

Linear Slide Hand LSH Series



LINEAR SLIDE HAND LSH SERIES

Are you damaging your workpieces?

Our shockless fingers grip workpieces gently even at high speeds.



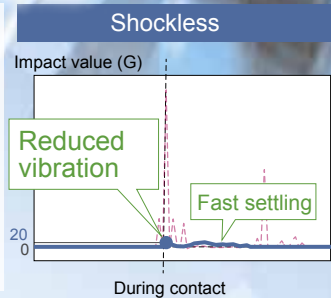
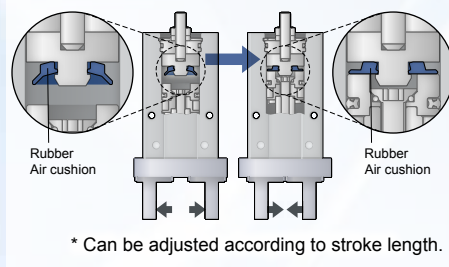
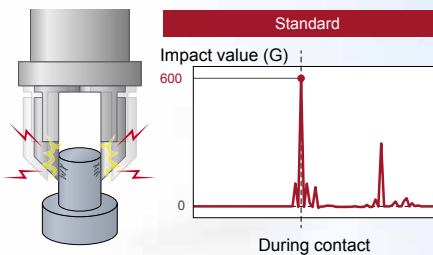
Shock absorbing mechanism integrated

Impact reduced to **1/30**

Unique shock absorbing mechanism (option)

Impact from sliding fingers damage workpieces.

Grips the workpiece gently even at high speeds.



High rigidity/high precision

Linear guide used

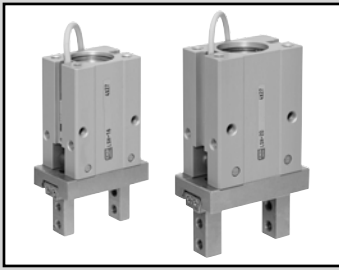
High rigidity and high accuracy are achieved with a structure integrating the guide rail and finger.



Increased flexibility in design

Can be mounted on three directions

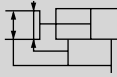
Axial (upward) mounting	Horizontal installation	Vertical installation
With reference spigot	Body thickness tolerance ± 0.05 mm	Excellent centering precision



Linear Slide Hand double acting

LSH Series

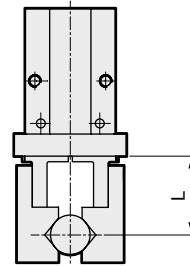
● Operating stroke length: 4, 6, 10, 14 mm



Specifications

Descriptions		LSH			
Bore size	mm	φ 10	φ 16	φ 20	φ 25
Actuation		Double acting			
Working fluid		Compressed air			
Max. working pressure	MPa	0.7			
Min. working pressure	Standard	0.2	0.1		
	Shockless	0.3	0.2		
Port size		M3		M5	
Ambient temperature	°C	-10 to 60 (no freezing)			
Operating stroke length	mm	4	6	10	14
Repeatability	mm	±0.01			
Weight	Standard	0.055	0.125	0.250	0.460
	Shockless	0.063	0.143	0.278	0.502
Lubrication		Not required (use turbine oil 1 ISO VG32 if necessary)			

Gripping power



Unit: N

Bore size (mm)	Open side	Closed side
φ 10	17	11
φ 16	45	34
φ 20	66	42
φ 25	104	65

* Supply pressure: 0.5 MPa; Value when L = 20 mm

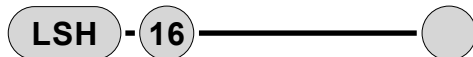
Switch specifications

Descriptions	Proximity 2-wire	Proximity 3-wire	Proximity 2-wire	Proximity 3-wire	
	F2S	F3S	F2H/F2V	F3H/F3V	F3PH/F3PV
Applications	Programmable Controller dedicated	Programmable For controller, relay	Programmable Controller dedicated	Programmable For controller, relay	
Output method	-	NPN Output	-	NPN Output	PNP Output
Power supply voltage	-	10 to 28 VDC	-	10 to 28 VDC	4.5 to 28 VDC
Load voltage/ current	10 to 30 VDC 5 to 20 mA	30 VDC, 50 mA or less	10 to 30 VDC 5 to 20 mA	30 VDC, 50 mA or less	
Indicator lamp	LED (Lit when ON)			Yellow LED (Lit when ON)	
Leakage current	1 mA or less	10 μA or less	1 mA or less	10 μA or less	
Shock resistance	980 m/s ²				
Weight	g			1 m:10 3 m:29	

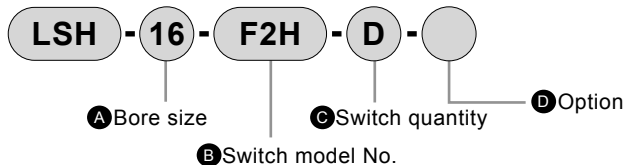
*1: The switch uses a bend-resistant lead wire.

How to order

Without switch



With switch



⚠ Precautions for model No. selection

*1: Shock absorbing option is available only for the closed side.

[Example of model No.]

LSH-16-F2H-D

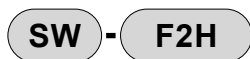
Model: Linear Slide Hand

Ⓐ Bore size : φ 16

Ⓑ Switch model No. : Proximity switch F2H
Lead wire 1 m

Ⓒ Switch quantity : 2

How to order switch



Switch model No.
(Item Ⓑ above)

Code	Descriptions
A Bore size (mm)	
10	φ 10
16	φ 16
20	φ 20
25	φ 25

B Switch model No.						
Lead wire	Lead wire	Contact	Voltage		Display	Lead wire
			AC	DC		
Straight	L-shaped	Proximity	●	●	1-color display	2-wire
						3-wire
F2H*	F2V*		●	●		2-wire
						3-wire
F3H*	F3V*		●	●		3-wire
						3-wire
F3PH*	F3PV*	●	●	3-wire		
				3-wire		

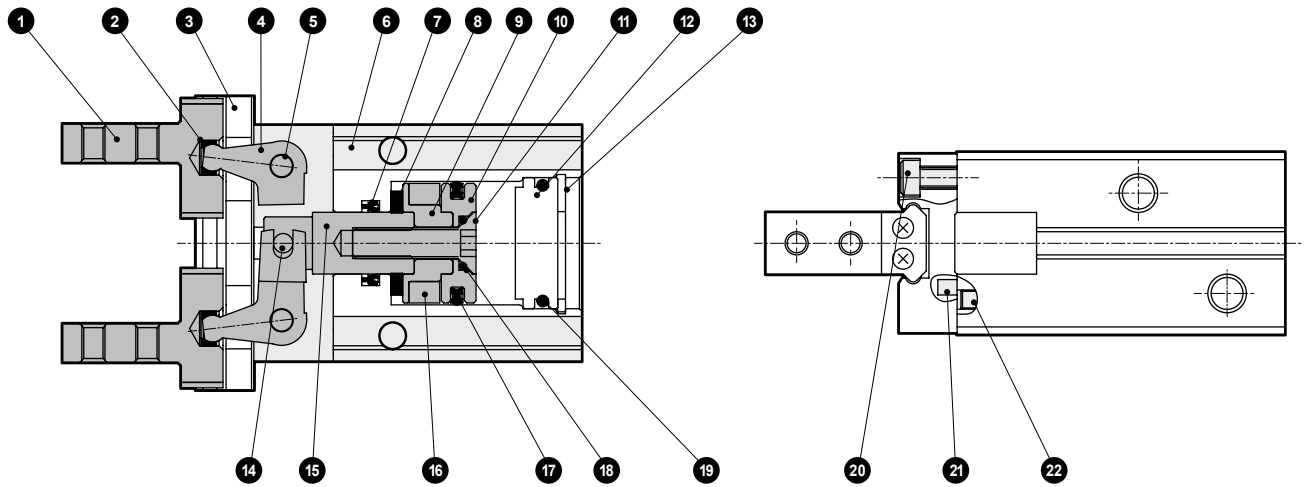
* Lead wire length	
Blank	1 m (Standard)
3	3 m (Option)

C Switch quantity	
R	1 on open side
H	1 on closed side
D	2

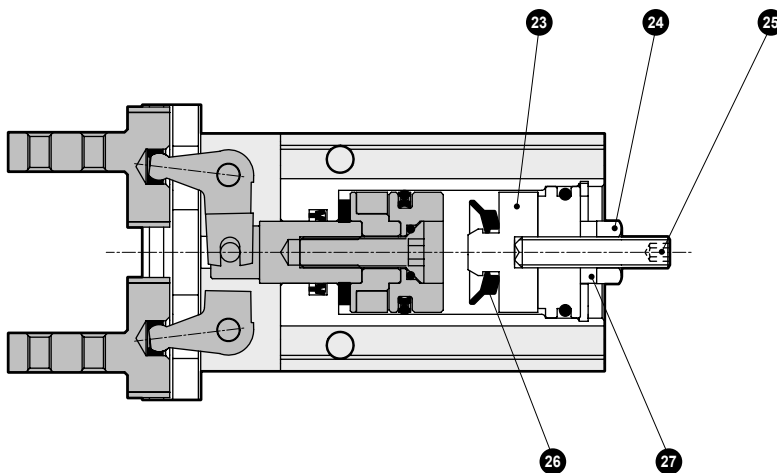
D Option	
Blank	Standard
C	Shockless (closed side only)

Internal structure and parts list

● LSH (Standard)



● LSH-*-C Shockless (closed side only)



Parts list

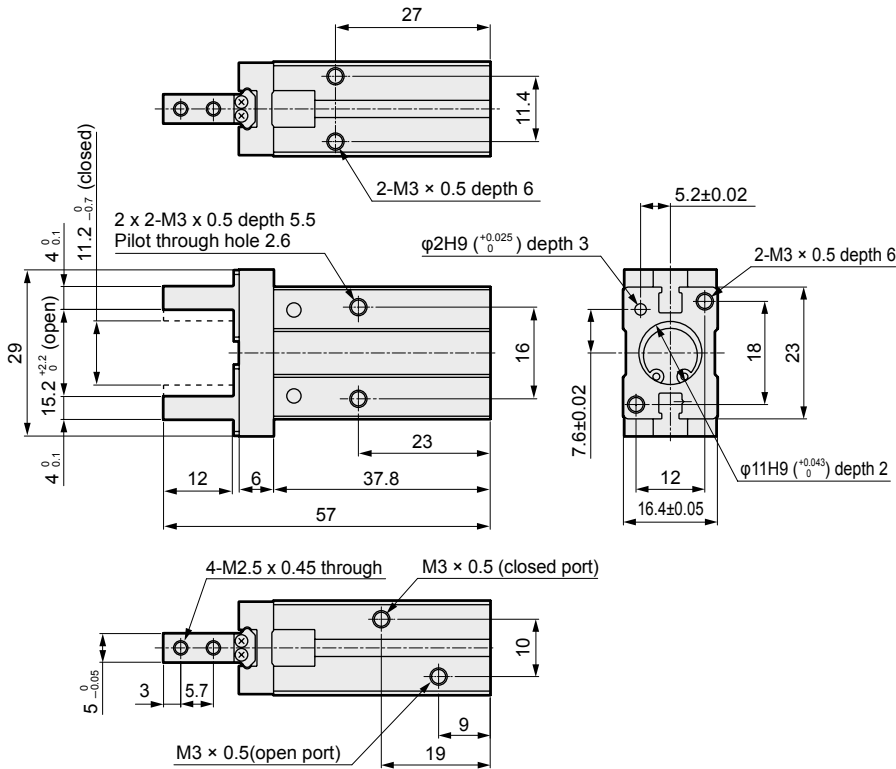
No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Finger	Stainless steel		15	Piston rod	Stainless steel	
2	Holder	Alloy steel		16	Magnet		
3	Linear guide	Stainless steel		17	Piston packing	Nitrile rubber	
4	Lever	Stainless steel		18	O-ring	Nitrile rubber	
5	Fulcrum axis	Alloy steel		19	O-ring	Nitrile rubber	
6	Body	Aluminum alloy		20	Hexagon socket head cap screw	Stainless steel	
7	Rod packing	Nitrile rubber		21	Pin	Alloy steel	
8	Cushion rubber	Urethane rubber		22	Hexagon socket set screw	Alloy steel	
9	Spacer	Aluminum alloy		23	Stopper	Aluminum alloy	Hard alumite
10	Piston	Aluminum alloy		24	Hexagon nut	Alloy steel	
11	Hexagon socket head cap screw	Stainless steel		25	Hexagon socket set screw	Alloy steel	
12	Head cover	Aluminum alloy		26	Rubber-air cushion	Special rubber	
13	C type snap ring	Stainless steel		27	Sealing washer	Stainless steel + nitrile rubber	
14	Operation shaft	Alloy steel					

Consumable parts list

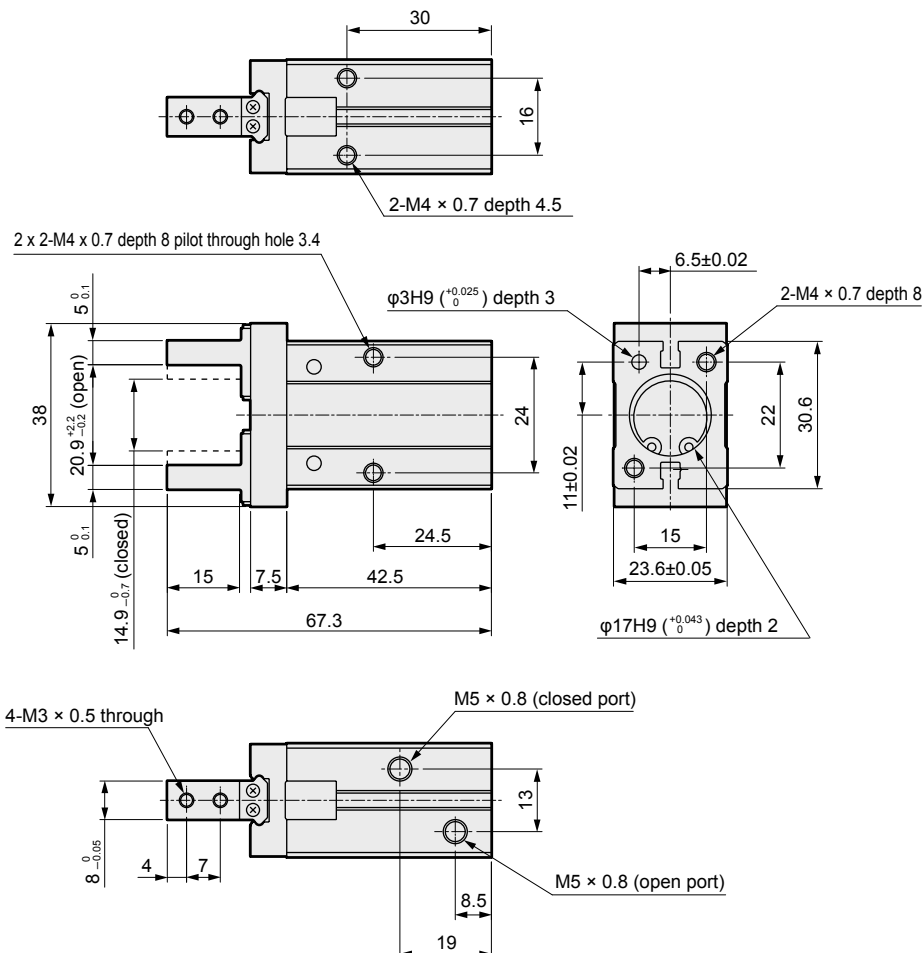
Bore size (mm)	Kit No.	Consumable parts No.
φ 10	LSH-10K	● 7 ● 8 ● 17 ● 18 ● 19
φ 16	LSH-16K	
φ 20	LSH-20K	
φ 25	LSH-25K	

Dimensions (bore size: $\phi 10$, $\phi 16$)

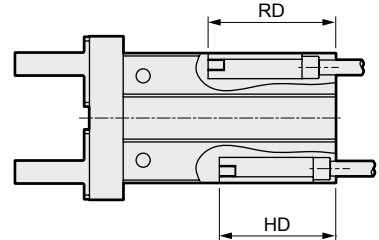
● LSH-10 (Standard)



● LSH-16 (Standard)



● With switch



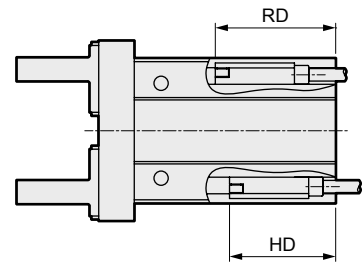
F2/3*	RD	22.5
	HD	20.5
F2S/F3S	RD	23.5
	HD	21.5

*1: RD dimension is the max. sensitivity position at the open side end position and HD dimension at the closed side end position. The actual mounting position should be adjusted after confirming the operational status of the switch.

*2: When using F□H, the switch lead wire protrudes from the end face of the head side. If this projection is a problem, use F□V or F□S.

*3: Since the opening and closing stroke is short, only one side of the open or closed state is detected for each switch.

● With switch



F2/3*	RD	25.5
	HD	22.5
F2S/F3S	RD	26.5
	HD	23.5

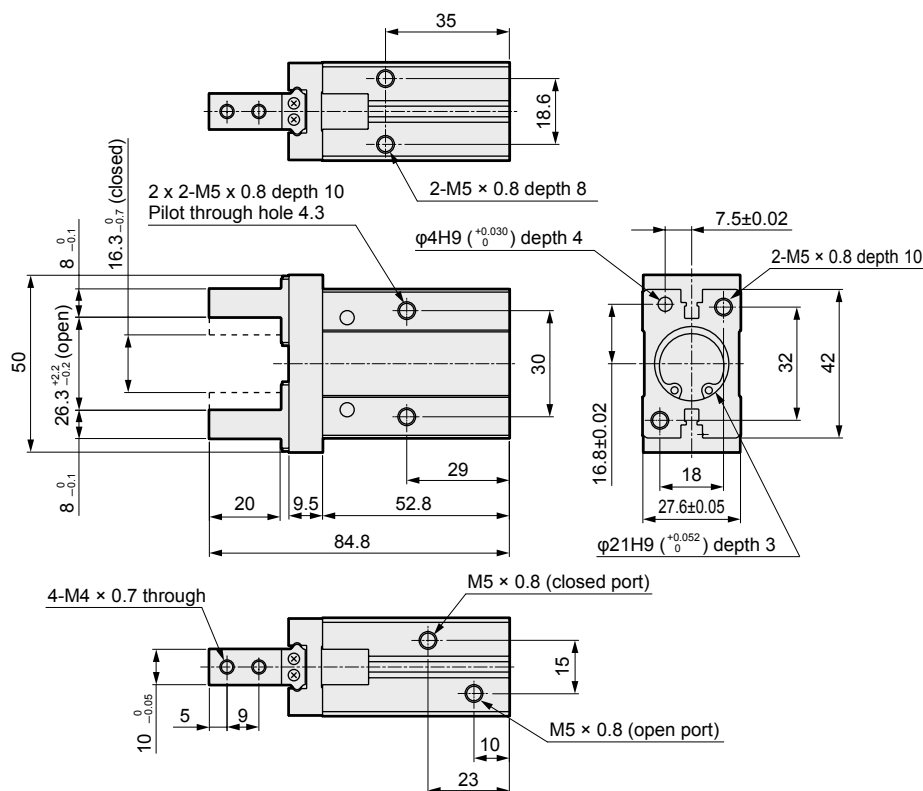
*1: RD dimension is the max. sensitivity position at the open side end position and HD dimension at the closed side end position. The actual mounting position should be adjusted after confirming the operational status of the switch.

*2: When using F□H, the switch lead wire protrudes from the end face of the head side. If this projection is a problem, use F□V or F□S.

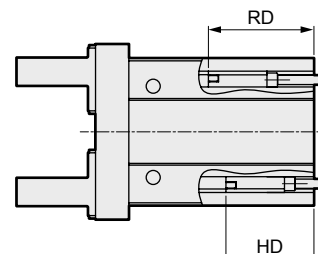
*3: Since the opening and closing stroke is short, only one side of the open or closed state is detected for each switch.

Dimensions (bore size: $\phi 20$, $\phi 25$)

● LSH-20 (Standard)



● With switch

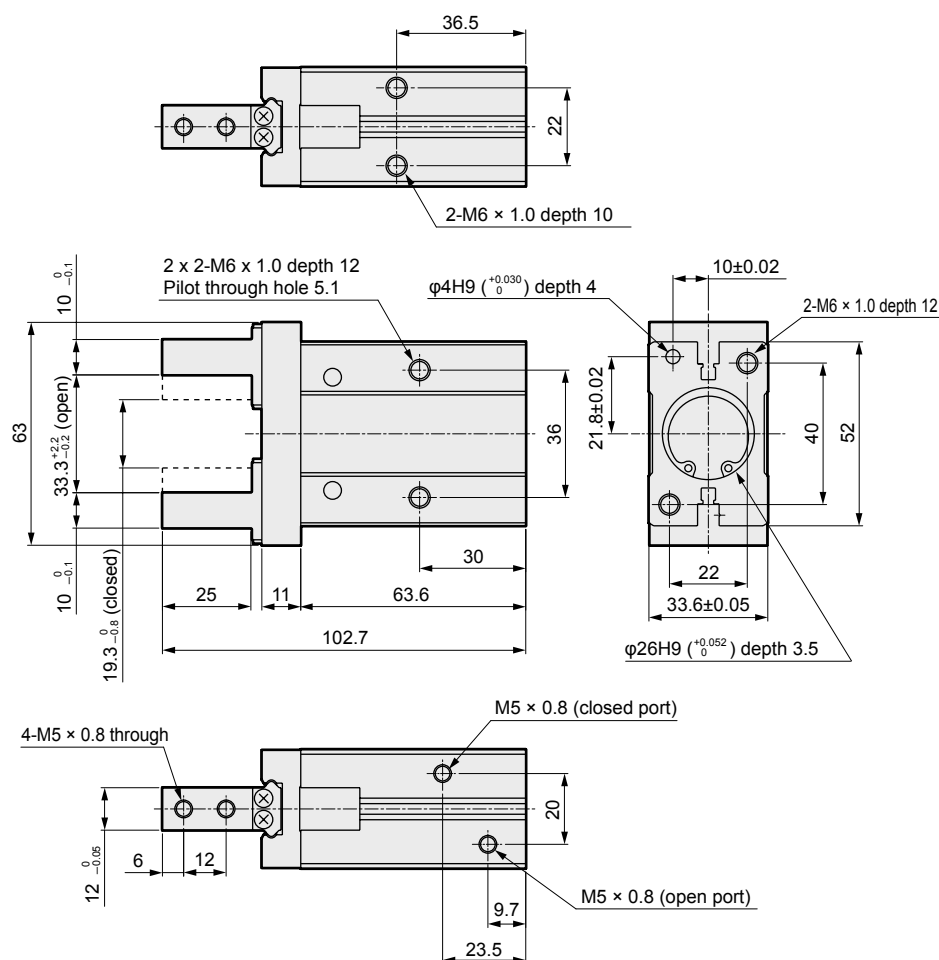


F2/3*	RD	30
	HD	25
F2S/F3S	RD	31
	HD	26

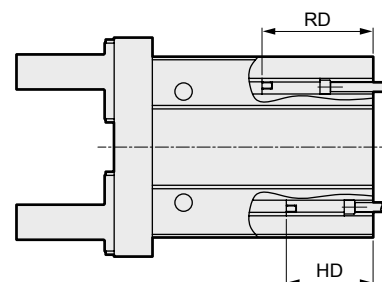
*1: RD dimension is the max. sensitivity position at the open side end position and HD dimension at the closed side end position. The actual mounting position should be adjusted after confirming the operational status of the switch.

*2: When using F□H, the switch lead wire protrudes from the end face of the head side. If this projection is a problem, use F□V or F□S.

● LSH-25 (Standard)



● With switch



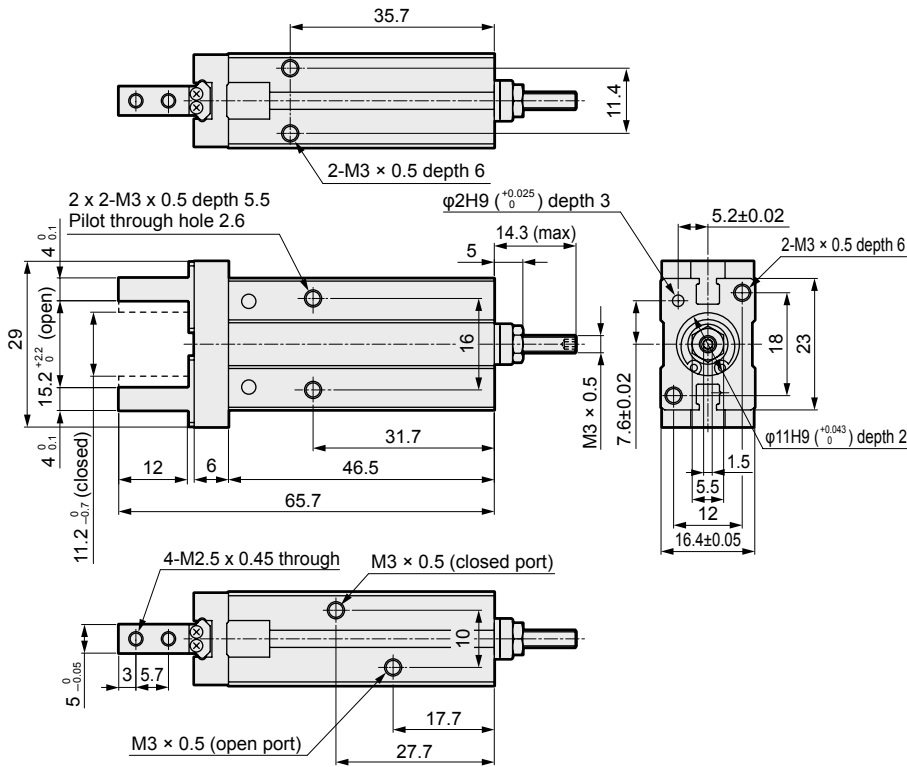
F2/3*	RD	32
	HD	25
F2S/F3S	RD	33
	HD	26

*1: RD dimension is the max. sensitivity position at the open side end position and HD dimension at the closed side end position. The actual mounting position should be adjusted after confirming the operational status of the switch.

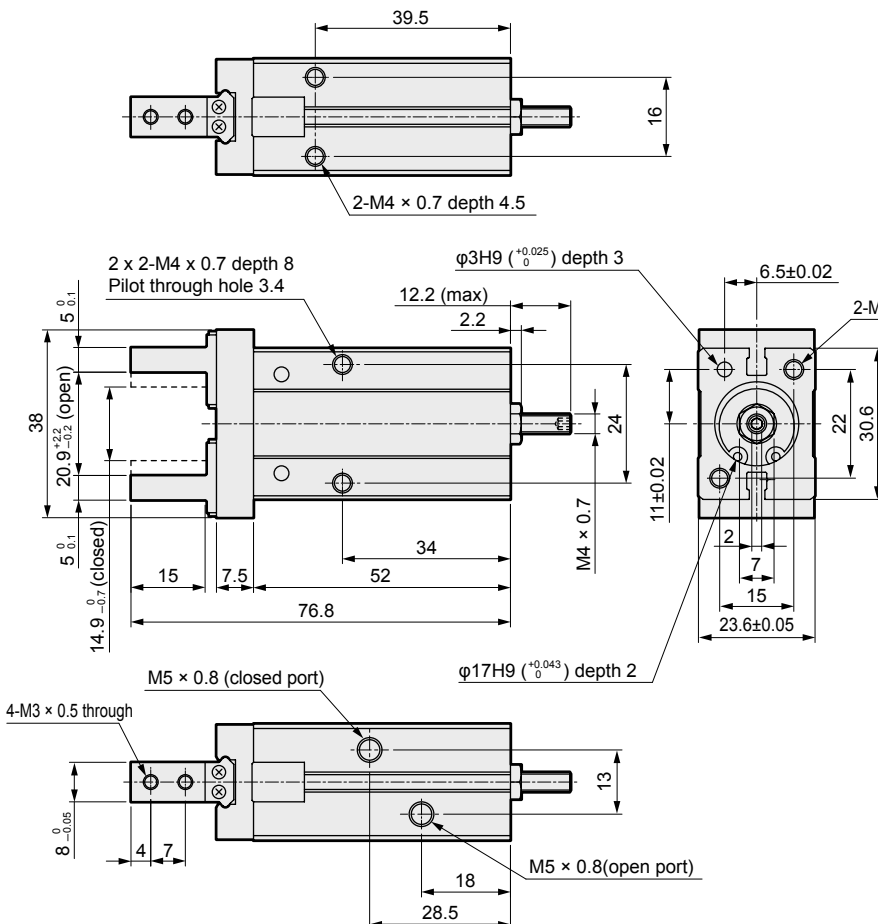
*2: When using F□H, the switch lead wire protrudes from the end face of the head side. If this projection is a problem, use F□V or F□S.

Dimensions (bore size: $\phi 10, \phi 16$)

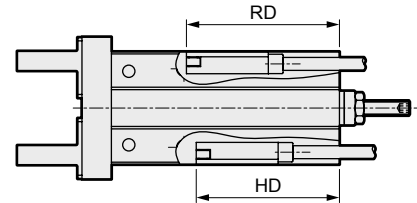
● LSH-10-C Shockless (closed side only)



● LSH-16-C Shockless (closed side only)



● With switch



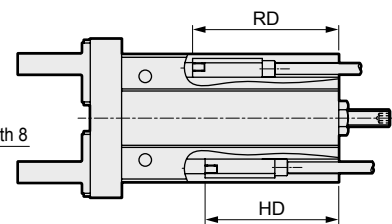
F2/3*	RD	31
	HD	29
F2S/F3S	RD	32
	HD	30

*1: RD dimension is the max. sensitivity position at the open side end position and HD dimension at the closed side end position. The actual mounting position should be adjusted after confirming the operational status of the switch.

*2: When using F□H, the switch lead wire protrudes from the end face of the head side. If this projection is a problem, use F□V or F□S.

*3: Since the opening and closing stroke is short, only one side of the open or closed state is detected for each switch.

● With switch



F2/3*	RD	35
	HD	32
F2S/F3S	RD	36
	HD	33

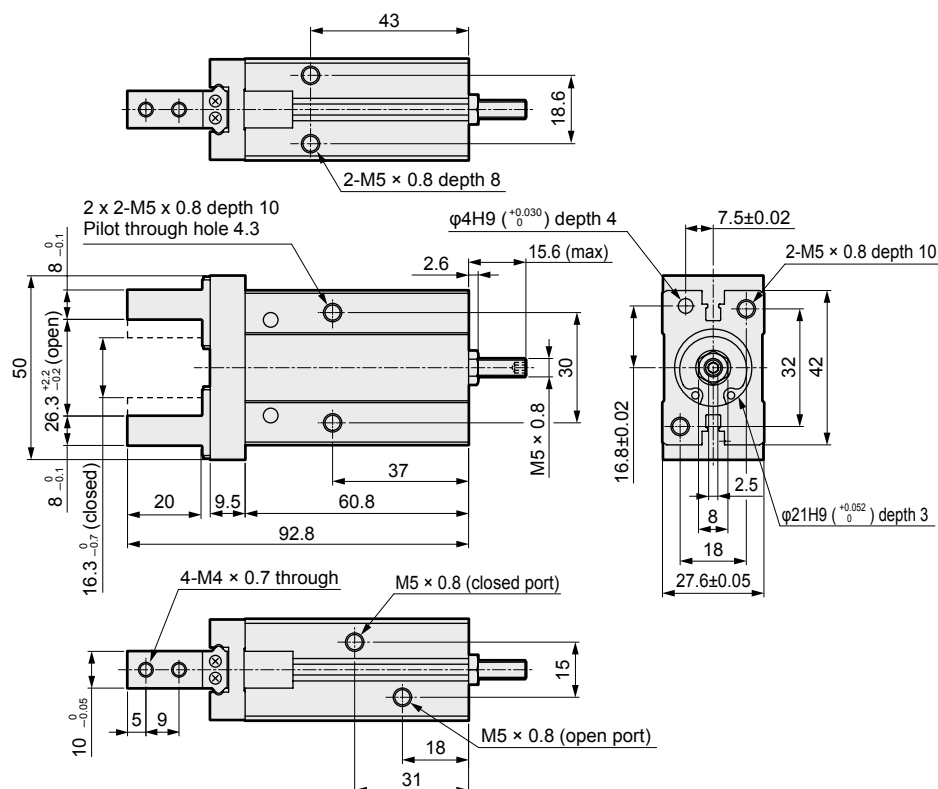
*1: RD dimension is the max. sensitivity position at the open side end position and HD dimension at the closed side end position. The actual mounting position should be adjusted after confirming the operational status of the switch.

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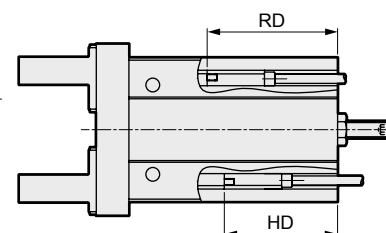
*3: Since the opening and closing stroke is short, only one side of the open or closed state is detected for each switch.

Dimensions (bore size: $\phi 20$, $\phi 25$)

● LSH-20-C Shockless (closed side only)



● With switch

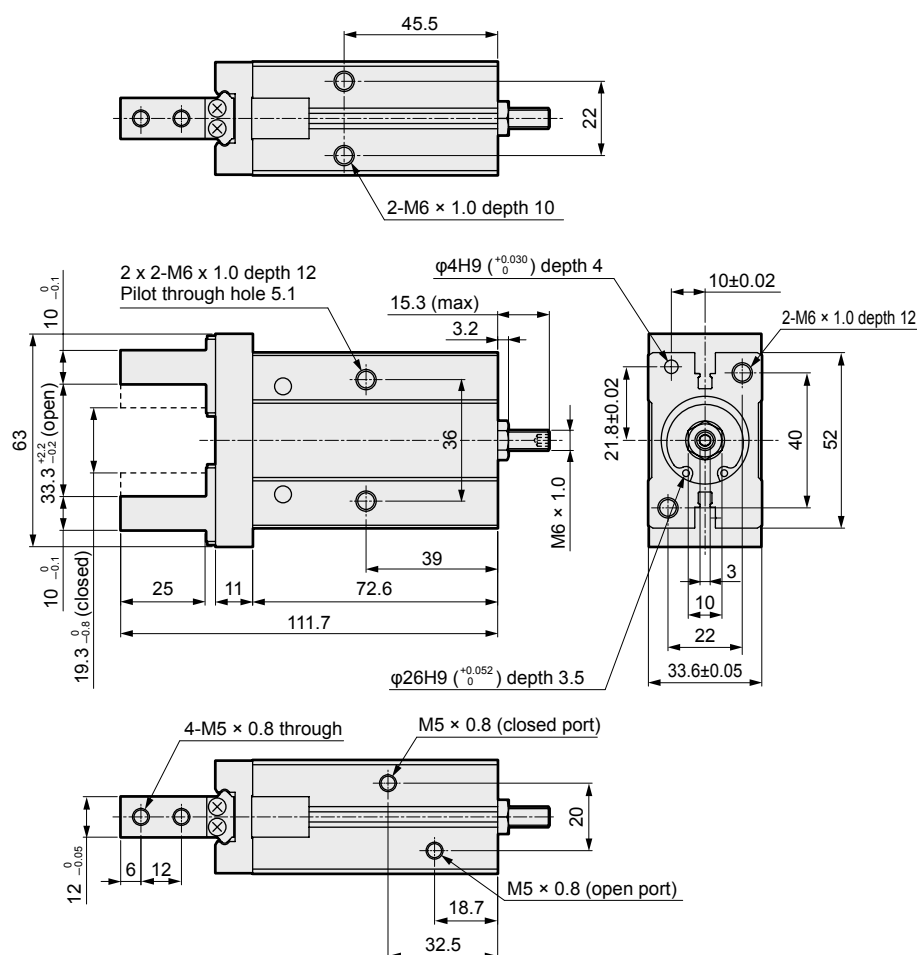


F2/3*	RD	38
	HD	33
F2S/F3S	RD	39
	HD	34

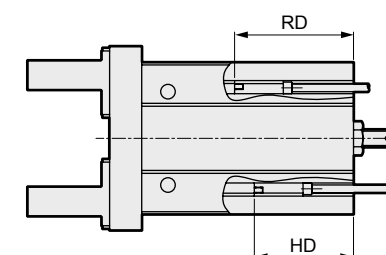
*1: RD dimension is the max. sensitivity position at the open side end position and HD dimension at the closed side end position. The actual mounting position should be adjusted after confirming the operational status of the switch.

*2: When using F□H, the switch lead wire protrudes from the end face of the head side. If this projection is a problem, use F□V or F□S.

● LSH-25-C Shockless (closed side only)



● With switch



F2/3*	RD	41
	HD	34
F2S/F3S	RD	42
	HD	35

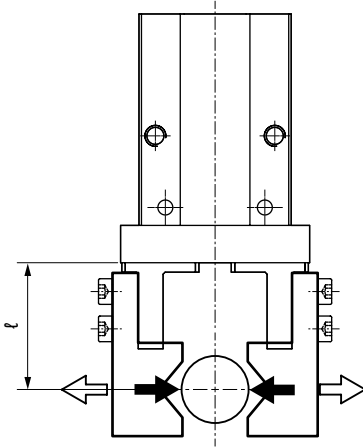
*1: RD dimension is the max. sensitivity position at the open side end position and HD dimension at the closed side end position. The actual mounting position should be adjusted after confirming the operational status of the switch.

*2: When using F□H, the switch lead wire protrudes from the end face of the head side. If this projection is a problem, use F□V or F□S.

Gripping power performance data

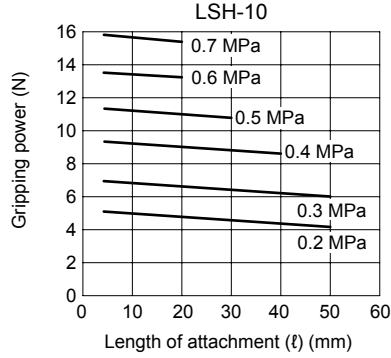
The gripping power in the opening/closing directions with attachment length l with a supply pressure of 0.2 to 0.7 MPa is shown.

- Open direction (←→)
- Closed direction (→)

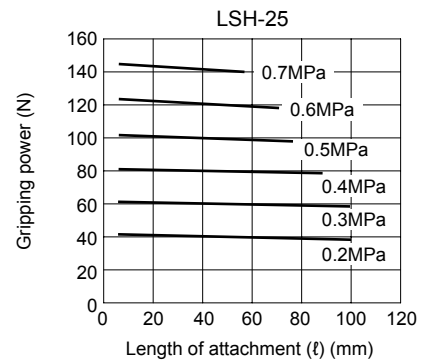
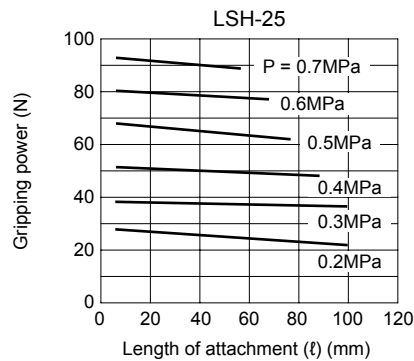
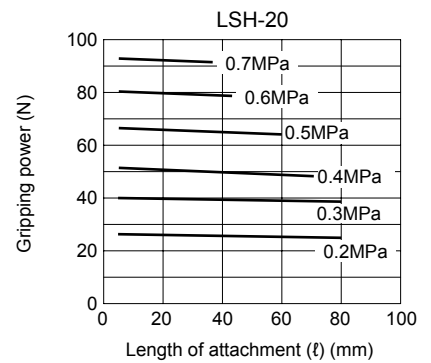
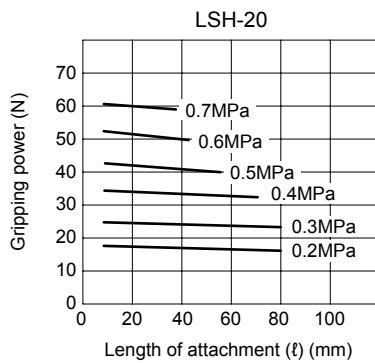
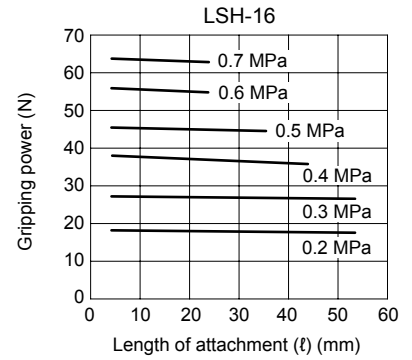
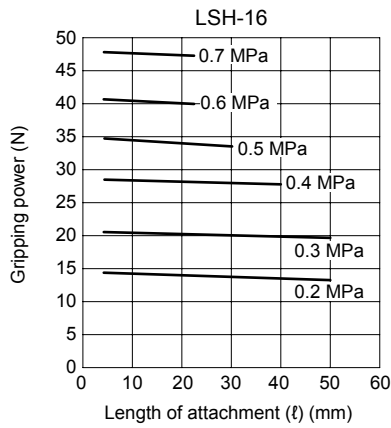
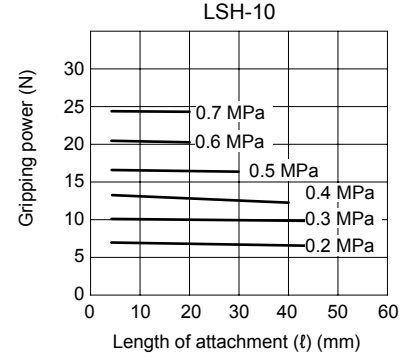


(Note) When making a selection, read the precautions for design and selection on page 8.

Closed direction

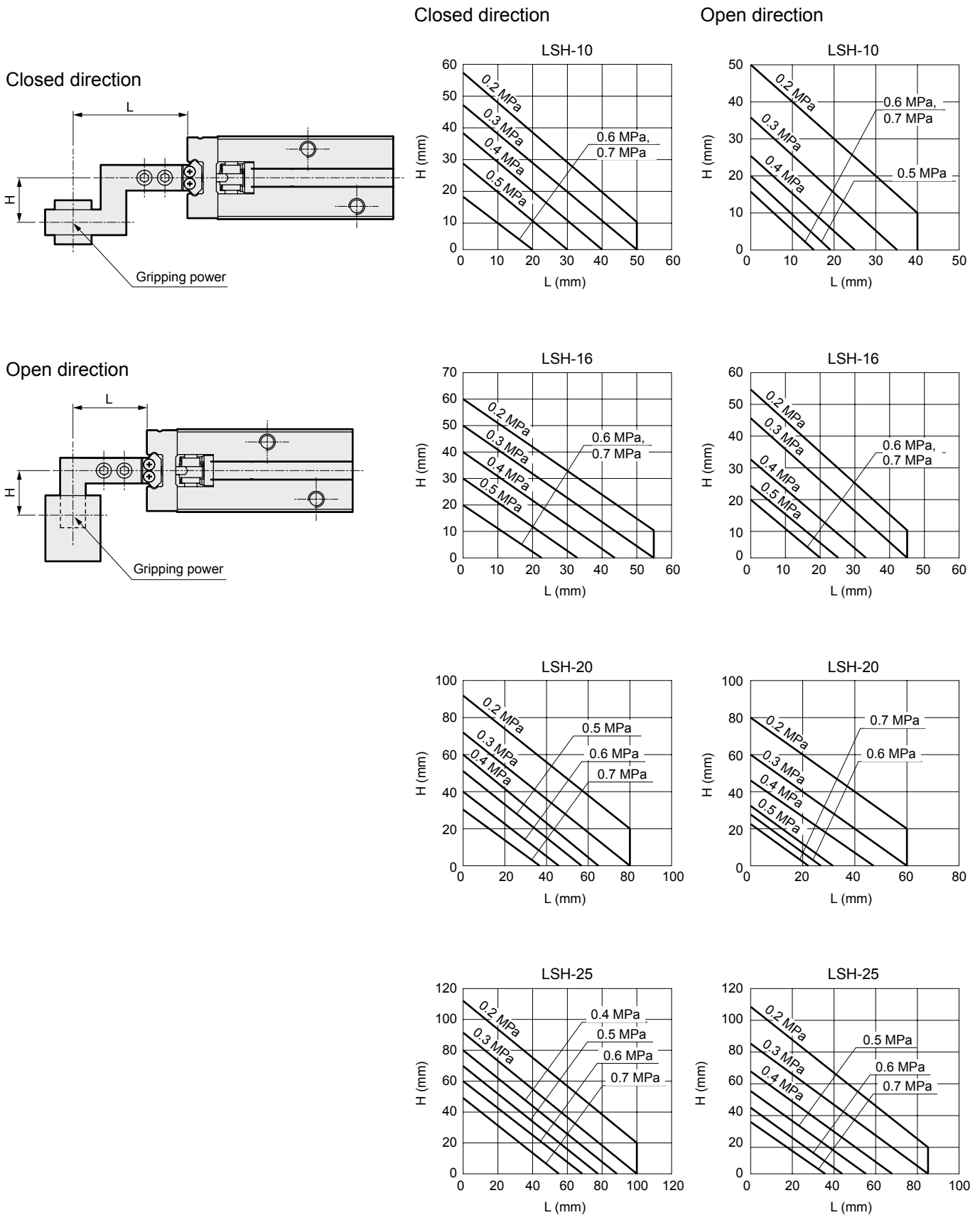


Open direction



Attachment length

When mounting an L-shaped small attachment, use within the range shown in the figure at right.





Safety Precautions

Always read this section before use.


When designing and manufacturing a device using CKD products, the manufacturer is obligated to check that device safety mechanism, pneumatic control circuit, or water control circuit and the system operated by electrical control that controls the devices is secured.


It is important to select, use, handle and maintain the product appropriately to ensure that the CKD product is used safely. Observe warnings and precautions to ensure device safety.


Check that device safety is ensured, and manufacture a safe device.

WARNING

- 1** This product is designed and manufactured as a general industrial machine part.
It must be handled by an operator having sufficient knowledge and experience in handling.
 - 2** Use this product in accordance with specifications.
This product must be used within its stated specifications. In addition, never modify or additionally machine this product. This product is intended for use in general industrial machinery equipment or parts. It is not intended for use outdoors (except for products with outdoor specifications) or for use under the following conditions or environments. (Note that this product can be used when CKD is consulted prior to its usage and the customer consents to CKD product specifications. The customer should provide safety measures to avoid danger in the event of problems.)
 - ①** Use for applications requiring safety, including nuclear energy, railways, aircraft, marine vessels, vehicles, medical devices, devices or applications in contact with beverages or foodstuffs, amusement devices, emergency cutoff circuits, press machines, brake circuits, or safety devices or applications.
 - ②** Use for applications where life or assets could be significantly affected, and special safety measures are required.
 - 3** Observe organization standards and regulations, etc. related to the safety of device design and control, etc.
ISO4414, JIS B 8370 (General rules for pneumatic systems)
JFPS2008 (Principles for pneumatic cylinder selection and use)
Including High Pressure Gas Safety Act, Industrial Safety and Health Act, other safety rules, body standards and regulations, etc.
 - 4** Do not handle, pipe, or remove devices before confirming safety.
 - ①** Inspect and service the machine and devices after confirming safety of all systems related to this product.
 - ②** Note that there may be hot or charged sections even after operation is stopped.
 - ③** When inspecting or servicing the device, turn OFF the energy source (air supply or water supply), and turn OFF power to the facility. Discharge any compressed air from the system, and pay attention to possible water leakage and leakage of electricity.
 - ④** When starting or restarting a machine or device that incorporates pneumatic components, make sure that the system safety, such as pop-out prevention measures, is secured.
 - 5** Observe warnings and cautions in the following pages to prevent accidents.
- The precautions are ranked as "DANGER", "WARNING" and "CAUTION" in this section.

 **DANGER:** When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries, and when there is a high degree of emergency to a warning.

 **WARNING:** If handled incorrectly, a dangerous situation may occur, resulting in death or serious injury.

 **CAUTION:** When a dangerous situation may occur if handling is mistaken leading to minor injuries or physical damage.

Note that some items described as "CAUTION" may lead to serious results depending on the situation. Every item provides important information and must be observed.

Limited warranty and disclaimer

- 1** **Warranty period**
This warranty shall be valid for one year after delivery to the customer's designated site.
- 2** **Scope of warranty**
If any faults, found to be the responsibility of CKD, occur during the above warranty term, the product shall be replaced, the required replacement parts provided free of charge, or shall be repaired at the CKD factory free of charge.
This Limited Warranty will not apply to:
 - (1) Failures due to use outside the conditions and environments set forth in the catalog or these specifications.
 - (2) Failures resulting from factors other than this product.
 - (3) Failures caused by improper use of the product.
 - (4) Failures resulting from modifications or repairs made without CKD consent.
 - (5) Failures caused by matters that could not be predicted with the technologies in practice when the product was delivered.
 - (6) Failures resulting from natural disasters or accidents for which CKD is not liable.The warranty covers the actually delivered product, and does not cover any damage resulting from losses induced by faults in the delivered product.
- 3** **Compatibility check**
The customer is responsible for confirming the compatibility of CKD products with the customer's systems, machines and equipment.



Pneumatic components

Safety Precautions

Always read this section before use.

Refer to Pneumatic Cylinders (CB-029SA) for general information of the cylinder and cylinder switches.

Product-specific cautions: Linear Slide Hand LSH Series

Design/selection

1. Common

⚠ WARNING

- If the moving workpiece poses a possible risk to personnel or if fingers could be caught in the finger, etc., install a protective cover, etc.
- If the circuit pressure drops due to power failure or air source trouble, the gripping power may decrease and the workpiece may fall. Provide position locking measures, etc., so that personnel are not injured or machines damaged.

⚠ CAUTION

■ Precautions for gripping power

- Gripping power represents the force holding the workpiece, as shown in the figure below.
- Attachment length should be within the numerical value given in the gripping power performance data table of each model.
- Max. working attachment length should be within the performance data.

When N is used to express the number of attachments as reference for the coefficient for transferring workpiece weight W_L .

$$W_L \times 9.8 \times 5 < (F \times N) \text{ [holding only]}$$

$$W_L \times 9.8 \times 10 < (F \times N) \text{ [normal transport]}$$

$$W_L \times 9.8 \times 20 < (F \times N) \text{ [sudden accelerated transport]}$$

W_L : Weight of workpiece [kg]

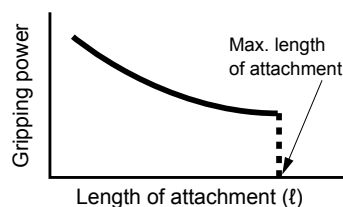
F : Gripping power [N]

N : Number of attachments [pcs.]

■ Use small attachments as short and lightweight as possible.

If the small attachment is long and heavy, inertia increases when opening and closing. This may cause play in the fingers, and adversely affect durability.

- Length of small attachment should be within the numerical values of performance data.
- The weight of the small attachment affects durability, so check that the weight is less than the following value:
 $W < 1/4H$ (1 pc.) W : Weight of small attachment
 H : Product weight of Hand



- When mounting an L-shaped attachment, use within the range on page 6.

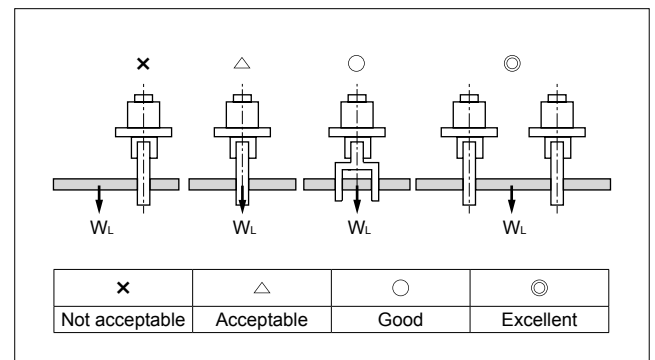
■ Working environment

At cutting, casting, or welding plants, there is a risk of foreign matter, such as cutting fluid, chips, powder and dust, entering the equipment. Use covers and such to prevent entry of foreign matter.

Do not use the equipment under the following environment.

- Exposed to cutting oil (because the sliding section is abraded by abrasive or polishing debris in the liquid)
- When the atmosphere contains organic solvents, chemicals, acids, alkalis, kerosene, etc.
- Exposed to water

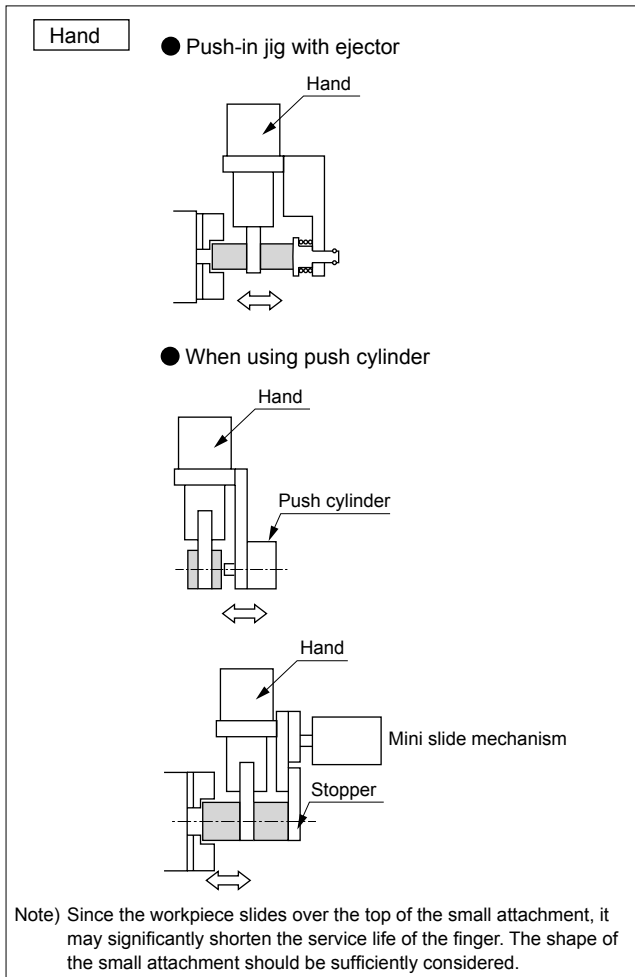
- When gripping long or large workpieces, stable gripping requires a grip on the center of gravity. Stability is a must when using larger or multiple workpieces as well.



- Select a model that has sufficient power to grip the workpiece weight.

- Select a model that has sufficient opening/closing width for the workpiece size.

- If directly inserting the workpiece into the jig with the hand, consider clearance during design. The hand could be damaged.



- If the small attachment is not rigid enough, resulting deflection could cause the finger to twist or adversely affect operation.
- Adjust the finger open/close speed with the speed controller (optional).
When used at high speed, backlash may occur sooner.

2. Shockless LSH-*-C

⚠ CAUTION

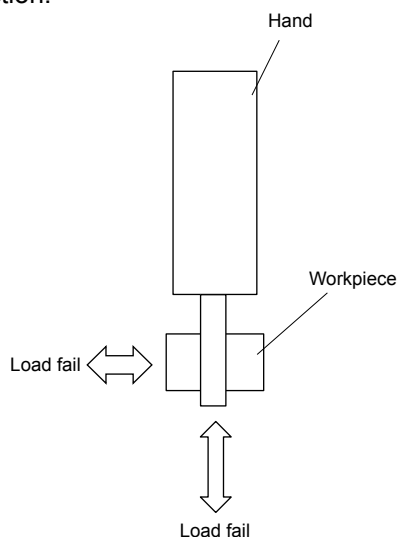
- Note that, structurally, the closed side end position cannot be retained if air supply is cut off. When detecting the closed side end by switch, set the switch position with pneumatic pressure applied, as otherwise the position may be out of the detection range.

Mounting, installation and adjustment

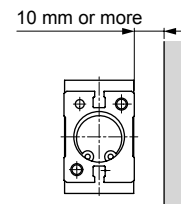
1. Common

⚠ CAUTION

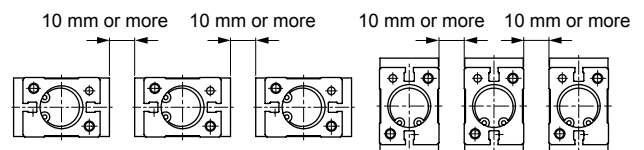
- Do not apply load to the attachments during attachment/removal and transport of workpiece. Scratches and dents may occur on the rolling surface of the finger linear guide, possibly causing malfunction.



- The cylinder switch may malfunction if there is a magnetic substance such as a metal plate installed adjacently. Check that a distance of 10 mm is provided from the surface of the cylinders.



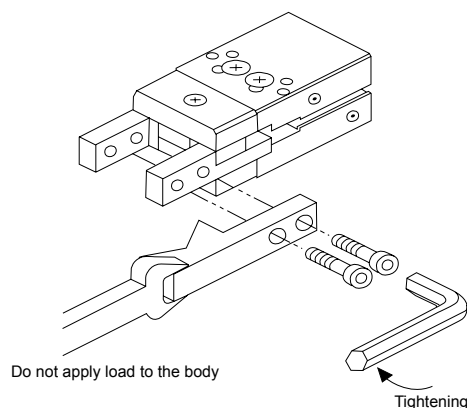
- The cylinder switch may malfunction if cylinders are installed adjacently. Check that the following distances are provided between cylinders.



- Clamping operation is accurate when performed as softly as possible at a low speed. Repeatability is also stable.
- Regularly grease the sliding section of the finger. Regular replenishment can extend service life further.

■ Installing the attachments

To prevent any effect onto the hand, support the finger with a wrench, etc., and tighten so that the finger is not twisted.

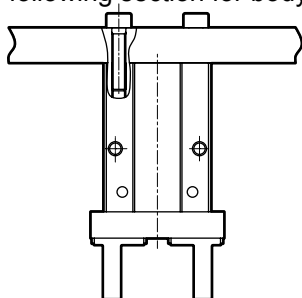


Descriptions	Bolt used	Tightening torque (N·m)
LSH-10	M2.5 × 0.45	0.32
LSH-16	M3 × 0.5	0.59
LSH-20	M4 × 0.7	1.4
LSH-25	M5 × 0.8	2.8

■ Do not cause dents or scratches that may worsen flatness or perpendicularity on the fixing face or finger.

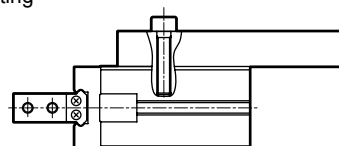
■ Refer to the following section for body mounting.

● Top mounting



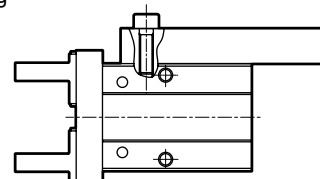
Descriptions	Bolt used	Tightening torque (N·m)	Max. screw insertion depth L (mm)
LSH-10	M3 × 0.5	0.88	6
LSH-16	M4 × 0.7	2.1	8
LSH-20	M5 × 0.8	4.3	10
LSH-25	M6 × 1.0	7.3	12

● Front mounting



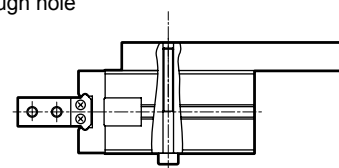
Descriptions	Bolt used	Tightening torque (N·m)	Max. screw insertion depth L (mm)
LSH-10	M3 × 0.5	0.69	5
LSH-16	M4 × 0.7	2.1	8
LSH-20	M5 × 0.8	4.3	10
LSH-25	M6 × 1.0	7.3	12

● Side mounting



Descriptions	Bolt used	Tightening torque (N·m)	Max. screw insertion depth L (mm)
LSH-10	M3 × 0.5	0.88	6
LSH-16	M4 × 0.7	1.6	4.5
LSH-20	M5 × 0.8	3.3	8
LSH-25	M6 × 1.0	5.9	10

● Use of through hole



Descriptions	Bolt used	Tightening torque (N·m)
LSH-10	M2.5 × 0.45	0.32
LSH-16	M3 × 0.5	0.88
LSH-20	M4 × 0.7	2.1
LSH-25	M5 × 0.8	4.3

Note) Through hole cannot be used when switch is provided.

■ Do not retighten or disassemble, other than the screws used for fixing the body and attachments. This could lead to malfunction.

2. Shockless LSH-*-C

⚠ CAUTION

■ Stroke length adjustment method

- Loosen the hexagon nut of the head side and adjust the stroke length by tightening the hexagon socket set screw.
- When tightening the hexagon socket set screw be sure to tighten to the correct torque according to Table 1.

Table 1 Tightening torque Unit: N·m

Bore size	Tightening torque
φ 10	1.1
φ 16	2.0
φ 20	4.7
φ 25	8.9

- Contact your CKD sales representative for details on other adjustment methods.

During Use & maintenance

1. Common

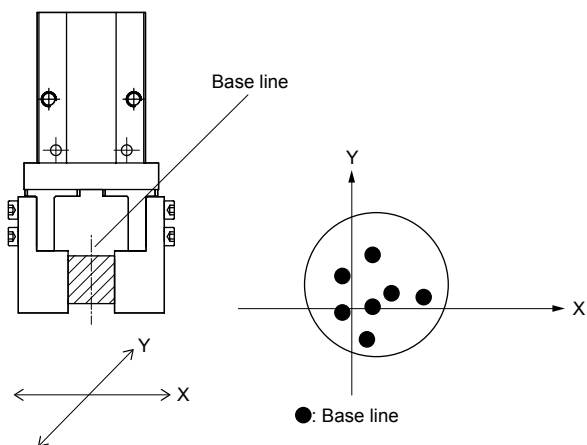
⚠ CAUTION

■ Repeatability

The repeatability here indicates the displacement of the workpiece in the case of repeated clamping and unclamping in the same conditions (hand fixed, same workpiece used: see below).

Conditions

- Workpiece dimensions, shape, weight
- Workpiece transfer position
- Clamp method, length
- Workpiece and workpiece receiving surface resistance
- Fluctuation of gripping power (air pressure), etc.



2. Shockless LSH-*-C

⚠ CAUTION

■ Because of changes in the cushion stiffness when left for long periods, the stroke may become slightly shorter than the standard value at the low pressure setting. Perform a trial run, such as operating several times and performing back-and-forth operation at high supply pressure.

■ Do not rapidly discharge air from the cylinder after performing low speed operation outside the catalog specifications range.

(Example: Removing piping or coupler, etc.)

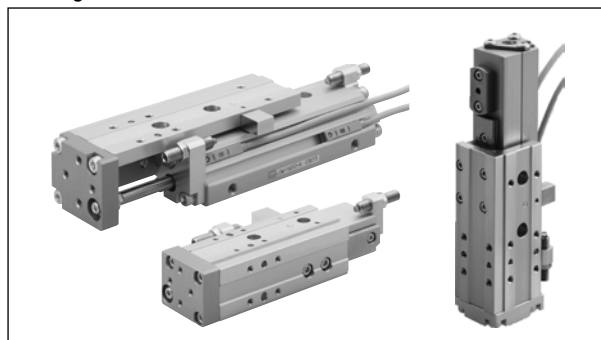
Otherwise the rubber-air cushion may fall. Note that the possibility of occurrence of this may increase, especially when the air pressure is high.

Related products

Linear slide cylinder LCW Series

- Specs most used by customers are provided as standard
Combination of 3 bore sizes (ϕ 12, 16, 20) and stroke lengths (30, 50, 75)
Stroke adjustment function available as standard
- High rigidity and light weight are possible by preserving LCR properties
- 3-surface mounting
Uses an innovative L-shaped table that greatly improves flexibility in design
- Piping and wiring direction on the same surface
Wiring and piping are neat to improve workability and visibility
- Compact and space saving
Reduction of axial direction by 27% and area ratio by 20%

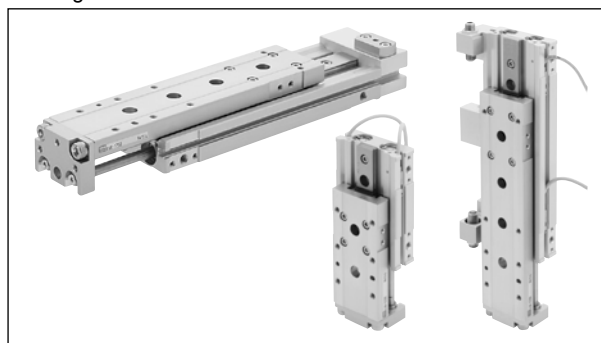
Catalog No. CC-1132A



Linear slide cylinder LCR Series

- Up to 10% lighter compared with previous models by using an aluminum table
- The highly rigid linear guide and slide table improve rigidity
- Designing is more flexible with the laterally symmetrical stoppers, multi-side piping, positioning hole availability, and more

Catalog No. CB-029SA



Electric actuator ERL2/ESD2 Series

- Positioning numbers
63 positioning points with high versatility have been added to the 7 positioning points of the previous model
- Simple configuration tools
Simple computer configuration software (E-Tools) has been added to accompany the teaching pendant (ETP2)
- Full compatibility
Actuators and controllers are fully compatible in any combination

Catalog No. CC-1219A

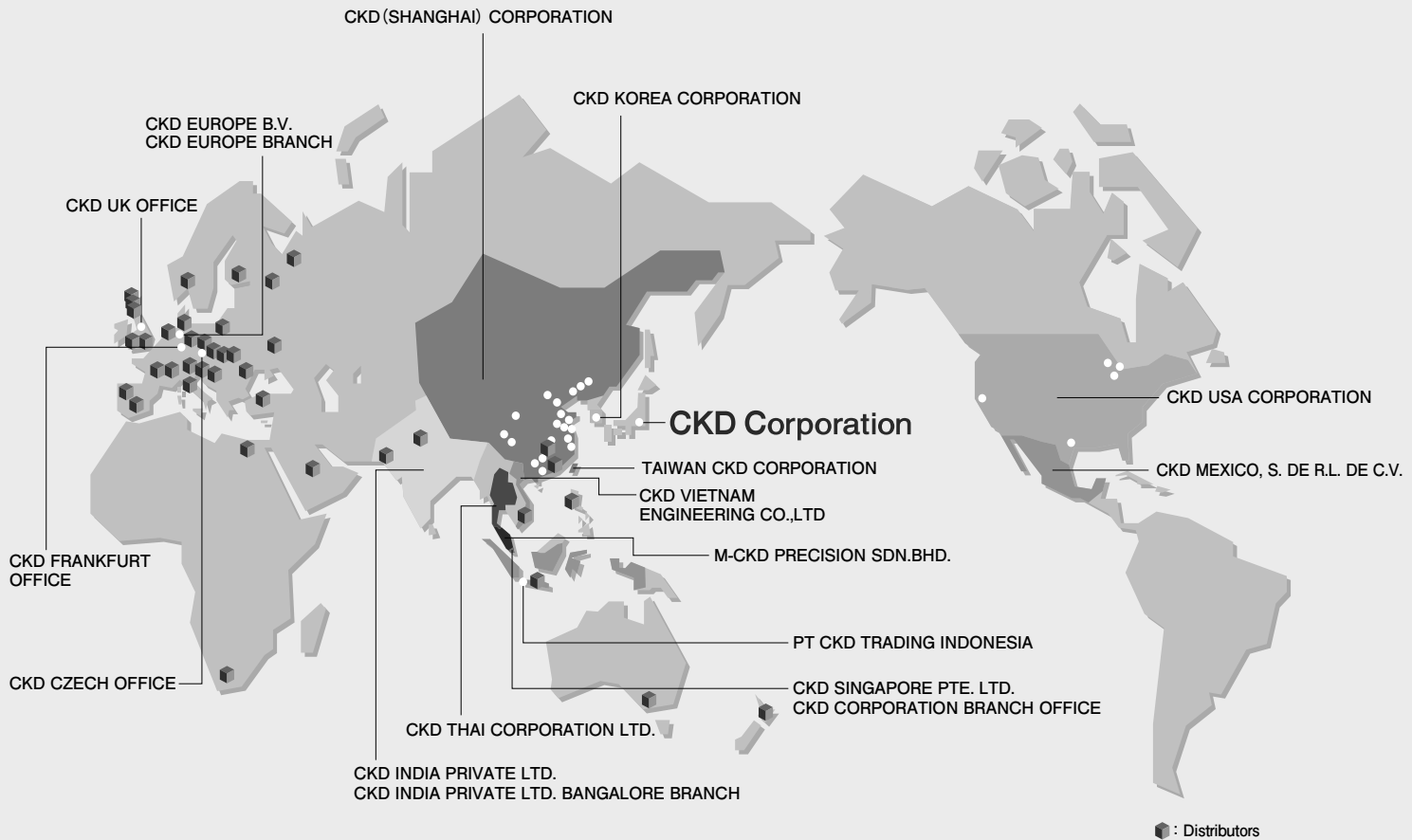


ABSODEX compact AX6000M Series

- Space saving
In addition to the industry's smallest dimensions, a compact, space-saving design is possible thanks to the concentric shape (rotary shaft and fixed shaft are the same)
- Flexible
Desired operation is achieved thanks to abundant program creation functions
Automatic creation using point specifying programs and other simple operation configuration are also supported
- High reliability and maintenance-free
Stable operation thanks to the direct drive method (gear-less) that eliminates worrying about changes in accuracy due to gear damage when overloaded or worn gear parts

Catalog No. CC-1148A





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