SMC Information

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09-E559
D-DN Printing OT 12450KS

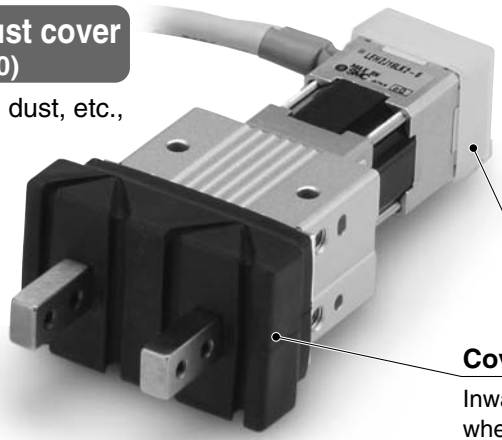
Electric Gripper 2-Finger Type/With Dust Cover
Series LEHZJ

2-finger type with dust cover is added to electric grippers!

CE RoHS

Sealed-construction dust cover
(Equivalent to IP50)

- Prevents machining chips, dust, etc., from getting inside
- Prevents spattering of grease, etc.



Three types of cover material
(Finger portion only)

- Chloroprene rubber (black): Standard
- Fluorine rubber (black): Option
- Silicone rubber (white): Option

Encoder dust cover
Silicone rubber

Cover designed with no protrusions
Inward-folding design creates no protrusions when the cover is opened and closed, preventing interference with other devices' operations.

■ 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

■ 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)

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

∗ When teaching box is used

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

Teaching box screen

With dedicated controller
Set with default parameters

Series LEHZJ

Size	Stroke/both sides [mm]	Gripping force [N]	
		Basic	Compact
10	4	6 to 14	3 to 6
16	6		4 to 8
20	10	16 to 40	11 to 28
25	14		

Series LEHZJ
Model Selection 1

Model Selection

Selection Procedure

Step 1 Confirm gripping force. → **Step 2** Confirm gripping point/ overhang. → **Step 3** Confirm external force on fingers.

Step 1 Confirmation of gripping force

Confirmation of conditions → Calculation of required gripping force → Selection of model from gripping force graph → Selection of 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 10 to 20 times Note) the workpiece weight, or more.

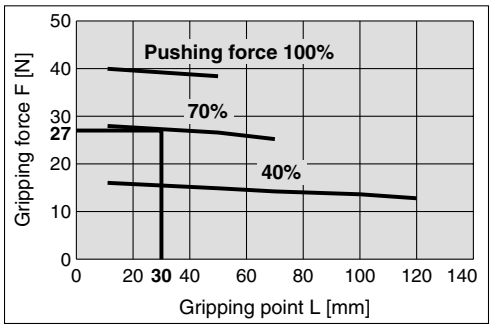
Note) For further details, refer to the calculation of required gripping force.

- 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 20 times or more above the workpiece weight.

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

LEHZJ20



In the case of selecting LEHZJ20

- 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.

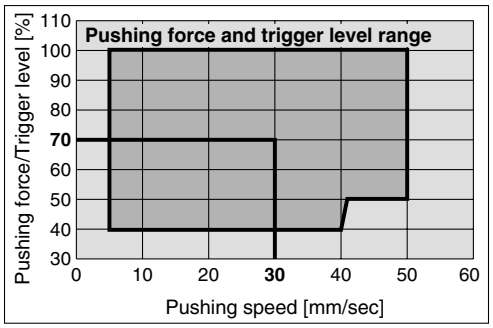
Pushing force: 70%

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

Gripping point distance: 30 mm

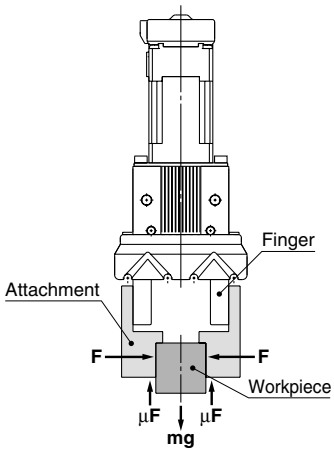
Pushing speed: 30 mm/sec

LEHZJ20



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

Calculation of 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/s²)
mg: Workpiece weight (N)

the conditions under which the workpiece will not drop are

$$\underline{2} \times \mu F > mg$$

(2 = Number of fingers)

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

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
$F = \dfrac{mg}{2 \times 0.2} \times 4 = 10 \times mg$	$F = \dfrac{mg}{2 \times 0.1} \times 4 = 20 \times mg$
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.

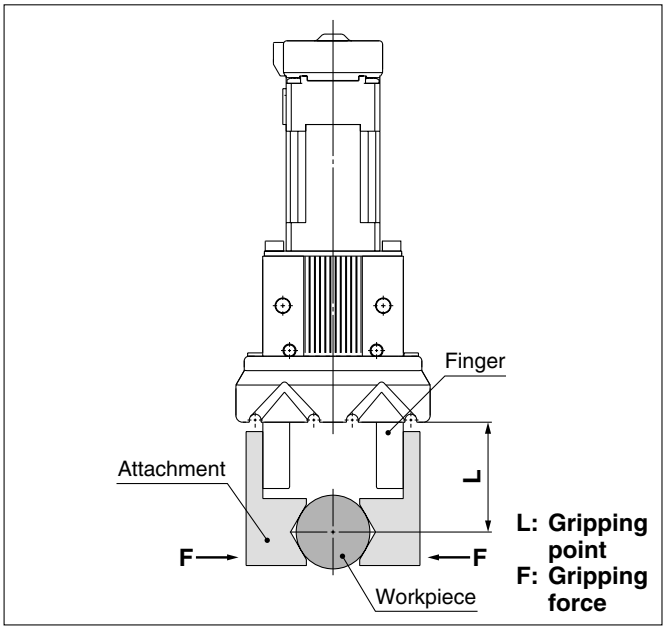
Model Selection

Step 1 Confirmation of gripping force: Series LEHZJ

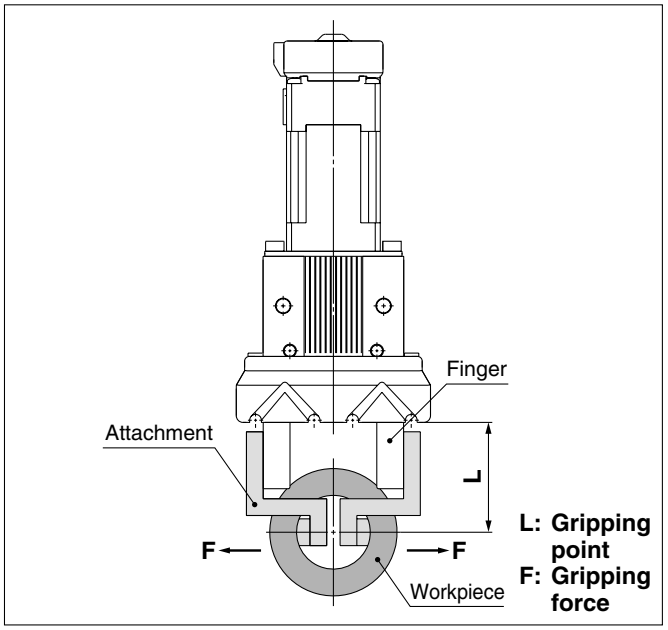
● **Indication of gripping force**
The gripping force shown in the below graphs is expressed as "F", which is the thrust of one finger, when both fingers and attachments are in full contact with the workpiece as shown in the below figure.

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

External Gripping State



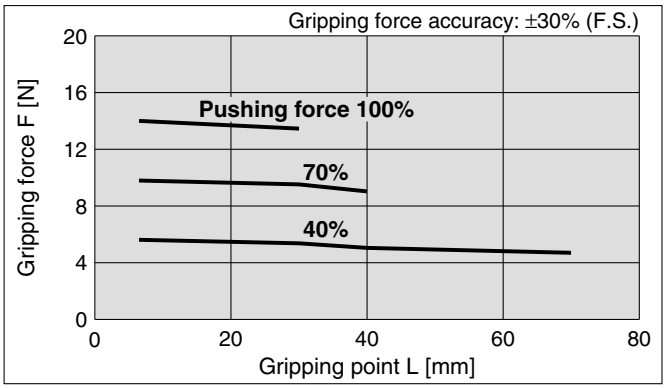
Internal Gripping State



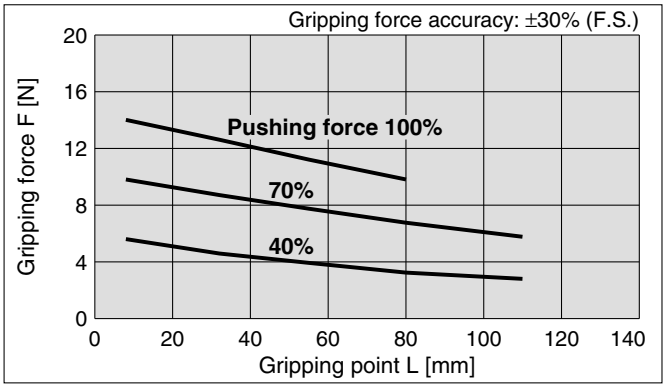
Basic

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

LEHZJ10



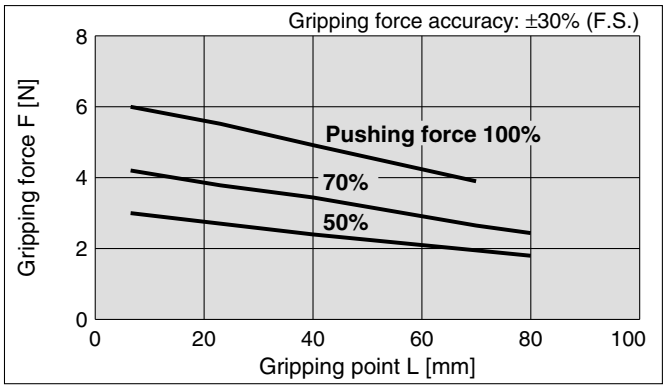
LEHZJ16



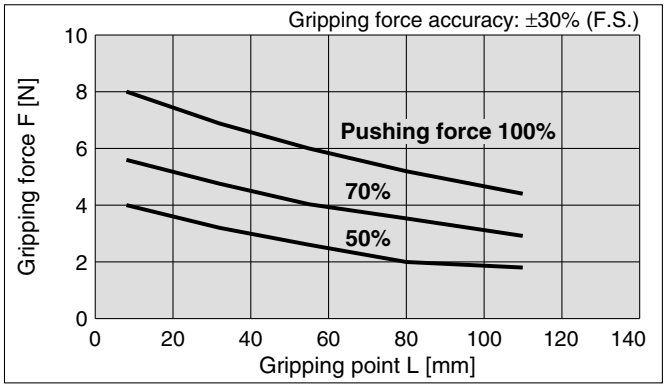
Compact

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

LEHZJ10L



LEHZJ16L



Series LEHZJ
Model Selection 2

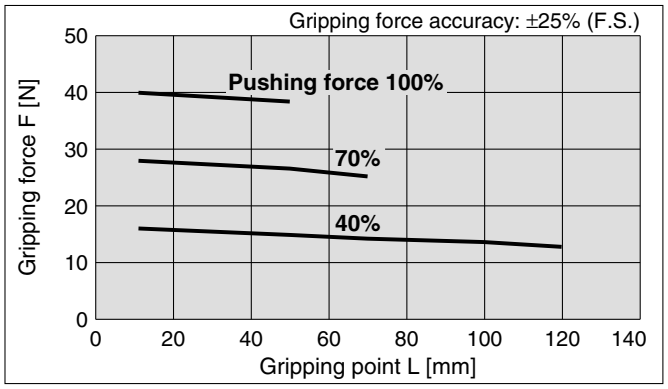
Model Selection

Step 1 **Confirmation of gripping force: Series LEHZJ**

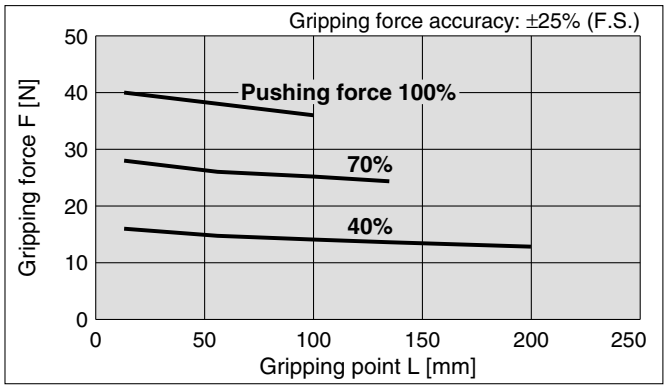
Basic

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

LEHZJ20



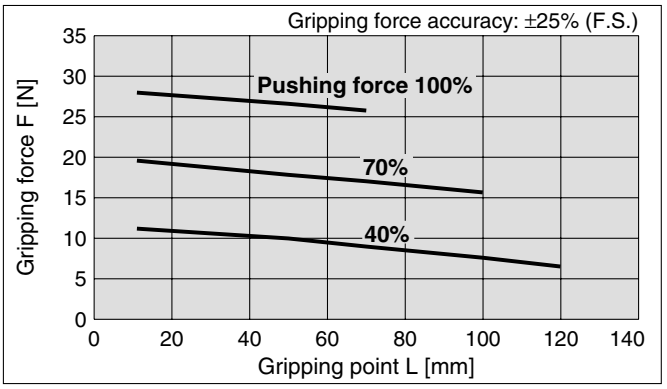
LEHZJ25



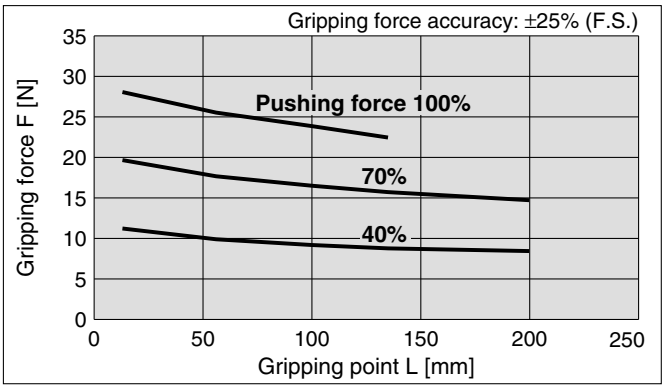
Compact

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

LEHZJ20L



LEHZJ25L

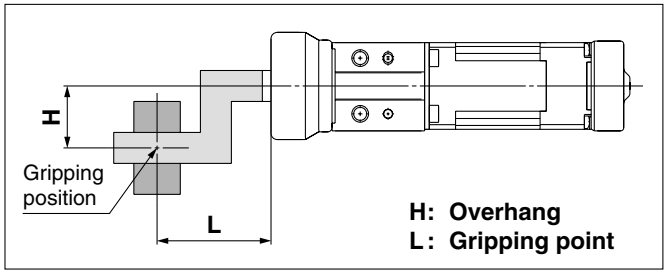


Model Selection

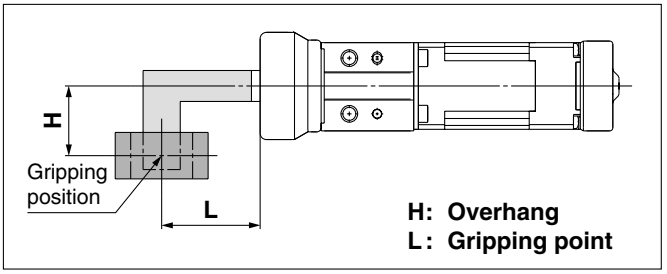
Step 2 Confirmation of gripping point and overhang: Series LEHZJ

- 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



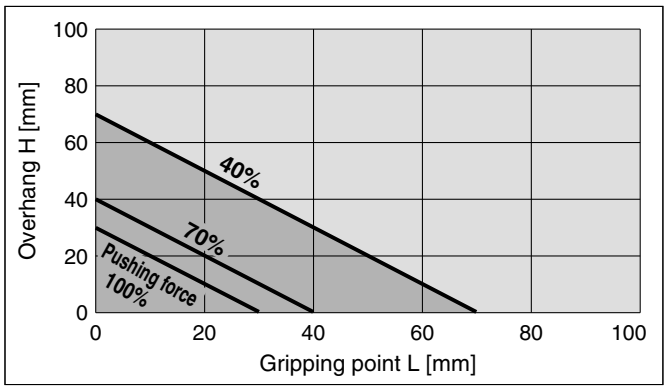
Internal Gripping State



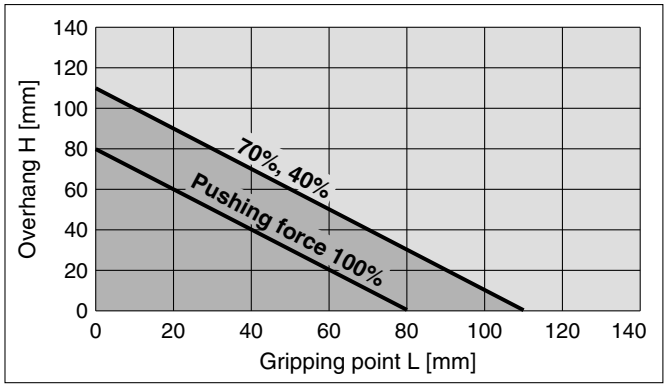
Basic

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

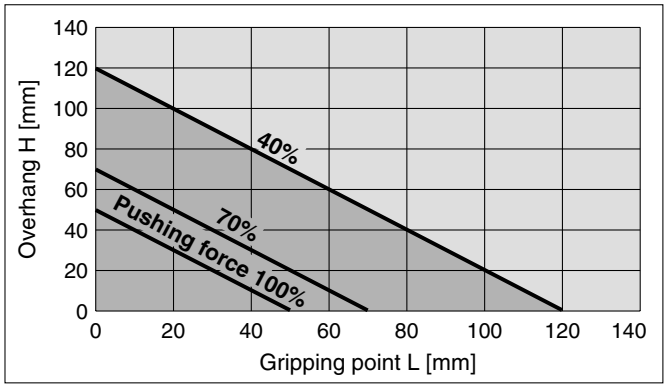
LEHZJ10



LEHZJ16



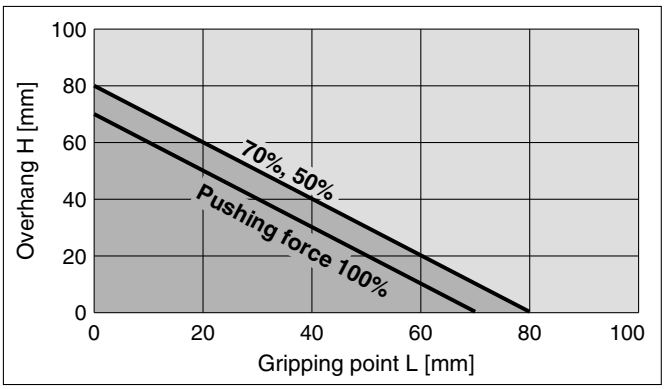
LEHZJ20



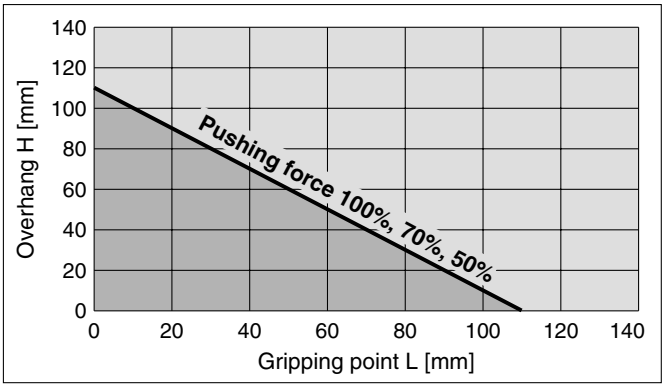
Compact

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

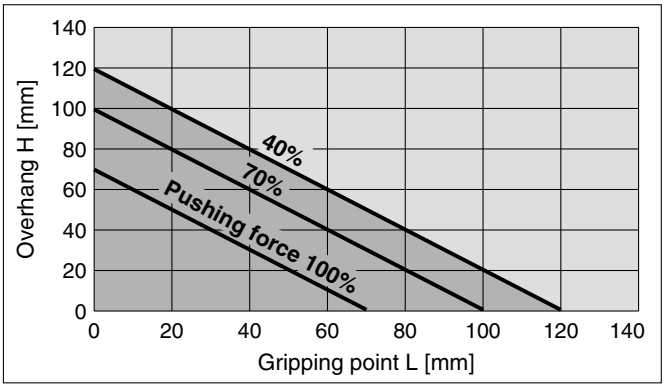
LEHZJ10L



LEHZJ16L



LEHZJ20L



Series LEHZJ
Model Selection 3

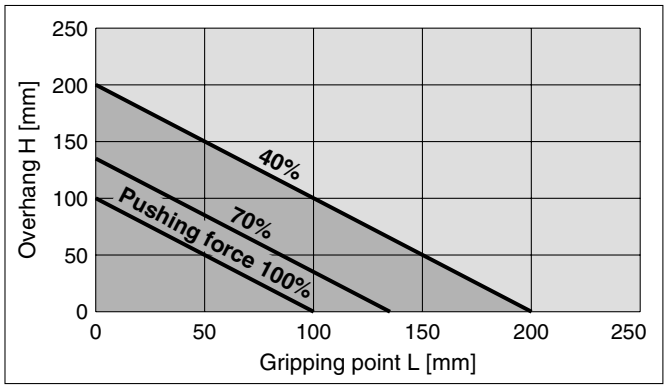
Model Selection

Step 2 **Confirmation of gripping point and overhang: Series LEHZJ**

Basic

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

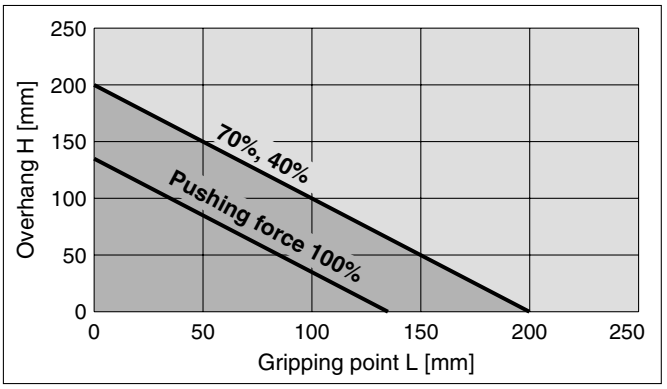
LEHZJ25



Compact

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

LEHZJ25L



Selection of Pushing Speed

● When setting pushing force and trigger level, set within the proper range as shown below.

Basic

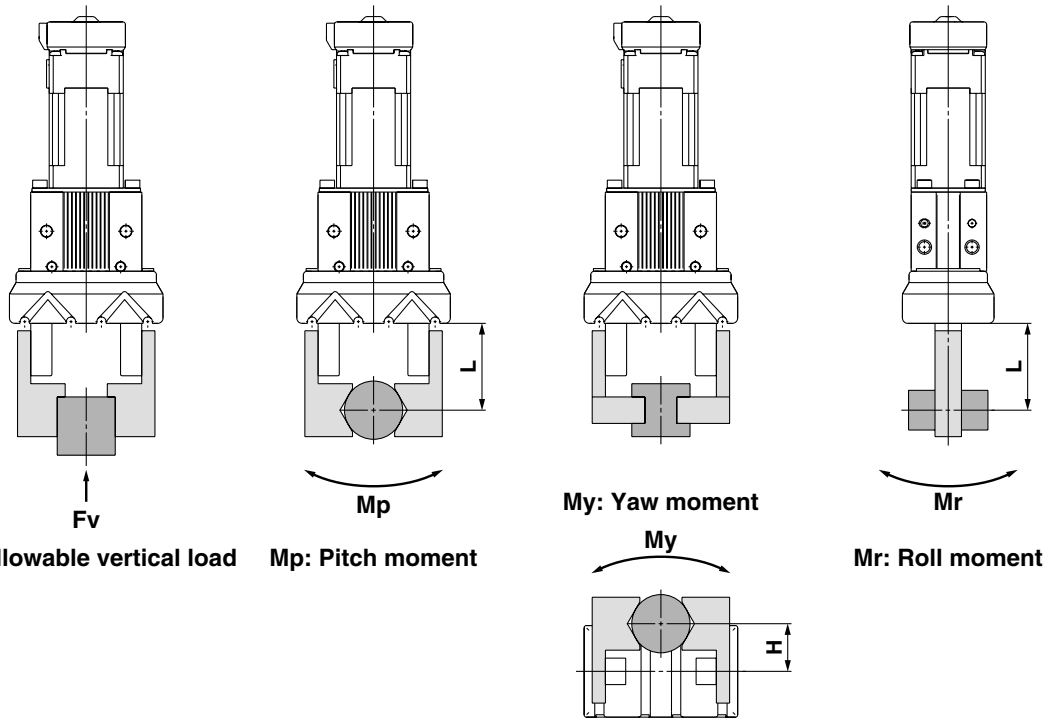
Compact

LEHZJ10L, LEHZJ16L

LEHZJ20L, LEHZJ25L

Model Selection

Step 3 Confirmation of external force on fingers: Series LEHZJ



Fv: Allowable vertical load **Mp: Pitch moment** **My: Yaw moment** **Mr: Roll moment**

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)
LEHZJ10(L)K2-4	58	0.26	0.26	0.53
LEHZJ16(L)K2-6	98	0.68	0.68	1.36
LEHZJ20(L)K2-10	147	1.32	1.32	2.65
LEHZJ25(L)K2-14	255	1.94	1.94	3.88

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

Calculation of allowable external force (when moment load is applied)	Calculation example
Allowable load F (N) = $\frac{\text{M (Static allowable moment) (N·m)}}{\text{L x } 10^{-3} *}$ (*Constant for unit conversion)	When a static load of f = 10 N is operating, which applies pitch moment to point L = 30 mm from the LEHZJ16K2-6 guide. Therefore, it can be used. **Allowable load F = $\frac{0.68}{30 \times 10^{-3}}$** **= 22.7 (N)** **Load f = 10 (N) < 22.7 (N)**

Electric Gripper 2-Finger Type/With Dust Cover

Series LEHZJ

LEHZJ10, 16, 20, 25

CE RoHS

How to Order

LEHZ J 10 K 2 – 4 – R 1 6N 1

Dust cover

J	With dust cover

Body size

10
16
20
25

Motor size

Nil	Basic
L	Compact

Lead

K	Basic

2-finger type

Stroke

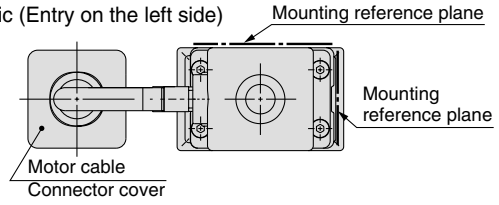
Stroke/both sides (mm)	Body size
4	10
6	16
10	20
14	25

Dust cover type

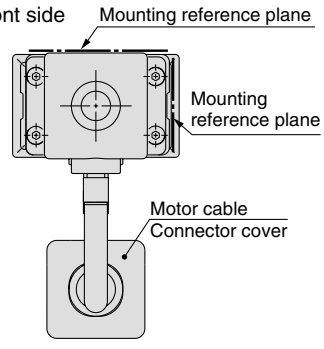
Nil	Chloroprene rubber (CR)
K	Fluorine rubber (FKM)
S	Silicone rubber (Si)

Motor cable entry

Nil — Basic (Entry on the left side)



F — Entry on the front side



Actuator cable type

Nil	Without cable
R	Robotic cable (Flexible cable)

Actuator cable length

Nil	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

Controller type Note)

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

Note) Refer to the LEH series catalog (CAT.ES100-77) for the detailed specifications of the controller itself.

I/O cable length

Nil	Without cable
1	1.5 m
3	3 m
5	5 m

Controller mounting

Nil	Screw mounting
D Note)	DIN rail mounting

Note) DIN rail is not included. Order it separately. Refer to the LEH series catalog (CAT.ES100-77).

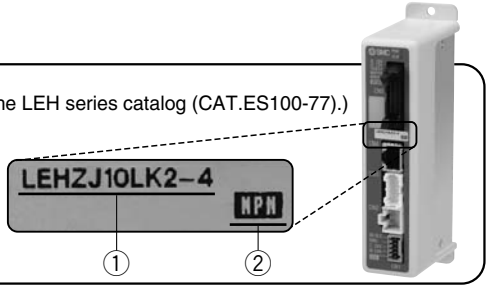
The actuator and controller are sold as a package. (Controller → Refer to the LEH series catalog (CAT.ES100-77).)

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

<Be sure to check the following before use.>

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

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



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

Specifications

Model			LEHZJ10	LEHZJ16	LEHZJ20	LEHZJ25
Actuator specifications	Stroke/both sides (mm)		4	6	10	14
	Gripping force (N) Note 1)	Basic	6 to 14		16 to 40	
		Compact	3 to 6	4 to 8	11 to 28	
	Opening and closing speed/ Pushing speed (mm/s) Note 2)		5 to 80/5 to 50		5 to 100/5 to 50	
	Drive method		Slide screw + Slide cam			
	Finger guide type		Linear guide (No circulation)			
	Repeatability (mm) Note 3)		±0.02			
	Repeated length determination accuracy (mm) Note 4)		±0.05			
	Finger backlash/ both sides (mm) Note 5)		0.5 or less			
	Impact resistance/ Vibration resistance (m/s²) Note 6)		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	170	230	440	610
		Compact	140	200	375	545
Electric specifications	Motor size		□20		□28	
	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) Note 7)	Basic	11/7		28/15	
		Compact	8/7		22/12	
	Momentary max. power consumption (W) Note 8)	Basic	19		51	
		Compact	14		42	
	Controller weight (g)		150 (Screw mounting), 170 (DIN rail 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 LEHZJ10/16
±25% (F.S.) for LEHZJ20/25

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.

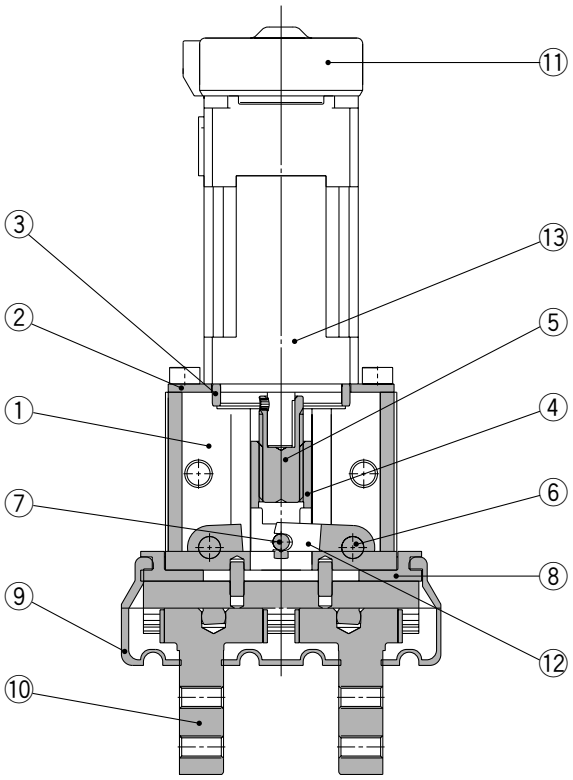
Note 6) Impact resistance: No malfunction occurred when the gripper was tested with a drop tester in both an axial direction and a perpendicular direction to the lead screw. (Test was performed with the gripper in the initial state.)
Vibration resistance: No malfunction occurred in a test ranging between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

Construction

Series LEHZJ



Component Parts

No.	Description	Material	Note
1	**Body**	Aluminum alloy	Anodized
2	**Motor plate**	Aluminum alloy	Anodized
3	**Guide ring**	Aluminum alloy	
4	**Slide nut**	Stainless steel	Heat treatment + Special treatment
5	**Slide bolt**	Stainless steel	Heat treatment + Special treatment
6	**Needle roller**	High carbon chromium bearing steel	
7	**Needle roller**	High carbon chromium bearing steel	
8	**Body plate**	Aluminum alloy	Anodized
9	**Dust cover**	CR	Chloroprene rubber
		FKM	Fluorine rubber
		Si	Silicone rubber
10	**Finger assembly**	—	
11	**Encoder dust cover**	Si	Silicone rubber
12	**Lever**	Special stainless steel	
13	**Step motor (Servo/24 VDC)**	—	

Replacement Parts

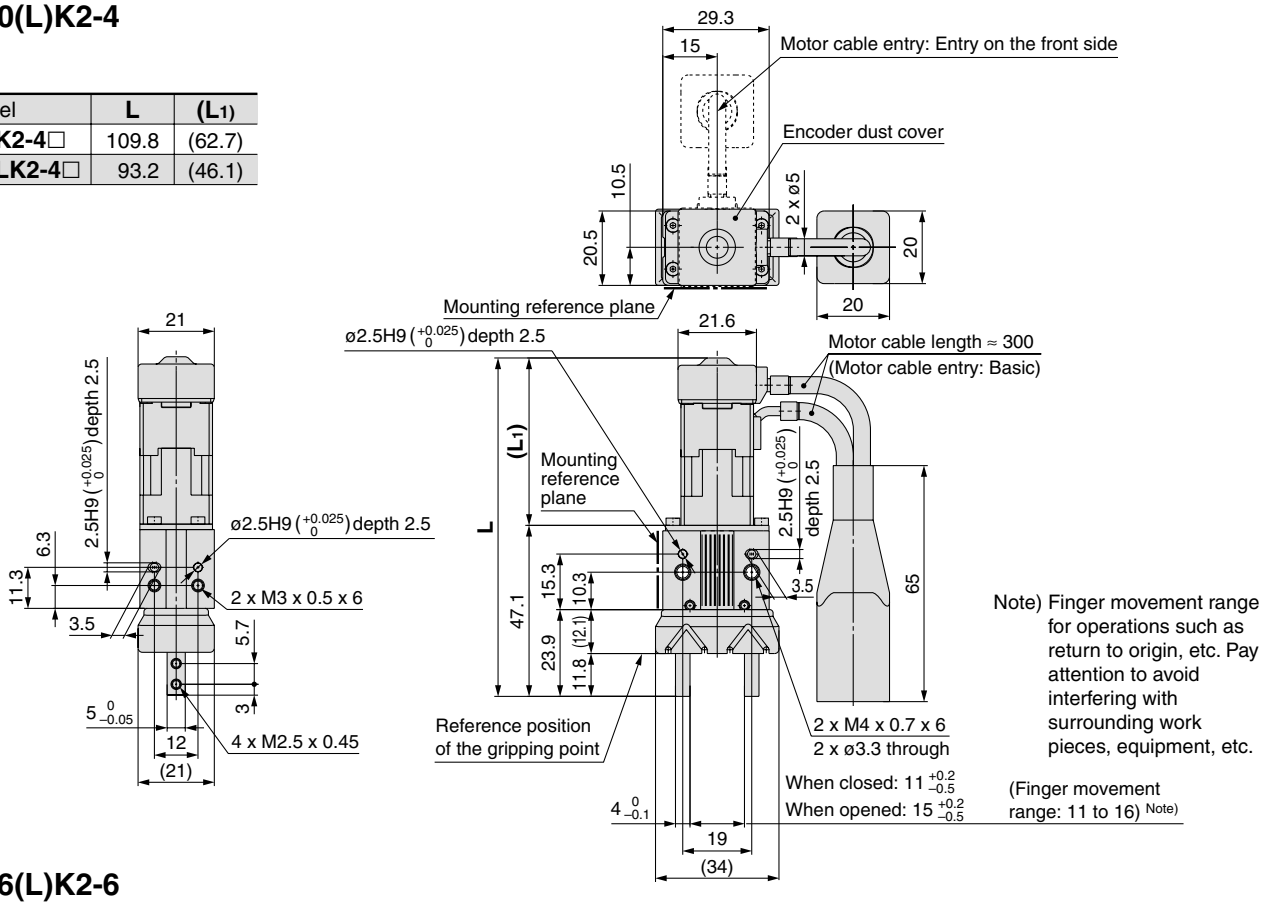
No.	Description			LEHZJ10	LEHZJ16	LEHZJ20	LEHZJ25
9	**Dust cover**	Material	CR	MHZJ2-J10	MHZJ2-J16	MHZJ2-J20	MHZJ2-J25
			FKM	MHZJ2-J10F	MHZJ2-J16F	MHZJ2-J20F	MHZJ2-J25F
			Si	MHZJ2-J10S	MHZJ2-J16S	MHZJ2-J20S	MHZJ2-J25S
10	**Finger assembly**			MHZJ-A1002	MHZJ-A1602	MHZJ-A2002	MHZJ-A2502

∗ The dust cover is a consumable part. Please replace as necessary.

Dimensions

LEHZJ10(L)K2-4

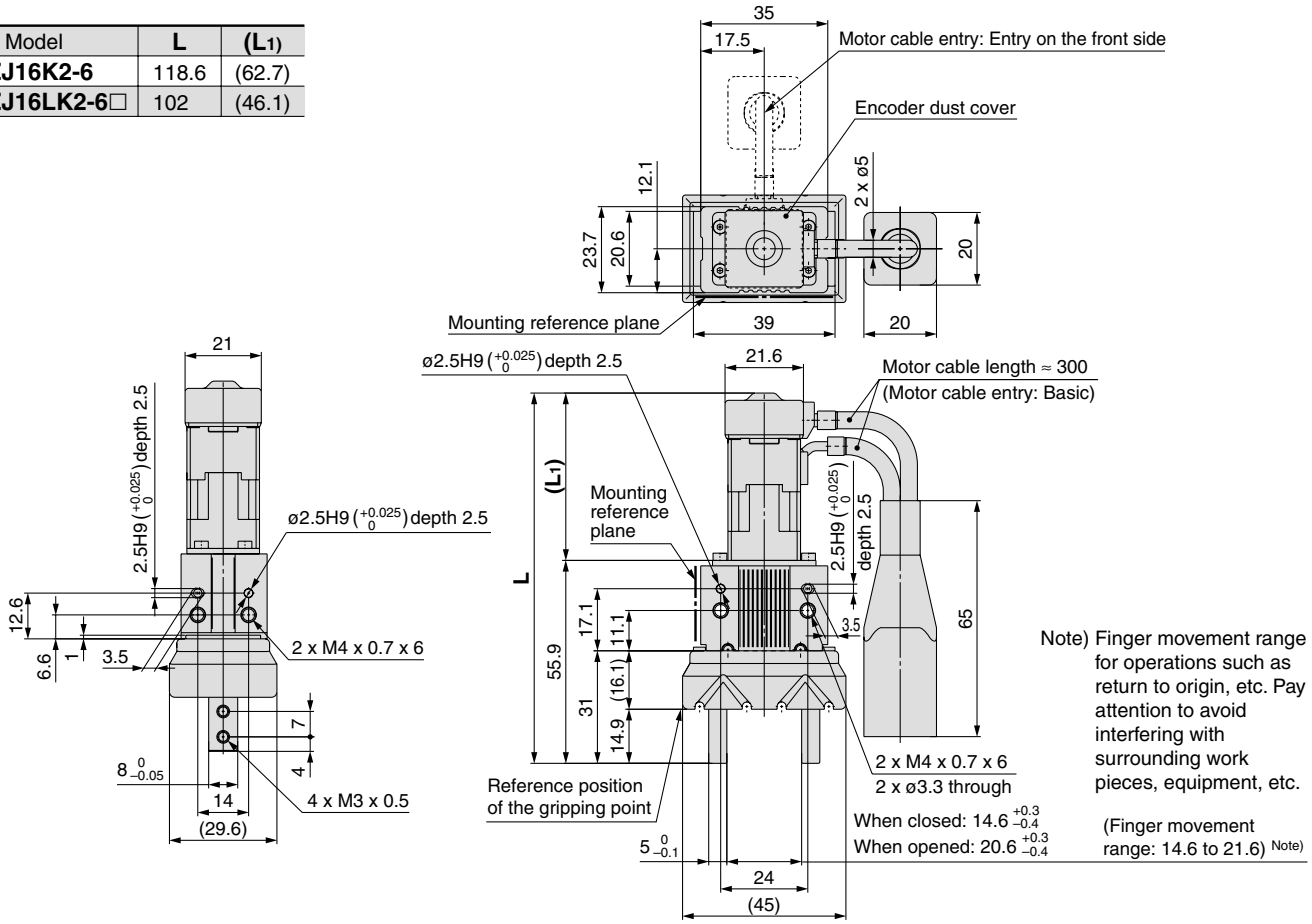
Model	L	(L_1)
LEHZJ10K2-4□	109.8	(62.7)
LEHZJ10LK2-4□	93.2	(46.1)



Note) Finger movement range for operations such as return to origin, etc. Pay attention to avoid interfering with surrounding work pieces, equipment, etc.

LEHZJ16(L)K2-6

Model	L	(L_1)
LEHZJ16K2-6	118.6	(62.7)
LEHZJ16LK2-6□	102	(46.1)

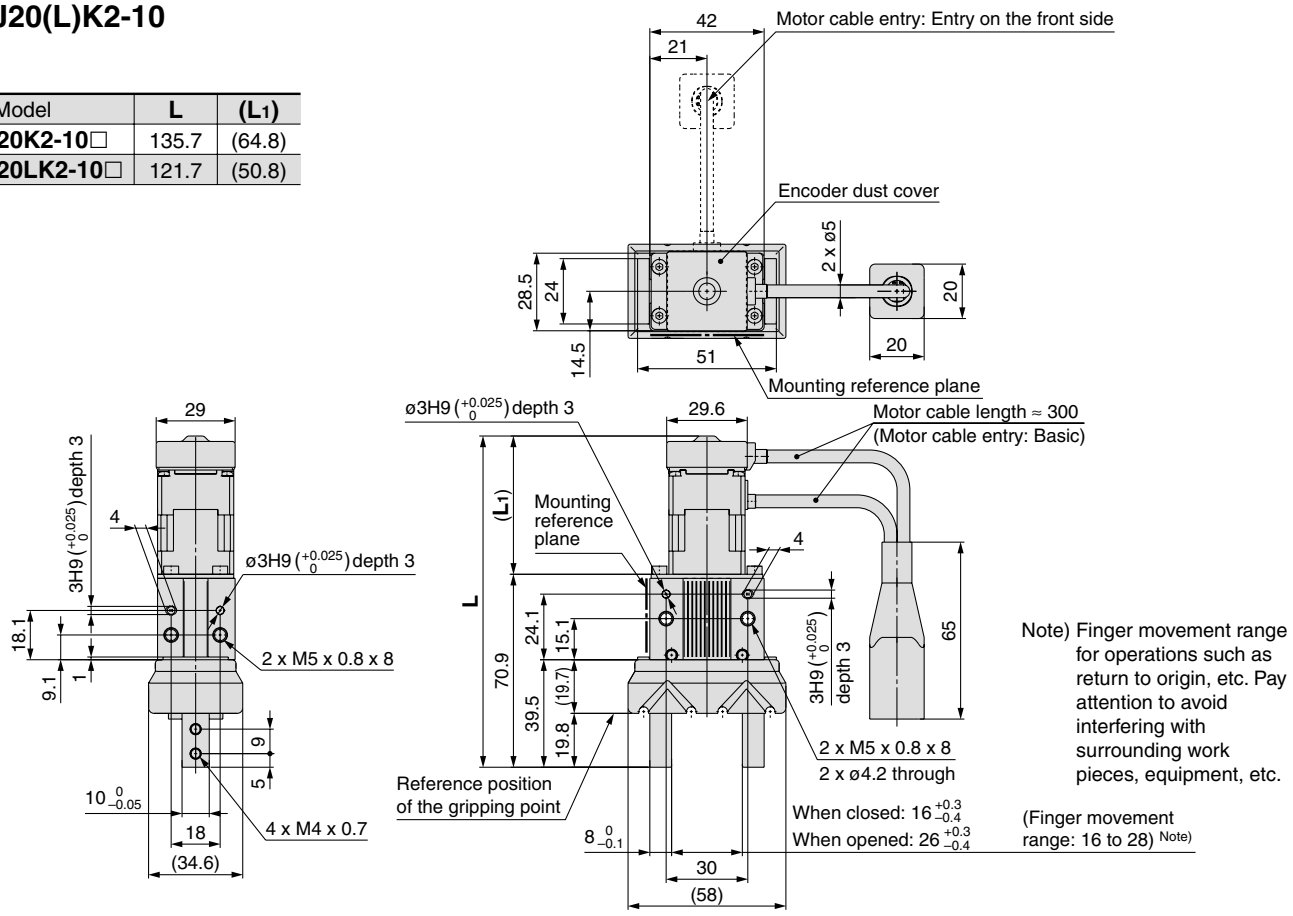


Note) Finger movement range for operations such as return to origin, etc. Pay attention to avoid interfering with surrounding work pieces, equipment, etc.

Dimensions

LEHZJ20(L)K2-10

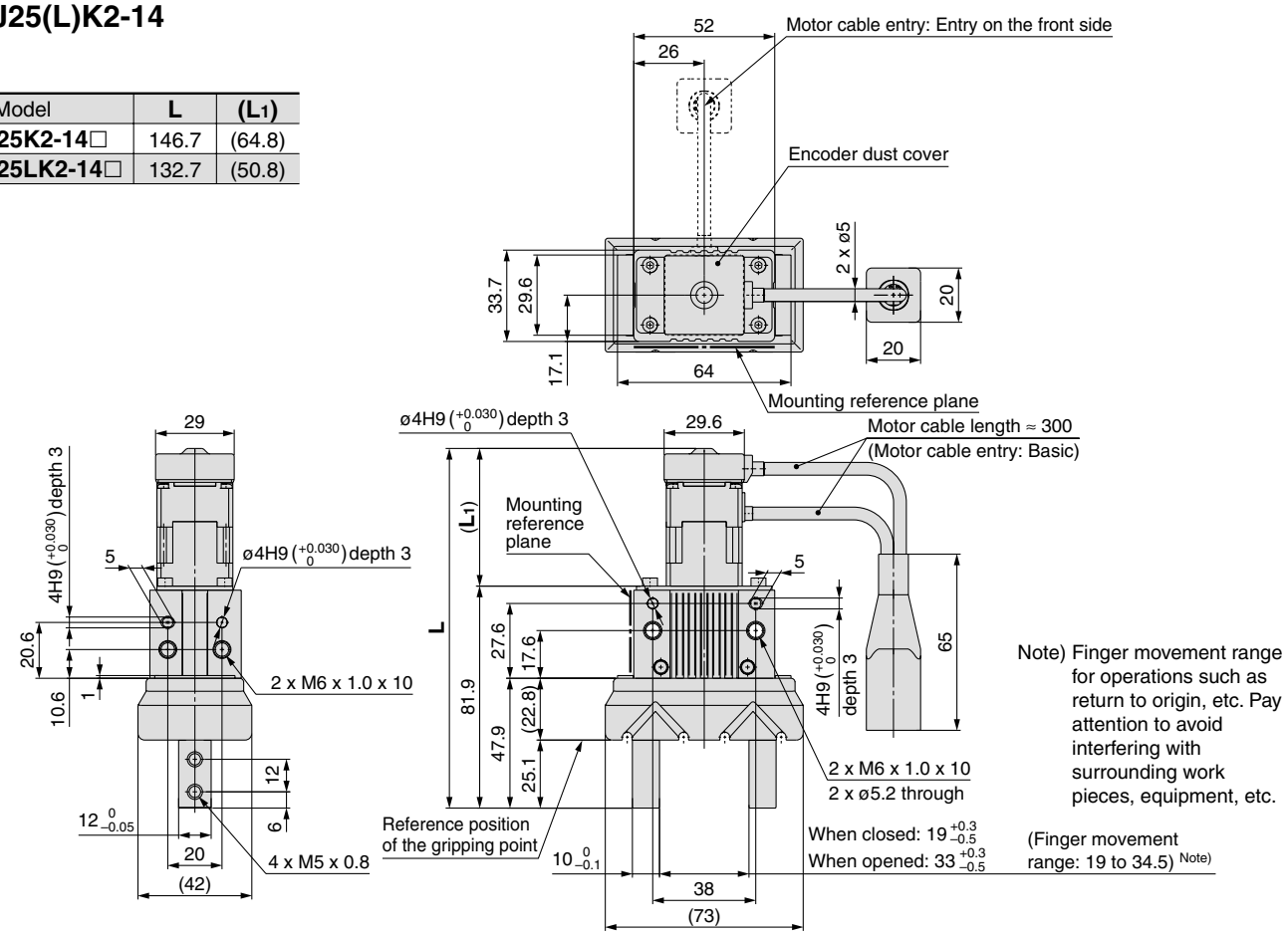
Model	L	(L1)
LEHZJ20K2-10□	135.7	(64.8)
LEHZJ20LK2-10□	121.7	(50.8)



Note) Finger movement range for operations such as return to origin, etc. Pay attention to avoid interfering with surrounding work pieces, equipment, etc.

LEHZJ25(L)K2-14

Model	L	(L1)
LEHZJ25K2-14□	146.7	(64.8)
LEHZJ25LK2-14□	132.7	(50.8)



Note) Finger movement range for operations such as return to origin, etc. Pay attention to avoid interfering with surrounding work pieces, equipment, etc.