mounting plate



Model	Bolt	Max. tightening torque [N·m]
LEHS10(L)	M3 x 0.5	0.9
LEHS20(L)	M5 x 0.8	3.0
LEHS32	M6 x 1	5.0
LEHS40	M6 x 1	5.0

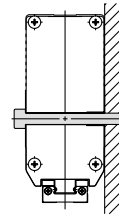
#### Mounting of Electric Gripper Series LEHF

When using the thread on the body



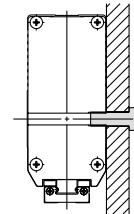
Model	Bolt	Max. tightening torque [N·m]	Max. screw-in depth L [mm]
LEHF10	M4 x 0.7	1.4	7
LEHF20	M5 x 0.8	3.0	8
LEHF32	M6 x 1	5.0	10
LEHF40	M6 x 1	5.0	10

When using the thread on the mounting plate



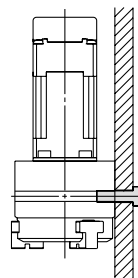
Model	Bolt	Max. tightening torque [N·m]
LEHF10	M4 x 0.7	1.4
LEHF20	M5 x 0.8	3.0
LEHF32	M6 x 1	5.0
LEHF40	M6 x 1	5.0

When using the thread on the back of the body



Model	Bolt	Max. tightening torque [N·m]	Max. screw-in depth L [mm]
LEHF10	M5 x 0.8	3.0	10
LEHF20	M6 x 1	5.0	12
LEHF32	M8 x 1.25	12.0	16
LEHF40	M8 x 1.25	12.0	16

When using the thread on the back of the body



Model	Bolt	Max. tightening torque [N·m]	Max. screw-in depth L [mm]
LEHS10(L)	M4 x 0.7	1.4	6
LEHS20(L)	M6 x 1	5.0	10
LEHS32	M8 x 1.25	12.0	14
LEHS40	M8 x 1.25	12.0	14

LEHZ

LEHF

LEHS

Specific Product Precautions

LECP6

Specific Product Precautions



# Series LEH Electric Grippers/ Specific Product Precautions 3

Be sure to read before handling. Refer to back page 1 for Safety Instructions and the operation manual for Electric Actuators Precautions.  
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## Mounting

### Warning

#### 3. Tighten the product mounting screws to the specified torque.

Tightening to a torque over the specified range can cause displacing or dropping of the attachment.

#### 4. When fixing the attachment to the finger, avoid applying excessive torque to the finger.

Play or deteriorated accuracy can result.

#### 5. The mounting face has holes and slots for positioning. Make use of them if necessary.

#### 6. When a workpiece is to be removed for de-energizing, open or close the finger manually or remove the attachment beforehand.

When the workpiece is removed by manual operation, check the position of the manual override of the product, and allow a necessary space. At that time, be careful not to apply excessive torque to the manual override, which causes breakage and malfunction.

#### 7. When gripping a workpiece, keep a gap in the horizontal direction to prevent the load from concentrating on one finger, to allow for workpiece misalignment.

For the same purpose, when moving a workpiece for alignment by the product, minimize the friction resistance created by the movement of the workpiece. The finger can be displaced, play or breakage.

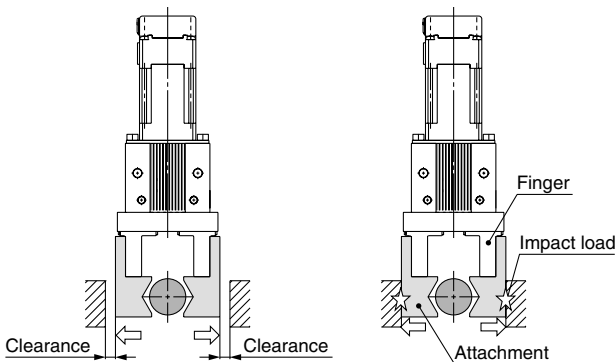
#### 8. Perform adjustment and confirmation to ensure there is no external force applied to the finger.

If the finger is subject to repetitive lateral load or impact load, it can cause play or breakage and the lead screw can get stuck, which results in operation failure. Allow a clearance to prevent the workpiece or the attachment from hitting gripper product at the end of the stroke.

#### 1) Stroke end when fingers are open

○ With clearance

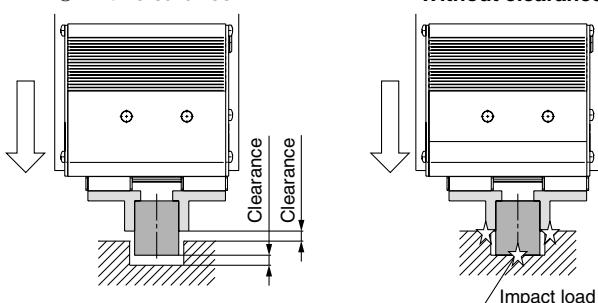
× Without clearance



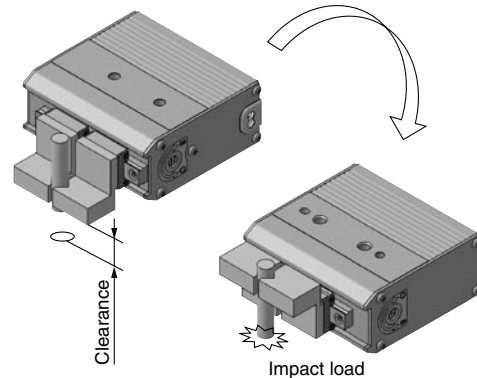
#### 2) Stroke end when gripper is moving

○ With clearance

× Without clearance

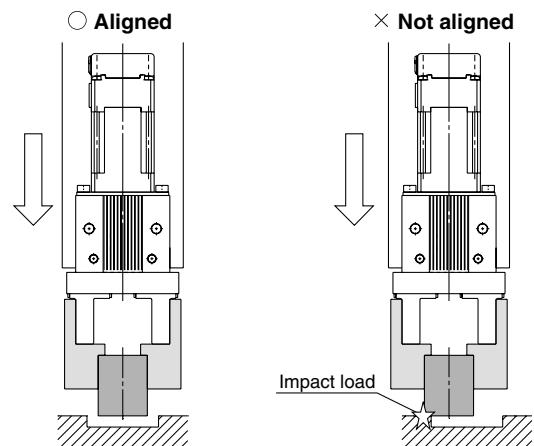


#### 3) When turning over



#### 9. When mounting a workpiece, align it with the product carefully to prevent excessive force to the finger.

In particular, during a trial run, operate the product manually or at a low speed and check that the safety is assured without impact.



## Handling

### Caution

#### 1. The parameters of the stroke and the open and close speed are for both fingers.

The stroke and the open and close speed of one finger will be halved from a set parameter.

#### 2. When gripping a workpiece by the product, be sure to use the in pushing operation.

Also, do not hit the workpiece to the finger and attachment in positioning operation or in the range of positioning operation.

Otherwise, the lead screw can get caught and cause operation failure. However, if the workpiece cannot be gripped in pushing operation (such as a plastically deformed workpiece, rubber component, etc.), you can grip it in positioning operation with consideration to the elastic force of the workpiece. In this case, keep the driving speed for impact specified in item 3.

When the operation is interrupted by a stop or temporary stop, and a pushing operation instruction is output just after operation is restarted, the operating direction will vary depending on the start position.



# Series LEH Electric Grippers/ Specific Product Precautions 4

Be sure to read before handling. Refer to back page 1 for Safety Instructions and the operation manual for Electric Actuators Precautions.  
Please download it via our website. <http://www.smcworld.com/>

## Handling

### ⚠ Caution

#### 3. Keep the following driving speed range for the pushing operation.

- LEHZ: 5 to 50 mm/s
- LEHF10: 5 to 20 mm/s
- LEHF20/32/40: 5 to 30 mm/s
- LEHS: 5 to 50 mm/s

Operation at the speed outside of the range can get the lead screw caught and cause operation failure.

#### 4. There is no backlash effect in the pushing operation.

The return to origin is done by the pushing operation. When in the positioning operation, the gap is caused by backlash in the finger. Please set "Position" in consideration of backlash.

#### 5. Do not change the setting of energy saving mode.

When the pushing (gripping) operation is continued, the heat generated by the motor can cause operation failure.

This is due to the self-lock mechanism in the lead screw, which makes the product keep the gripping force. To save the energy in this situation where the product is to be stand-by or continue to grip for extended periods of time, the product will be controlled to reduce current consumption (to 40% automatically after it has gripped a workpiece once). If there is a reduction of gripping force seen in the product after a workpiece has been gripped and deformed over certain amount of time, contact SMC.

#### 6. INP output signal

##### 1) Positioning operation

When the product comes within the set range by step data [In pos], the INP (In position) output signal is turned on.  
Initial value: Set to [0.50] or higher.

##### 2) Pushing operation

When the actual thrust exceeds step data (Trigger LV), the INP (In position) output signal is outputted.

Set the [Pushing force] and the [Trigger LV] within the limitation range.

a) To ensure that the gripper holds the workpiece with the set [pushing force], it is recommended that the [Trigger LV] is set to the same value as the [pushing force].

b) When the [Trigger LV] and [Pushing force] are set to be less than the lower limit of the limitation range, there is a possibility that the INP output signal will be switched on from the pushing operation start position.

##### <INP output signal in the controller version>

##### ● SV0.8 or more

Although the product automatically switches to the energy saving mode (reduced current) after pushing operation is completed, the INP output signal remains ON.

##### ● SV0.7 or less

a. When [Trigger LV] is set to 40% (when the value is the same as the energy saving mode)

Although the product automatically switches to the energy saving mode (reduced current) after pushing operation is completed, the INP output signal remains ON.

b. When [Trigger LV] is set higher than 40%

The product is turned on after pushing operation is completed, but INP output signal will be turned off when current consumption is reduced automatically in energy saving mode.

#### 7. When releasing a workpiece, set the positioning force to 150%.

If the torque is too small when a workpiece is gripped in the pushing operation, the product can have galling and become unable to release the workpiece.

#### 8. If the finger has galling due to operational setting error, etc., open and close the finger manually.

When the workpiece is removed by manual operation, check the position of the manual override of the product, and reserve a necessary space. At that time, be careful not to apply excessive torque to the manual override, which causes breakage and malfunction.

#### 9. Self-lock mechanism

The product keeps a gripping force due to the self-lock mechanism in the lead screw.

Also, it will not operate in the opposite direction even when external force is applied during gripping a workpiece.

##### <Type of Stops, Cautions>

##### 1) All the power supplies to the controller are shut off.

When the power supply is turned on to restart operation, the controller will be initialized, and the product can drop a workpiece due to a motor magnetic pole detective operation. (It means that there is finger motions of partial strokes by the phase detection of motor after power supply is turned on.) Remove the workpiece before restarting operation.

##### 2) "EMG (stop)" of the CN1 of the controller is shut off.

###### When using the stop switch on the teaching box;

It is not necessary to remove a workpiece beforehand because a motor magnetic pole detective operation will not occur when the power supply is turned on to restart operation. An alarm can take place when operation is restarted from stop.

##### 3) "M24V (motor driving power supply)" of the CN1 of the controller is shut off.

It is not necessary to remove a workpiece beforehand because a motor magnetic pole detective operation will not occur when the power supply is turned on to restart operation.

An alarm can take place when stop is activated during operation or operation is restarted from stop.

#### 10. Return to origin

1) It is recommended to set the directions of return to origin and workpiece gripping to the same direction.

If they are set opposite, there can be backlash, which worsens the measurement accuracy significantly.

2) If the direction of return to origin is set to CW (Internal grip);

If the return to origin is performed with the product only, there can be significant deviation between different actuators. Use a workpiece to set return to origin.

3) If the return to origin is performed by using a workpiece;

The stroke (operation range) will be shortened. Recheck the value of step data.

4) If basic parameters (Origin offset) are used;

When the return to origin is set with [Origin offset], it is necessary to change the current position of the product. Recheck the value of step data.

#### 11. In the pushing (gripping) operation, set the product to a position of at least 0.5 mm away from a workpiece. (This position is referred to as a pushing start position.)

If the product is set to the same position as a workpiece, the following alarm and unstable operation can occur.

##### a. "Posn failed" alarm

The product cannot reach a pushing start position due to the deviation of work pieces in width.

##### b. "Pushing ALM" alarm

The product is pushed back from a pushing start position after starting to push.

## Maintenance

### ⚠ Warning

#### 1. When the product is to be removed, check it has not been gripping a workpiece.

There is a risk of dropping the workpiece.

LEHZ

LEHF

LEHS

Specific Product Precautions

LECP6

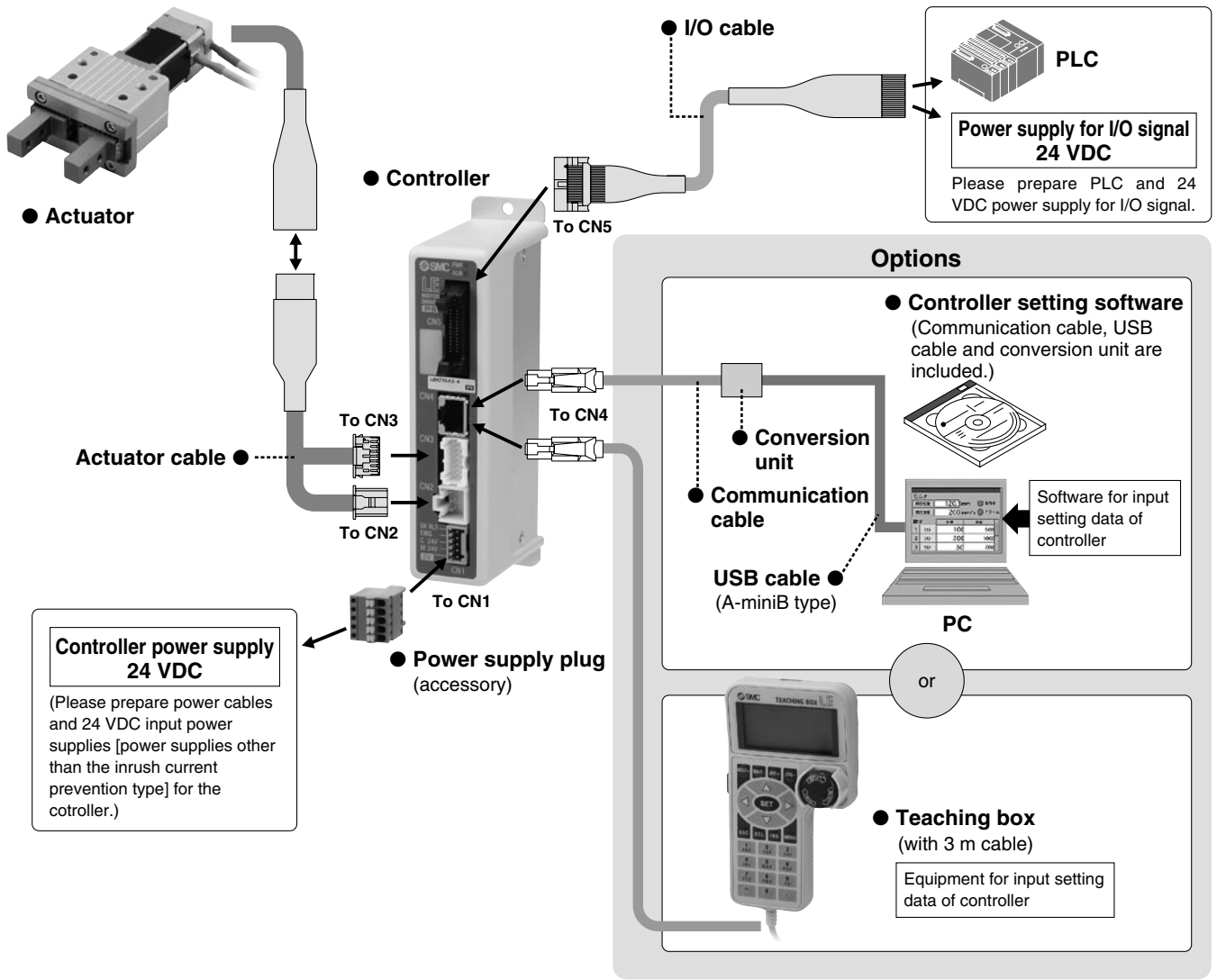
Specific Product Precautions







# Step Motor Controller (Servo/24 VDC) Series *LECP6*

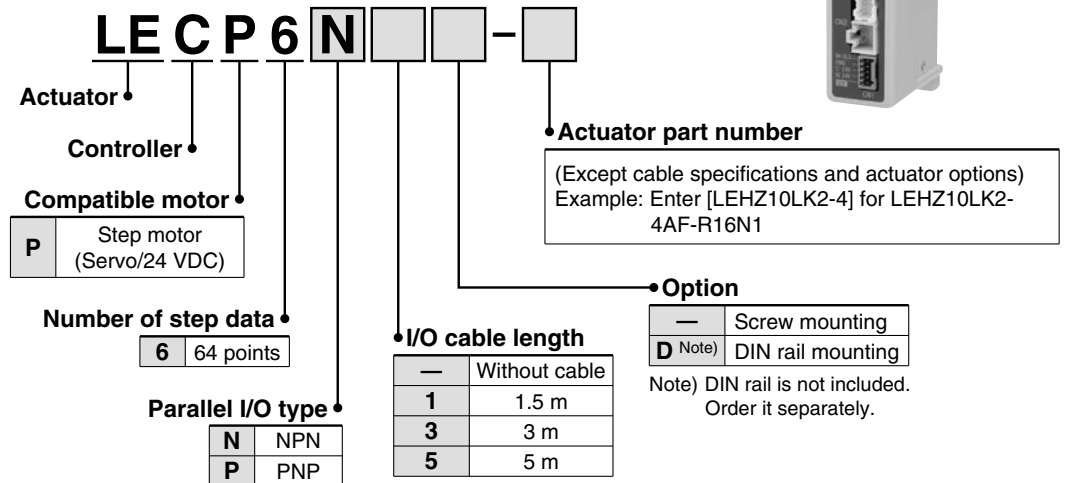


# Step Motor Controller (Servo/24 VDC)

## Series *LECP6*



### How to Order



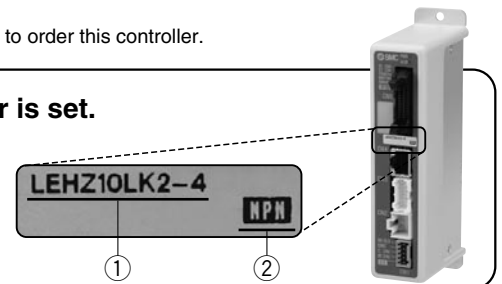
\* When controller equipped type (-P6□□) is selected when ordering the LE series, you do not need to order this controller.

### The controller is sold as single unit after the compatible actuator is set.

Confirm that the combination of the controller and the actuator is compatible.

<Be sure to check the following before use.>

- ① Check that the actuator label for model number matches the controller label.
- ② Check that the Parallel I/O configuration matches (NPN or PNP).



## Specifications

### Basic Specifications

Item	Specifications
<b>Compatible motor</b>	Unipolar connection type 2-phase HB step motor
<b>Power supply</b> <small>Note 1)</small>	Power voltage: 24 VDC $\pm 10\%$ Current consumption: 3 A (Peak 5 A) <small>Note 2)</small> [Including motor drive power, control power, stop, lock release]
<b>Parallel input</b>	11 inputs (Photo-coupler isolation)
<b>Parallel output</b>	13 outputs (Photo-coupler isolation)
<b>Compatible encoder</b>	A/B phase, Line receiver input Resolution 800 p/r
<b>Serial communication</b>	RS485 (Modbus protocol compliant)
<b>Memory</b>	EEPROM
<b>LED indicator</b>	LED (Green/Red) one of each
<b>Lock control</b>	Forced-lock release terminal <small>Note 3)</small>
<b>Cable length (m)</b>	I/O cable: 5 or less Actuator cable: 20 or less
<b>Cooling system</b>	Natural air cooling
<b>Operating temperature range (°C)</b>	0 to 40 (No condensation and freezing)
<b>Operating humidity range (%)</b>	35 to 85 (No condensation and freezing)
<b>Storage temperature range (°C)</b>	-10 to 60 (No condensation and freezing)
<b>Storage humidity range (%)</b>	35 to 85 (No condensation and freezing)
<b>Insulation resistance (MΩ)</b>	Between the housing (radiation fin) and SG terminal 50 (500 VDC)
<b>Weight (g)</b>	150 (Screw mounting) 170 (DIN rail mounting)

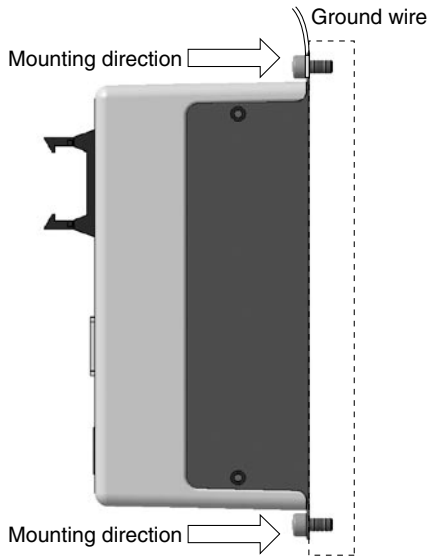
Note 1) Do not use the power supply of "inrush current prevention type" for the controller power supply.

Note 2) The power consumption changes depending on the actuator model. Refer to the specifications of the actuator for more details.

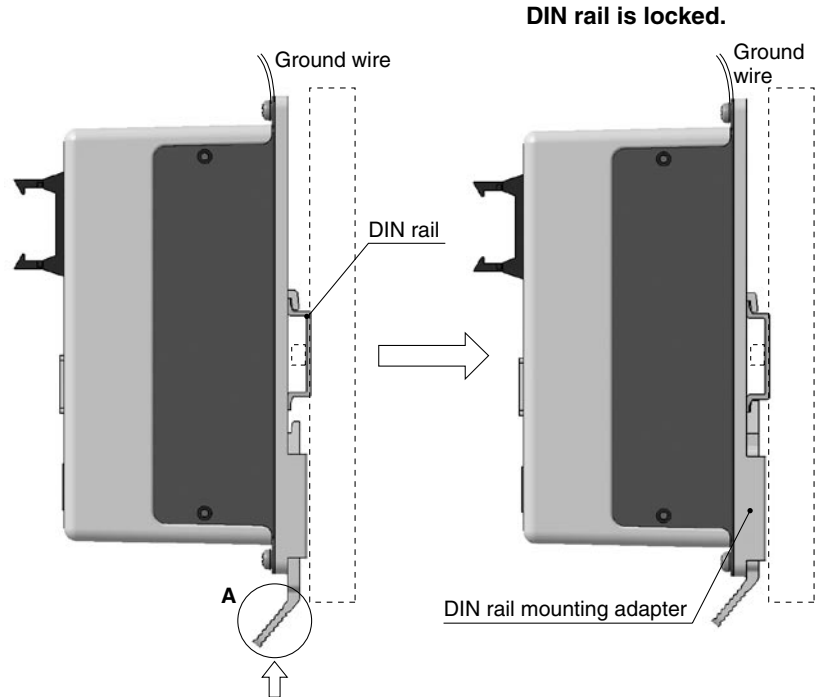
Note 3) Applicable to non-energized lock control type.

## How to Mount

### a) Screw mounting (LECP6□□-□) (Installation with two M4 screws)



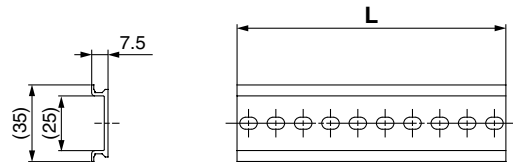
### b) DIN rail mounting (LECP6□□D-□) (Installation with the DIN rail)



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

### DIN rail AXT100-DR-□

\* For □, enter a number from the "No." line in the below table.  
Refer to the dimensions on page 52 for the mounting dimensions.



### L Dimensions

No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
L dimension	23	35.5	48	60.5	73	85.5	98	110.5	123	135.5	148	160.5	173	185.5	198	210.5	223	235.5	248	260.5
No.	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
L dimension	273	285.5	298	310.5	323	335.5	348	360.5	373	385.5	398	410.5	423	435.5	448	460.5	473	485.5	498	510.5

### DIN rail mounting adapter LEC-D0 (with 2 mounting screws)

This should be used when the DIN rail mounting adapter is mounted onto the screw mounting type controller afterwards.

LEHZ

LEHF

LEHS

Specific Product Precautions

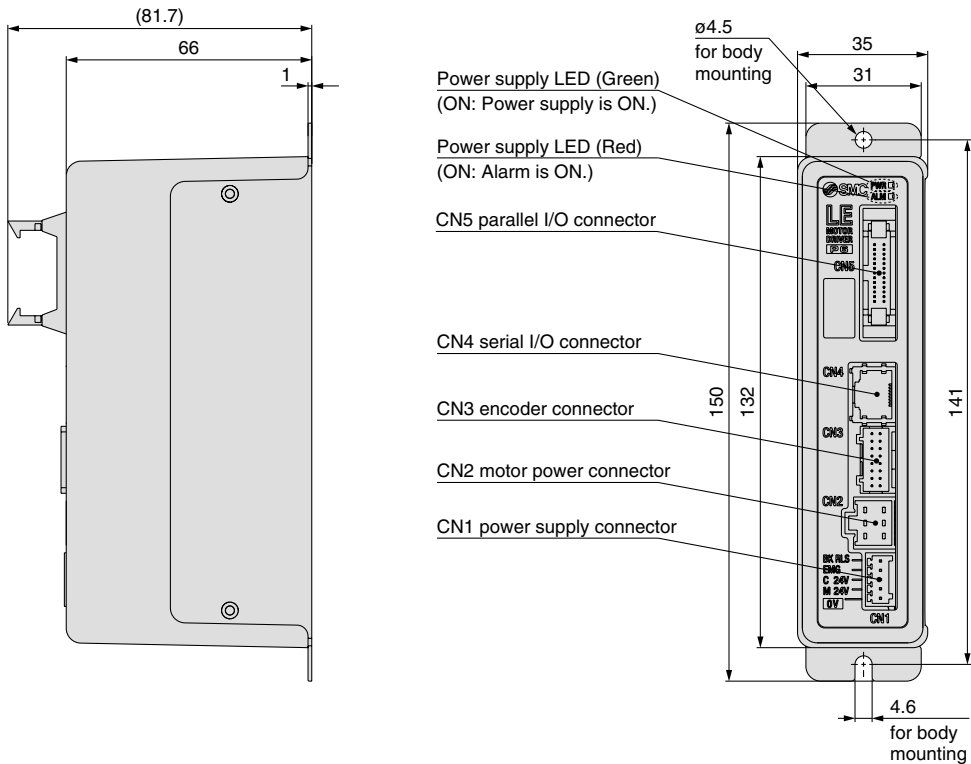
LECP6

Specific Product Precautions

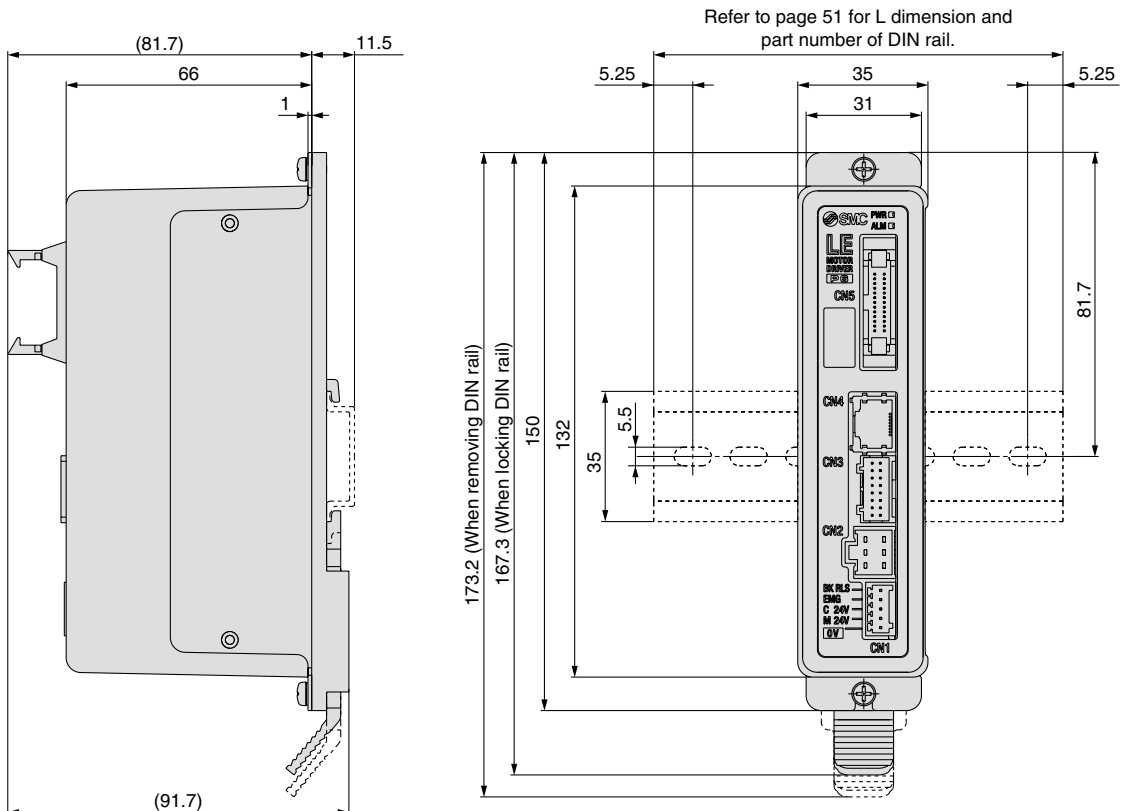
# Series **LECP6**

## Dimensions

### a) Screw mounting (LECP6□□-□)



### b) DIN rail mounting (LECP6□□D-□)



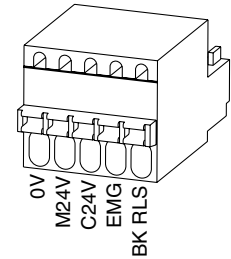
## Wiring Example 1

**Power Supply Connector: CN1** \* Power supply plug (Phoenix Contact FK-MC0.5/5-ST-2.5) is an accessory.

Power supply plug

### CN1 Power Supply Connector Terminal

Terminal name	Function	Function details
0V	Common supply (-)	M24V terminal/C24V terminal/EMG terminal/BK RLS terminal are common (-).
M24V	Motor power supply (+)	This is the motor power supply (+) that is supplied to the controller.
C24V	Control power supply (+)	This is the control power supply (+) that is supplied to the controller.
EMG	Stop (+)	This is the input (+) that releases the stop.
BK RLS	Lock release (+)	This is the input (+) that releases the lock.

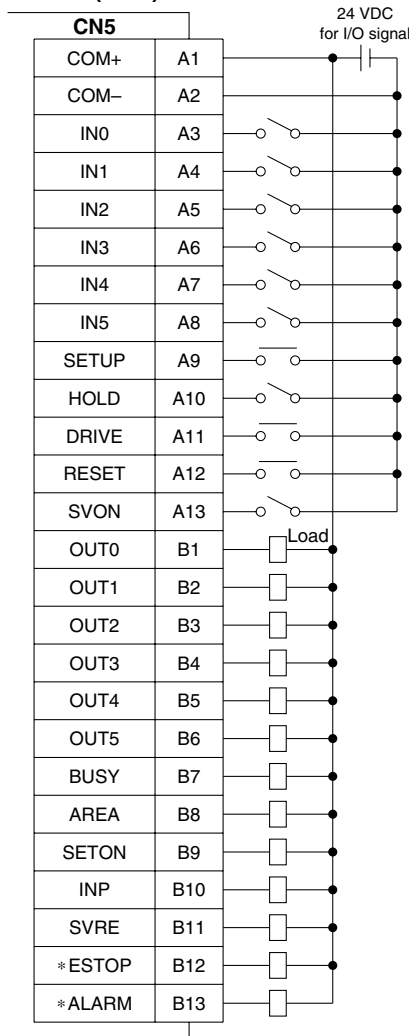


## Wiring Example 2

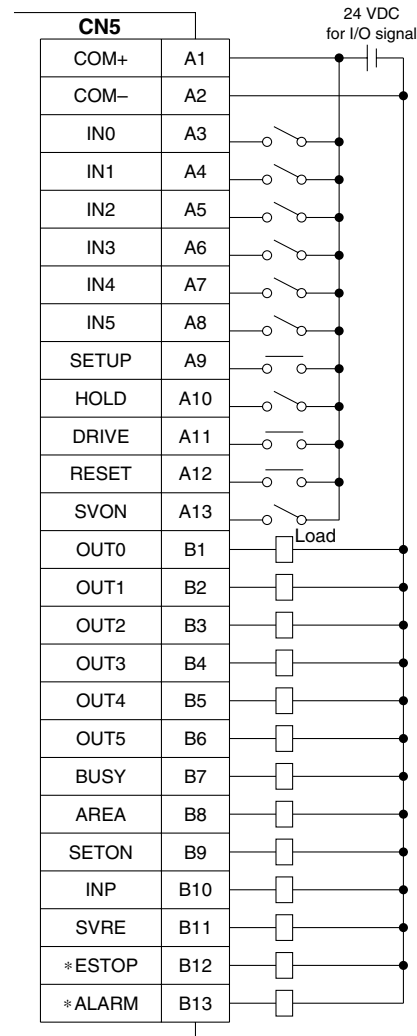
**Parallel I/O Connector: CN5** \* When you connect a PLC, etc., to the CN5 parallel I/O connector, please use the I/O cable (LEC-CN5-□).  
 \* The wiring should be changed depending on the type of the parallel I/O (NPN or PNP). Please wire referring to the following diagram.

### Wiring diagram

#### LECP6N□□-□ (NPN)



#### LECP6P□□-□ (PNP)



### Input Signal

Name	Contents
COM+	Connects the power supply 24 V for input/output signal
COM-	Connects the power supply 0 V for input/output signal
IN0 to IN5	Step data specified Bit No. (Input is instructed in the combination of IN0 to 5.)
SETUP	Instruction to return to the original position
HOLD	Operation is temporarily stopped.
DRIVE	Instruction to drive
RESET	Alarm reset and operation interruption
SVON	Servo ON instruction

### Output Signal

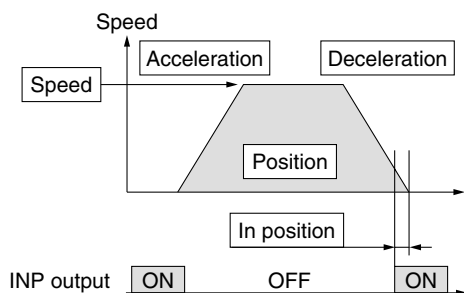
Name	Contents
OUT0 to OUT5	Outputs the step data No. during operation
BUSY	Outputs when the actuator is moving
AREA	Outputs within the step data area output setting range
SETON	Outputs when returning to the original position
INP	Outputs when target position or target force is reached (Turns on when the positioning or pushing is completed.)
SVRE	Outputs when servo is on
* ESTOP (Note)	Not output when EMG stop is instructed
* ALARM (Note)	Not output when alarm is generated

Note) These signals are output when the power supply of the controller is ON. (N.C.)

## Step Data Setting

### 1. Step data setting for positioning

In this setting, the actuator moves toward and stops at the target position. The following diagram shows the setting items and operation. The setting items and set values for this operation are stated below.



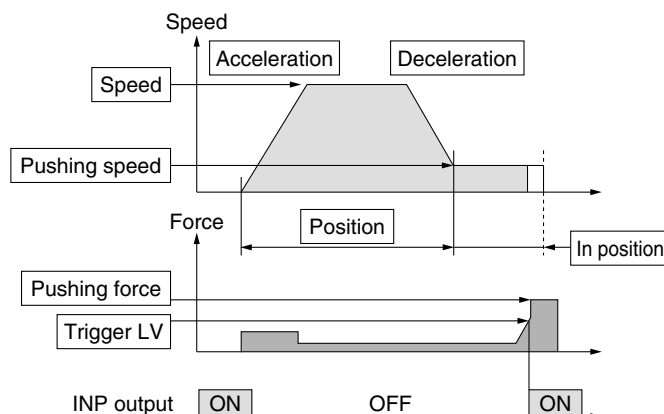
⊙: Need to be set.  
○: Need to be adjusted as required.  
—: Setting is not required.

#### Step Data (Positioning)

Necessity	Item	Description
⊙	Movement MOD	When the absolute position is required, set Absolute. When the relative position is required, set Relative.
○	Speed	Transfer speed to the target position
○	Position	Target position
○	Acceleration	Parameter which defines how rapidly the actuator reaches the speed set. The higher the set value, the faster it reaches the speed set.
○	Deceleration	Parameter which defines how rapidly the actuator comes to stop. The higher the set value, the quicker it stops.
⊙	Pushing force	Set 0. (If values 1 to 100 are set, the operation will be changed to the pushing operation.)
—	Trigger LV	Setting is not required.
—	Pushing speed	Setting is not required.
○	Positioning force	Max. torque during the positioning operation (No specific change is required.)
○	Area 1, Area 2	Condition that turns on the AREA output signal.
○	In position	Condition that turns on the INP output signal. When the actuator enters the range of [in position], the INP output signal turns on. (It is unnecessary to change this from the initial value.) When it is necessary to output the arrival signal before the operation is completed, make the value larger.

### 2. Step data setting for pushing

The actuator moves toward the pushing start position, and when it reaches that position, it starts pushing with less than the set force. The following diagram shows the setting items and operation. The setting items and set values for this operation are stated below.



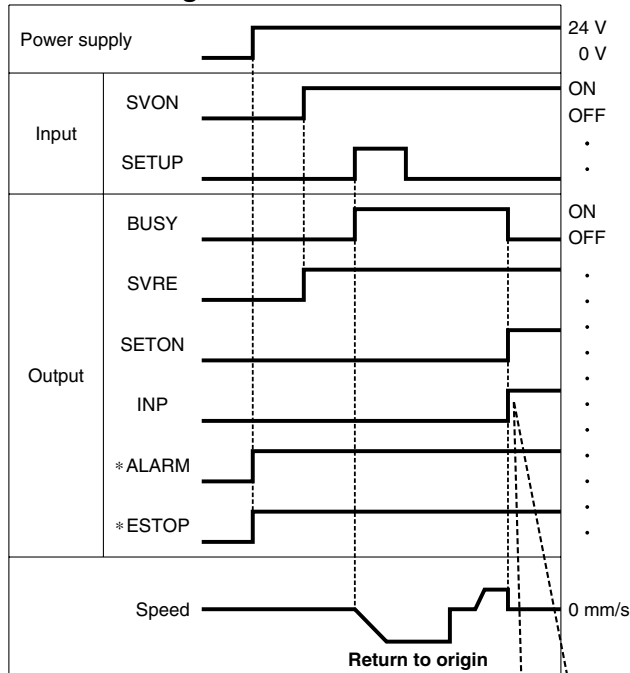
⊙: Need to be set.  
○: Need to be adjusted as required.

#### Step Data (Pushing)

Necessity	Item	Description
⊙	Movement MOD	When the absolute position is required, set Absolute. When the relative position is required, set Relative.
○	Speed	Transfer speed to the pushing start position
○	Position	Pushing start position
○	Acceleration	Parameter which defines how rapidly the actuator reaches the speed set. The higher the set value, the faster it reaches the speed set.
○	Deceleration	Parameter which defines how rapidly the actuator comes to stop. The higher the set value, the quicker it stops.
⊙	Pushing force	Pushing force ratio is defined. The setting range differs depending on the electric actuator type. Refer to the operation manual for the electric actuator.
⊙	Trigger LV	Condition that turns on the INP output signal. The INP output signal is turned on when the generated force exceeds the value. Threshold level should be less than the pushing force.
○	Pushing speed	Pushing speed When the speed is set fast, the electric actuator and work pieces might be damaged due to the impact when they hit the end, so this set value should be smaller. Refer to the operation manual of the electric actuator.
○	Positioning force	Max. torque during the positioning operation (No specific change is required.)
○	Area 1, Area 2	Condition that turns on the AREA output signal.
⊙	In position	Transfer distance during pushing. If the transferred distance exceeds the setting, it stops even if it is not pushing. If the transfer distance is exceeded, the INP output signal will not be turned on.

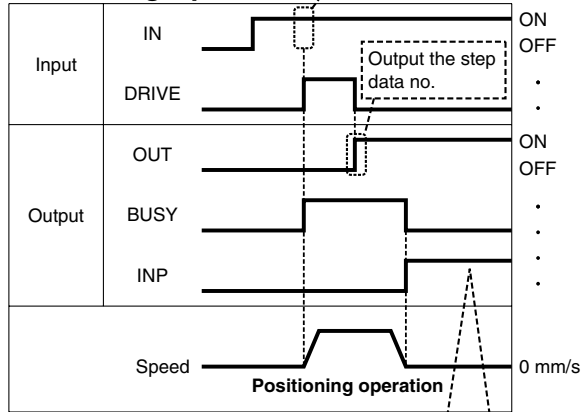
## Signal Timing

### Return to Origin



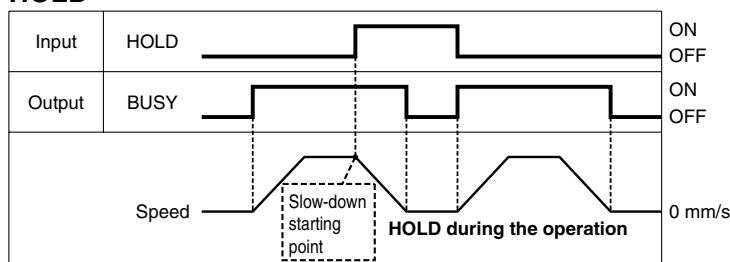
- \* "ALARM" and "ESTOP" are expressed as negative-logic circuit.
- \* When "Power supply is ON" is shown on the timing chart, the power supply is ON.
- \* When "Stop is OFF" is shown on the timing chart, the stop button is pressed (operation is stopped).

### Positioning Operation



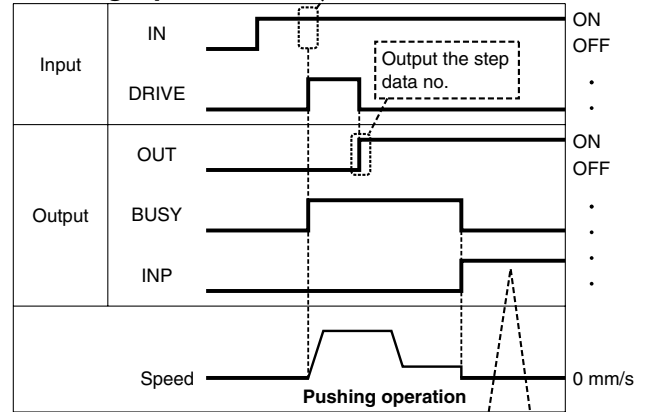
- \* "OUT" is output when "DRIVE" is changed from ON to OFF.  
(When power supply is applied, "DRIVE" or "RESET" is turned ON or "ESTOP" is turned OFF, all of the "OUT" outputs are turned OFF.)

### HOLD

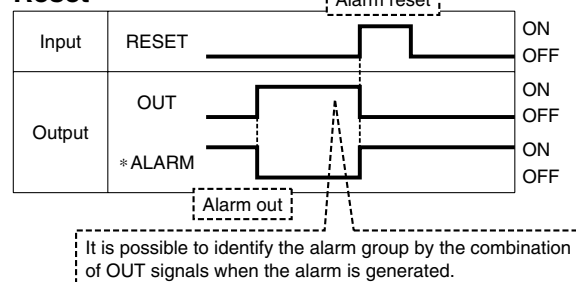


- \* When the actuator is in the positioning range in the pushing operation, it does not stop even if HOLD signal is input.

### Pushing Operation



### Reset



- \* "ALARM" and "ESTOP" are expressed as negative-logic circuit.

LEHZ

LEHF

LEHS

Specific Product Precautions

LECP6

Specific Product Precautions

# Series LECP6

## Options

[Actuator cable]

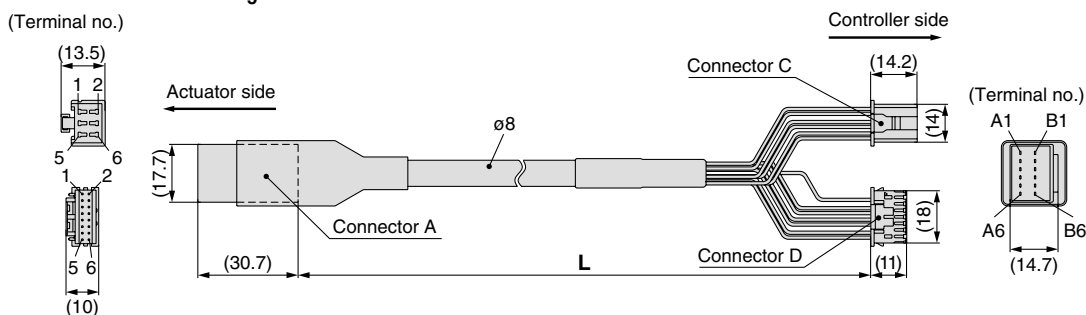
LE-CP-1

Cable length (L)

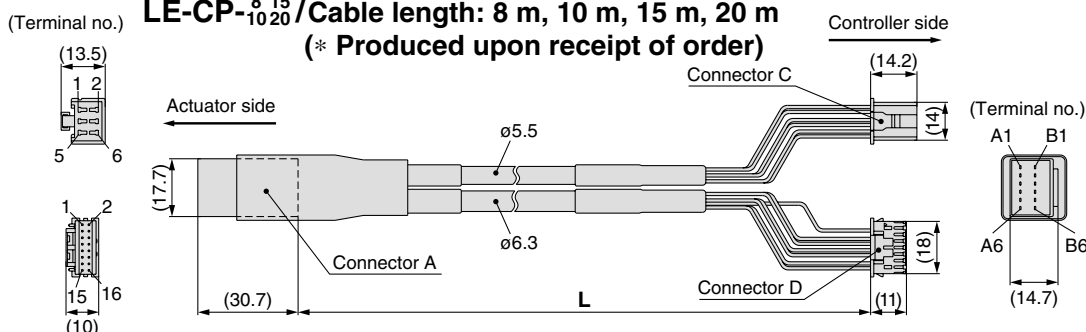
1	1.5 m
3	3 m
5	5 m
8	8 m*
A	10 m*
B	15 m*
C	20 m*

\* Produced upon receipt of order

LE-CP-<sup>1</sup>/<sub>3</sub> / Cable length: 1.5 m, 3 m, 5 m



LE-CP-<sup>8 15</sup>/<sub>10 20</sub> / Cable length: 8 m, 10 m, 15 m, 20 m  
(\* Produced upon receipt of order)



Circuit	Connector A terminal no.	Cable colour	Connector C terminal no.
A	B-1	Brown	2
A	A-1	Red	1
B	B-2	Orange	6
B	A-2	Yellow	5
COM-A/COM	B-3	Green	3
COM-B/-	A-3	Blue	4
Vcc	B-4	Brown	12
GND	A-4	Black	13
A	B-5	Red	7
A	A-5	Black	6
B	B-6	Orange	9
B	A-6	Black	8
		—	3

Cable colour	Connector D terminal no.
Brown	12
Black	13
Red	7
Black	6
Orange	9
Black	8
—	3

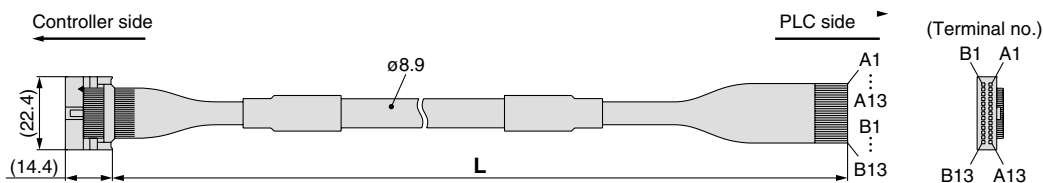
[I/O cable]

LEC-CN5-1

Cable length (L)

1	1.5 m
3	3 m
5	5 m

\* Conductor size: AWG28



Connector pin No.	Cable colour	Dot mark	Dot colour
A1	Light brown	■	Black
A2	Light brown	■	Red
A3	Yellow	■	Black
A4	Yellow	■	Red
A5	Light green	■	Black
A6	Light green	■	Red
A7	Gray	■	Black
A8	Gray	■	Red
A9	White	■	Black
A10	White	■	Red
A11	Light brown	■ ■	Black
A12	Light brown	■ ■	Red
A13	Yellow	■ ■	Black

Connector pin No.	Cable colour	Dot mark	Dot colour
B1	Yellow	■ ■	Red
B2	Light green	■ ■	Black
B3	Light green	■ ■	Red
B4	Gray	■ ■	Black
B5	Gray	■ ■	Red
B6	White	■ ■	Black
B7	White	■ ■	Red
B8	Light brown	■ ■ ■	Black
B9	Light brown	■ ■ ■	Red
B10	Yellow	■ ■ ■	Black
B11	Yellow	■ ■ ■	Red
B12	Light green	■ ■ ■	Black
B13	Light green	■ ■ ■	Red
—			Shield



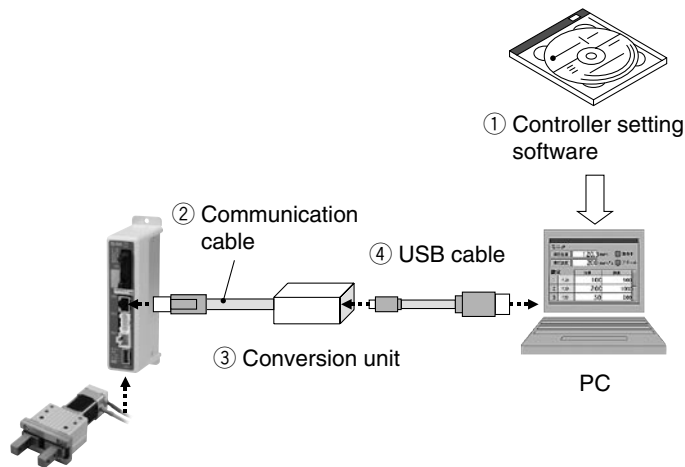
# Series LEC

# Controller Setting Software/LEC-W1

## How to Order

### LEC-W1

Controller setting software  
(Japanese and English are available.)



## Contents

- ① Controller setting software (CD-ROM)
- ② Communication cable  
(Cable between the controller and the conversion unit)
- ③ Conversion unit
- ④ USB cable  
(Cable between the PC and the conversion unit)

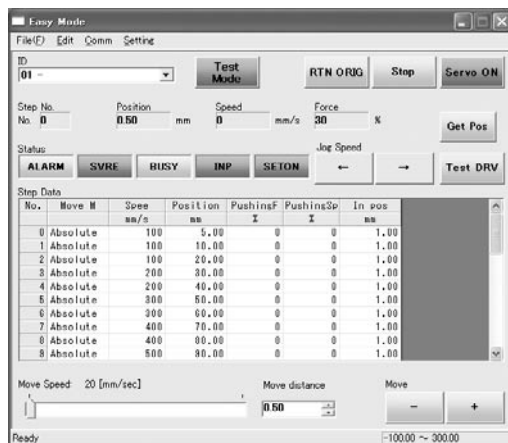
## Hardware Requirements

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

\* Windows® and Windows XP® are registered trademarks of Microsoft Corporation.

## Screen Example

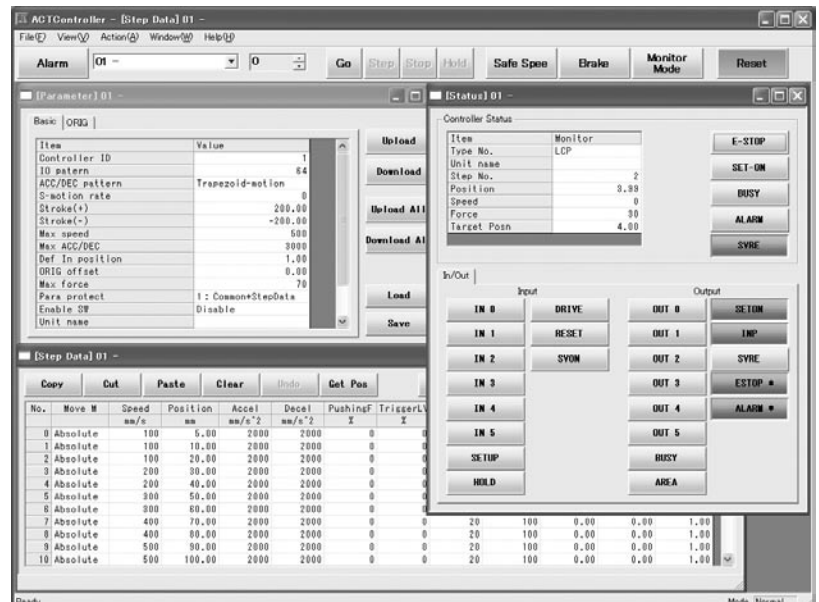
### Easy mode screen example



### Easy operation and simple setting

- Allowing to set and display actuator step data such as position, speed, force, etc.
- Setting of step data and testing of the drive can be performed on the same page.
- Can be used to jog and move at a constant rate.

### Normal mode screen example



### Detail setting

- Step data can be set in detail.
- Signals and terminal status can be monitored.
- Parameters can be set.
- JOG and constant rate movement, return to origin, test operation and testing of compulsory output can be performed.

# Series LEC

# Teaching Box/LEC-T1



## How to Order



**LEC-T1-3 J G**

Teaching box

Cable length  
3 3 m

Initial language  
J Japanese  
E English

Enable switch

—	None
S	Equipped with enable switch

\* Interlock switch for jog test function

Stop switch

G	Equipped with stop switch
---	---------------------------

## Specifications

### Standard functions

- Chinese character display
- Stop switch is provided.

### Option

- Enable switch is provided.

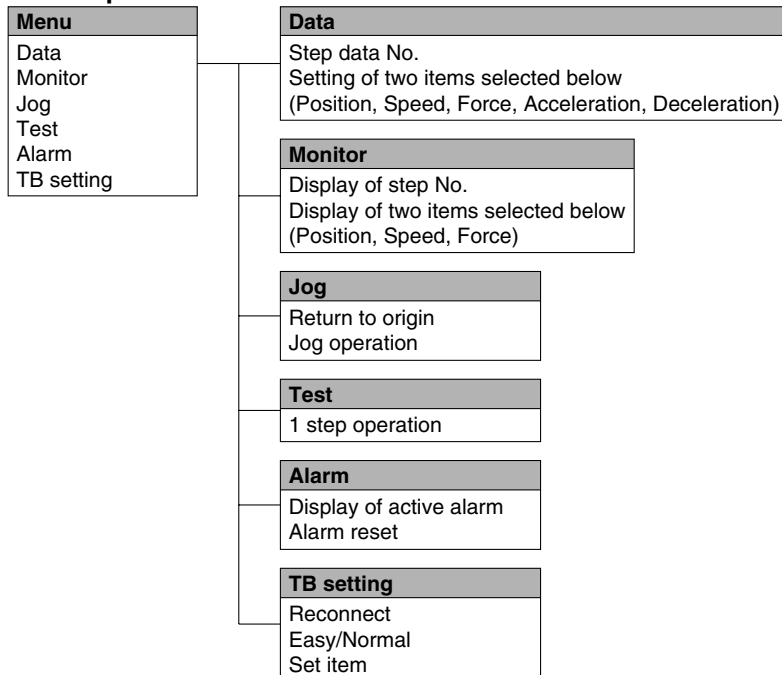
Item	Description
Switch	Stop switch, Enable switch (Option)
Cable length	3 m
Enclosure	IP64 (Except connector)
Operating temperature range (°C)	5 to 50 (No condensation)
Operating humidity range (%)	35 to 85
Weight (g)	350 (Except cable)

\* The EMC compliance for the teaching box was tested with LECP6 controller and applicable actuator only.

## Easy Mode

Function	Description
Step data	• Setting of step data
Jog	• Jog operation • Return to origin
Test	• 1 step operation • Return to origin
Monitor	• Display of axis and step data No. • Display of two items selected (Position, Speed, Force)
Alarm	• Display of active alarm • Alarm reset
TB setting	• Reconnection of axis • Setting of easy normal mode • Setting of step data and selection of item for monitoring function

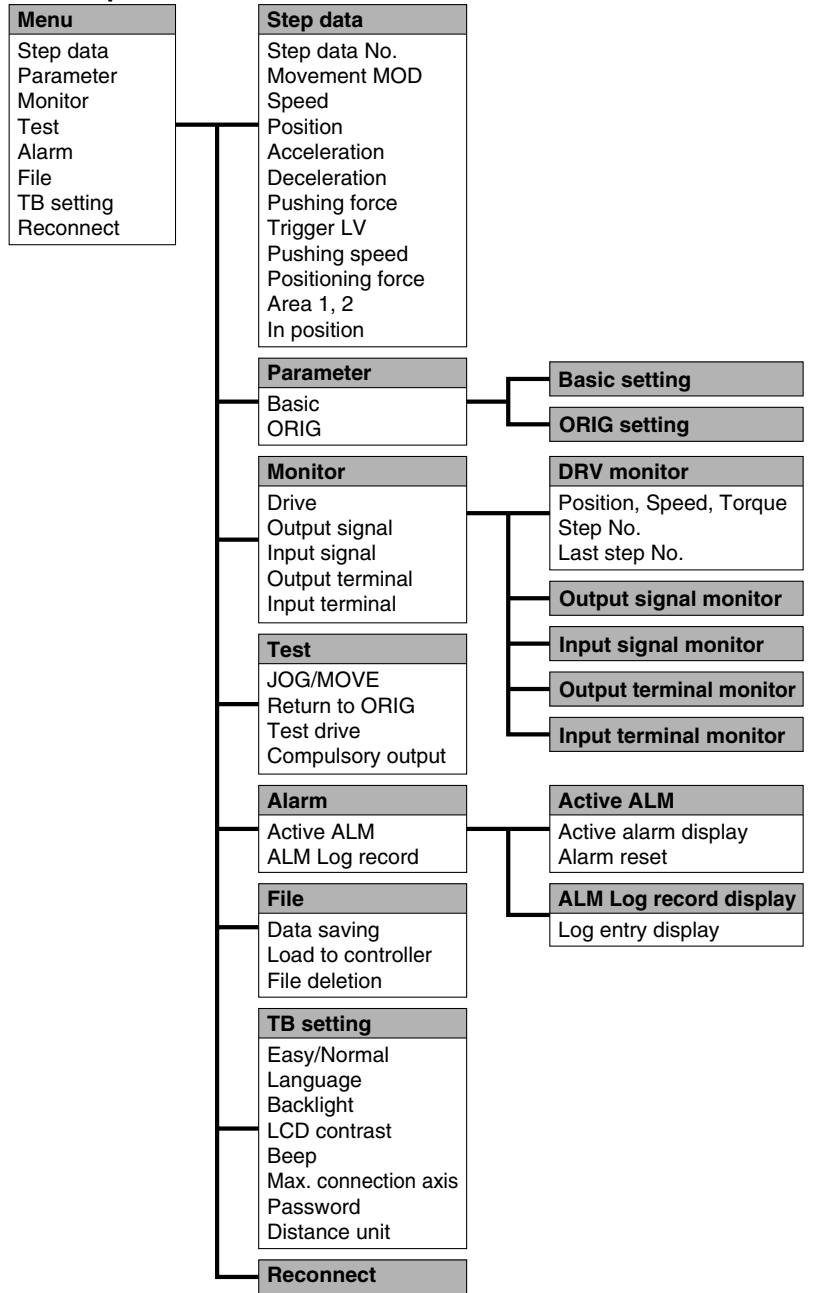
### Menu Operations Flowchart



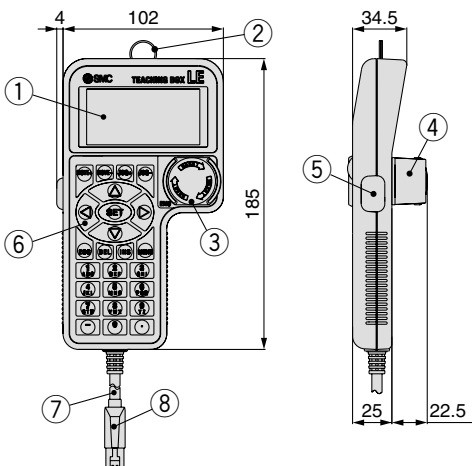
**Normal Mode**

Function	Description
Step data	• Step data setting
Parameter	• Parameters setting
Test	<ul style="list-style-type: none"> <li>• Jog operation/Constant rate movement</li> <li>• Return to origin</li> <li>• Test drive (Specify a maximum of 5 step data and operate.)</li> <li>• Compulsory output (Compulsory signal output, Compulsory terminal output)</li> </ul>
Monitor	<ul style="list-style-type: none"> <li>• Drive monitor</li> <li>• Output signal monitor</li> <li>• Input signal monitor</li> <li>• Output terminal monitor</li> <li>• Input terminal monitor</li> </ul>
Alarm	<ul style="list-style-type: none"> <li>• Active alarm display (Alarm reset)</li> <li>• Alarm log record display</li> </ul>
File	<ul style="list-style-type: none"> <li>• Data saving Save the step data and parameters of the controller which is being used for communication (it is possible to save four files, with one set of step data and parameters defined as one file).</li> <li>• Load to controller Loads the data which is saved in the teaching box to the controller which is being used for communication.</li> <li>• Delete the saved data.</li> </ul>
TB setting	<ul style="list-style-type: none"> <li>• Display setting (Easy/Normal mode)</li> <li>• Language setting (Japanese/English)</li> <li>• Backlight setting</li> <li>• LCD contrast setting</li> <li>• Beep sound setting</li> <li>• Max. connection axis</li> <li>• Distance unit (mm/inch)</li> </ul>
Reconnect	• Reconnection of axis

**Menu Operations Flowchart**



**Dimensions**



No.	Description	Function
1	<b>LCD</b>	A screen of liquid crystal display (with backlight)
2	<b>Ring</b>	A ring for hanging the teaching box
3	<b>Stop switch</b>	Locks and stops operation when this switch is pressed. The lock is released when it is turned to the right.
4	<b>Stop switch guard</b>	A guard for the stop switch
5	<b>Enable switch (Option)</b>	Prevents unintentional operation (unexpected operation) of the jog test function. Other functions such as data change are not covered.
6	<b>Key switch</b>	Switch for each input
7	<b>Cable</b>	Length: 3 meters
8	<b>Connector</b>	A connector connected to CN4 of the controller



# Series LEC Controller and Peripheral Devices/ Specific Product Precautions 1

Be sure to read before handling.  
Refer to back page 1 for Safety Instructions.

## Design/Selection

### Warning

- 1. Be sure to apply the specified voltage.**  
Otherwise, malfunction and breakage may be caused. If the applied voltage is lower than the specified, it is possible that the load cannot be moved due to an internal voltage drop of the controller. Please check the operating voltage before use.
- 2. Do not operate the product beyond the specifications.**  
Otherwise, a fire, malfunction or actuator damage can result. Please check the specifications before use.
- 3. Install an emergency stop circuit outside of the enclosure.**  
Please install an emergency stop outside of the enclosure so that it can stop the system operation immediately and intercept the power supply.
- 4. In order to prevent damage due to the breakdown and the malfunction of the controller and its peripheral devices, a backup system should be established previously by giving a multiple-layered structure or a fail-safe design to the equipment, etc.**
- 5. If a danger against the personnel is expected due to an abnormal heat generation, smoking, ignition, etc., of the controller and its peripheral devices, cut off the power supply for the product and the system immediately.**

## Handling

### Warning

- 1. Do not touch the inside of the controller and its peripheral devices.**  
It may cause an electric shock or damage to the controller.
- 2. Do not perform the operation or setting of the product with wet hands.**  
It may cause an electric shock.
- 3. Product with damage or the one lacking of any components should not be used.**  
It may cause an electric shock, fire, or injury.
- 4. Use only the specified combination between the electric actuator and controller.**  
It may cause damage to the actuator or the controller.
- 5. Be careful not to be caught or hit by the workpiece while the actuator is moving.**  
It may cause an injury.
- 6. Do not connect the power supply or power on the product before confirming the area to which the workpiece moves is safe.**  
The movement of the workpiece may cause an accident.
- 7. Do not touch the product when it is energized and for some time after power has been disconnected, as it is very hot.**  
It may lead to a burn due to the high temperature.
- 8. Check the voltage using a tester for more than 5 minutes after power-off in case of installation, wiring and maintenance.**  
It may cause an electric shock, fire, or injury.

## Handling

### Warning

- 9. Static electricity may cause malfunction or break the controller. Do not touch the controller while power is supplied.**  
When touching the controller for maintenance, take sufficient measures to eliminate static electricity.
- 10. Do not use the product in an area where dust, powder dust, water, chemicals or oil is in the air.**  
It will cause failure or malfunction.
- 11. Do not use the product in an area where a magnetic field is generated.**  
It will cause failure or malfunction.
- 12. Do not install the product in the environment of flammable gas, explosive gas and corrosive gas.**  
It could lead to fire, explosion and corrosion.
- 13. Radiant heat from strong heat supplies such as a furnace, direct sunlight, etc., should not be applied to the product.**  
It will cause failure of the controller or its peripheral devices.
- 14. Do not use the product in an environment subject to a temperature cycle.**  
It will cause failure of the controller or its peripheral devices.
- 15. Do not use the product in a place where surges are generated.**  
When there are units that generate a large amount of surge around the product (e.g., solenoid type lifters, high frequency induction furnaces, motors, etc.), this may cause deterioration or damage to the product's internal circuit. Avoid supplies of surge generation and crossed lines.
- 16. Do not install the product in an environment under the effect of vibrations and impacts.**  
It will cause failure or malfunction.
- 17. When a surge generating load such as a relay or solenoid valve is directly driven, use a product that incorporates a surge absorption element.**

## Installation

### Warning

- 1. Install the controller and its peripheral devices on a fire-proof material.**  
A direct installation on or near a flammable material may cause fire.
- 2. Do not install the product in a place subject to vibrations and impacts.**  
It will cause failure or malfunction.
- 3. Do not mount the controller and its peripheral devices together with a large-sized electromagnetic contactor or no-fuse breaker, which generates vibration, on the same panel. Mount them on different panels, or keep the controller and its peripheral devices away from such a vibration supply.**
- 4. Install the controller and its peripheral devices on a flat surface.**  
If the mounting surface is distorted or not flat, an unacceptable force may be added to the housing, etc., to cause troubles.



# Series LEC Controller and Peripheral Devices/ Specific Product Precautions 2

Be sure to read before handling.  
Refer to back page 1 for Safety Instructions.

## Power Supply

### Caution

- 1. Use a power supply that has low noise between lines and between power and ground.**  
In cases where noise is high, an isolation transformer should be used.
- 2. The power supplies should be separated between the controller power and the I/O signal power and both of them do not use the power supply of “inrush current prevention type”.**  
If the power supply is “inrush current prevention type”, a voltage drop may be caused during the acceleration of the actuator.
- 3. To prevent surges from lightning, an appropriate measure should be taken. Ground the surge absorber for lightning separately from the grounding of the controller and its peripheral devices.**

## Grounding

### Warning

- 1. Be sure to carry out grounding in order to ensure the noise tolerance.**
- 2. Dedicated grounding should be used.**  
Grounding should be to a D-class ground. (Ground resistance of 100 Ω or less)
- 3. Grounding should be performed near the controller and its peripheral devices to shorten the grounding distance.**
- 4. In the unlikely event that malfunction is caused by ground, please disconnect the unit from ground.**

## Maintenance

### Warning

- 1. Perform a maintenance check periodically.**  
Confirm wiring and screws are not loose.  
Loose screws or wires may cause unintentional malfunction.
- 2. Conduct an appropriate functional inspection after completing the maintenance.**  
At times where the equipment or machinery does not operate properly, conduct an emergency stop of the system. Otherwise, an unexpected malfunction may occur and it will become impossible to secure the safety. Conduct a test of the emergency stop in order to confirm the safety of the equipment.
- 3. Do not disassemble, modify or repair the controller and its peripheral devices.**
- 4. Do not put anything conductive or flammable inside of the controller.**  
It may cause a fire.
- 5. Do not conduct an insulation resistance test and withstand voltage test on this product.**
- 6. Ensure sufficient space for maintenance activities.**  
Design the system that allows required space for maintenance.

LEHZ

LEHF

LEHS

Specific Product Precautions

LECP6

Specific Product Precautions

## Related Product

### Electric Slide Table

#### Series LES

- **Compact, Space-saving**  
(61% reduction in volume compared to the SMC conventional products)
- **Reduced cycle time**  
Max. acceleration and deceleration:  
**5,000 mm/s<sup>2</sup>**  
Max. speed: **400 mm/s**
- **Positioning repeatability: ±0.05 mm**  
Positioning pattern points: **64 points**
- **Mounting in 2 directions is available.**



CAT.ES100-78

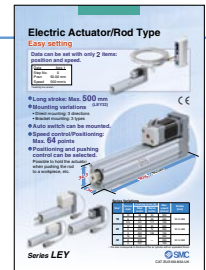
Model	Stroke (mm)	Work load (kg)				Speed (mm/s)	Screw lead (mm)
		Step motor (Servo/24 VDC)		Servo motor (24 VDC)			
		Horizontal	Vertical	Horizontal	Vertical		
LESH8R	50, 75	2	0.5	2	0.5	10 to 200	4
		1	0.25	1	0.25	20 to 400	8
LESH16R	50, 100	6	2	5	2	10 to 200	5
		4	1	2.5	1	20 to 400	10
LESH25R	50, 100, 150	9	4	6	2.5	10 to 150	8
		6	2	4	1.5	20 to 400	16

### Electric Actuator/Rod Type

#### Series LEY

- **Long stroke: Max. 500 mm**
- **Mounting variations (LEY32)**
  - Direct mounting: 3 directions
  - Bracket mounting: 3 types
- **Auto switch can be mounted.**
- **Speed control/Positioning: Max. 64 points**
- **Positioning and pushing control can be selected.**

Possible to hold the actuator when pushing the rod to a workpiece, etc.



CAT.ES100-83A

Size	Screw lead	Pushing force [N]		Max. speed [mm/s]	Stroke [mm]
		Step motor	Servo motor		
16	10	38	30	500	50 to 300
	5	74	58	250	
	2.5	141	111	125	
25	12	122	35	500	50 to 400
	6	238	72	250	
	3	452	130	125	
32	16	189	—	500	50 to 500
	8	370		250	
	4	707		125	

## Related Products

### Electric Actuator

- **Easy mounting of the body/Reduction of the installation time**

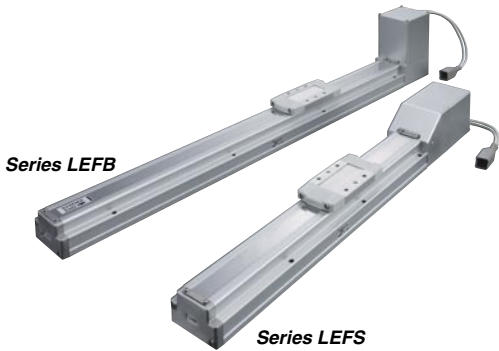
Possible to mount the main body without removing the external cover, etc.

- **Compact**

Height and Width: Reduced by approx. 50%



CAT.ES100-87A



Series	Size	Work load (kg)	Stroke (mm)	Speed (mm/s)	Positioning repeatability (mm)
LEFS	16	10	Up to 400	500	±0.02
	25	20	Up to 600	500	
	32	45	Up to 800	500	
LEFB	16	1	Up to 1000	Up to 2000	±0.1
	25	5	Up to 2000	Up to 2000	
	32	14	Up to 2000	Up to 1500	

\* The size corresponds to the bore of the air cylinder with an equivalent thrust. (For the operation using ball screws)

#### Ball screw drive

##### Series LEFS

- **Max. work load: 45 kg**
- **Positioning repeatability: ±0.02 mm**




#### Belt drive

##### Series LEFB

- **Max. stroke: 2000 mm**
- **Transfer speed: 2000 mm/s**

## Safety Instructions

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

-  **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.

- \*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 10218-1: Manipulating industrial robots - Safety.  
etc.

### 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 catalogue information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.
- 2. Only personnel with appropriate training should operate machinery and equipment.**  
The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.
- 3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.**
  1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
  2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
  3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.
- 4. 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 catalogue.
  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.

### Caution

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

## Limited warranty and Disclaimer/ Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”.

Read and accept them before using the product.

### Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered.\*2)  
Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.  
This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalogue for the particular products.

**\*2) Vacuum pads are excluded from this 1 year warranty.**

A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.  
Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

### Compliance Requirements

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

## Safety Instructions

Be sure to read “Handling Precautions for SMC Products” (M-E03-3) before using.