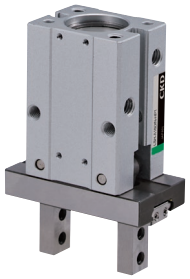
CKD

New Products

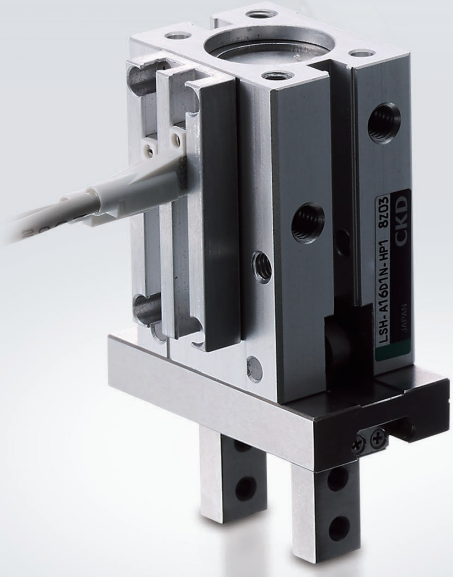
Linear Slide Hand
LSH-HP Series



Changing "gripping" changes manufacturing

New

Switch output and
IO-Link adapters added



HP
HIGH PRODUCTIVITY

CKD Corporation
CC-1419A 4

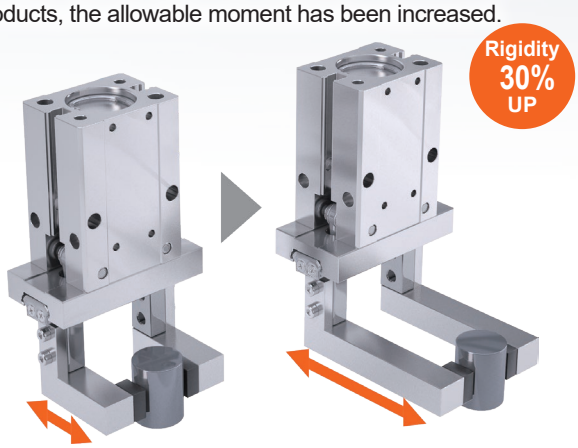
Linear Slide Hand LSH-HP1 Series

Increased linear guide performance

High rigidity

Increased amount of overhang

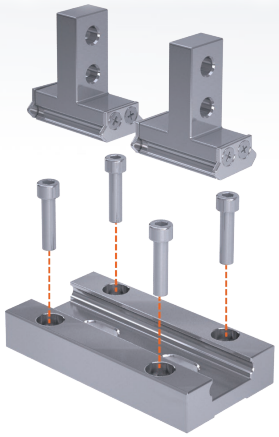
By improving the guide rigidity beyond that of conventional products, the allowable moment has been increased.



High precision

Repeatability ±0.01 mm

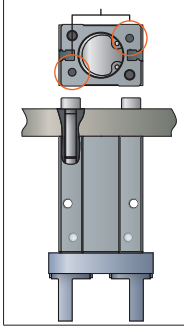
High rigidity and high precision are achieved with a structure integrating the guide rail and finger.

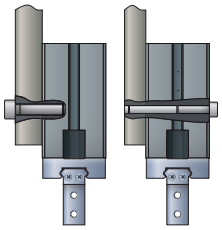


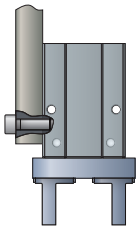
Increased flexibility in design

Can be mounted on three directions

Axial (upward) mounting	Horizontal mounting	Vertical mounting
Two positioning holes enabling inverted mounting with reference spigot have been added		



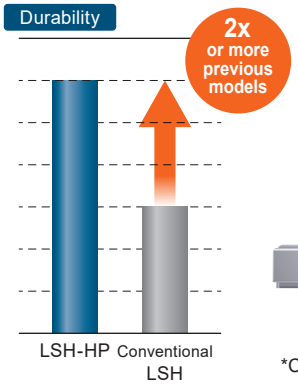


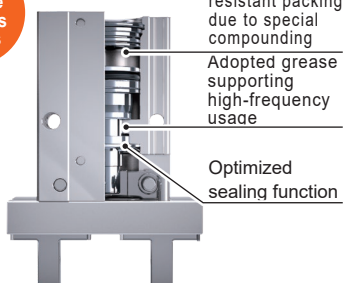


Long service life

Twice the durability compared with conventional models*

Packing design has been optimized. Highly advanced sliding technology has enabled durability twice that of conventional models.



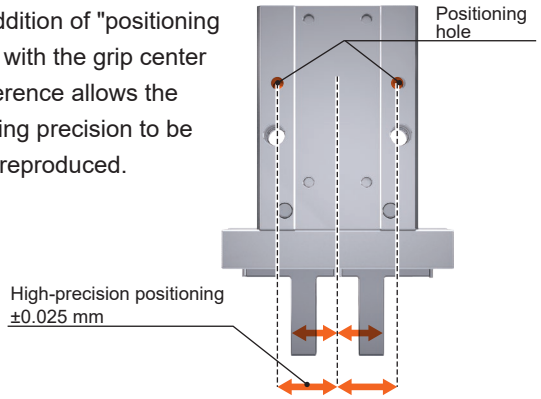


*Compared to conventional LSH model.

Reduced processes on site

High-precision positioning of ±0.025 mm

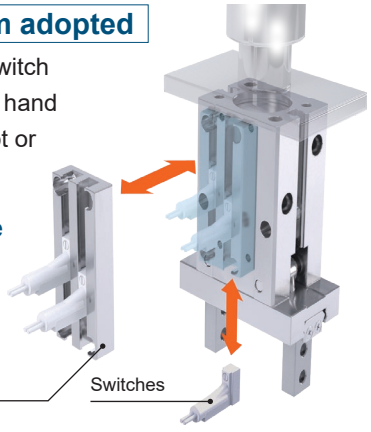
The addition of "positioning holes" with the grip center as reference allows the centering precision to be easily reproduced.



Rail plate system adopted

The rail plate allows switch replacement while the hand is attached to the robot or equipment.

Switches can be easily replaced

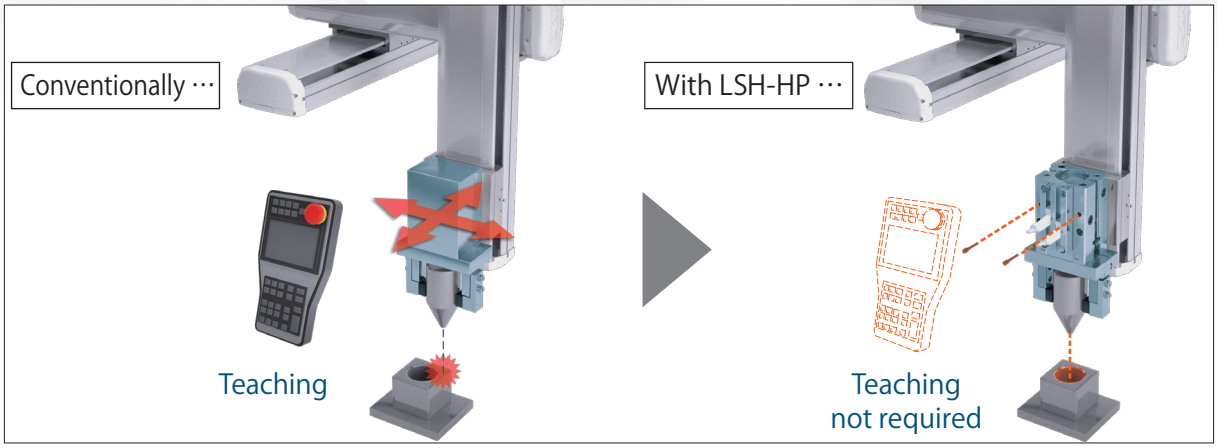


Increased productivity begins with the Linear Slide Hand

Case Study - Reduced processes on site

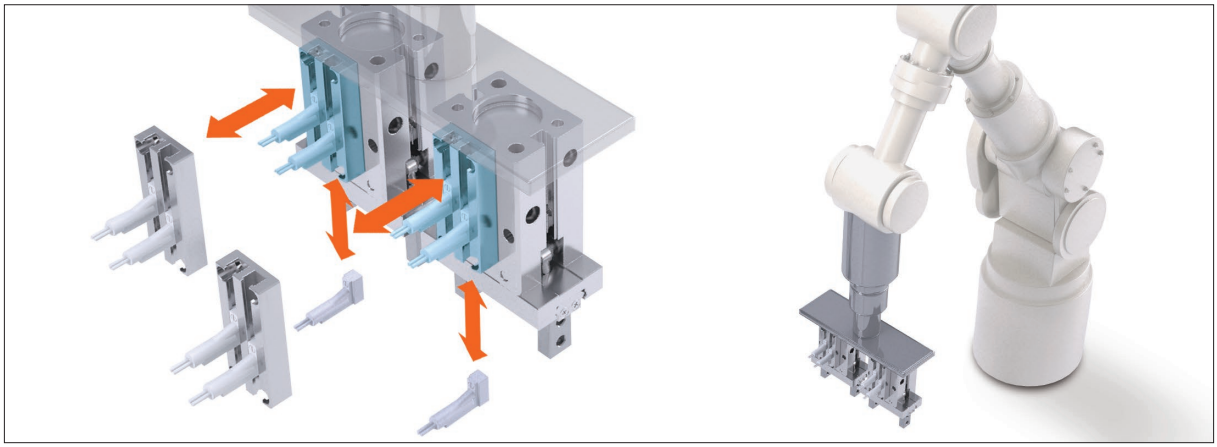
Replacement of body

Positioning holes that guarantee centering precision enable highly reproducible mounting, with no fine adjustment required.This contributes to reduced mounting adjustment work-hours and improved reproducibility.



Replacement of switch

The switch can be replaced without detaching the hand from the robot or equipment.



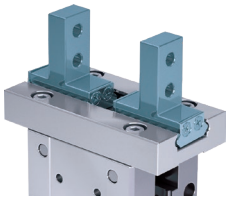
Extensive series variation

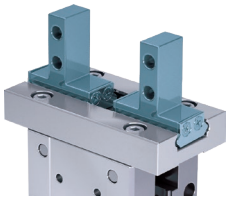

Standard

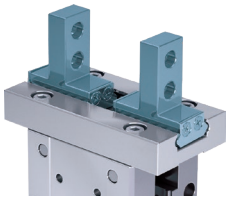

With rubber cover

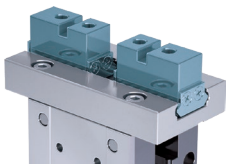

Long stroke


Long stroke with rubber cover


Basic opening/closing direction tap


Side tap


Opening/closing direction through hole


Flat

Linear Slide Hand with Length Measuring Function

LSH-HP2 Series

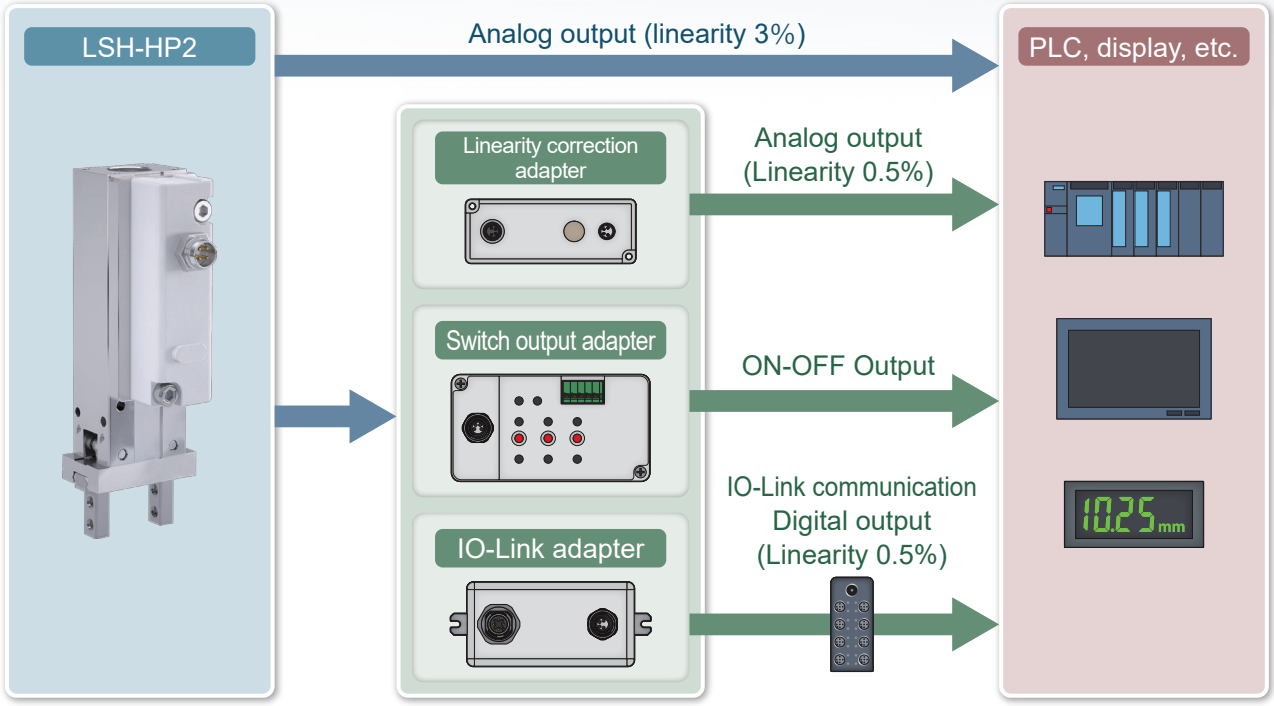
High precision

Repeatability ±0.02 mm

A new sensor system is adopted and integrated, achieving higher repeatability than ever before.

Selectable output format

Various output formats can be selected according to the application.



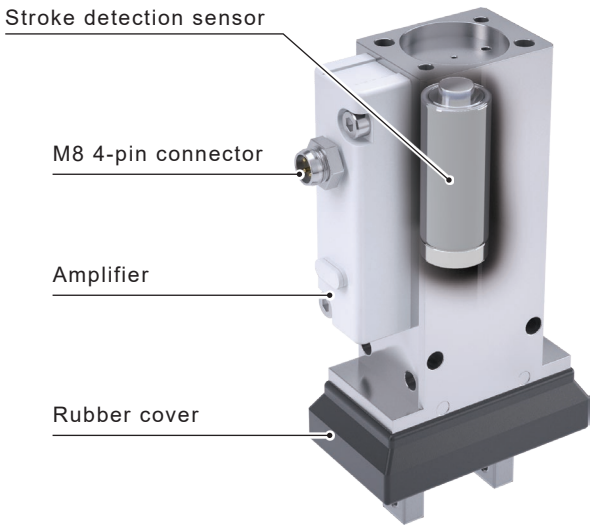
Integrated structure

Industry's 1st

Adopts an LVDT* sensor highly resistant to vibration and impact.

A displacement sensor is built into the body, achieving a high-precision integrated structure.

* LVDT is short for Linear Variable Differential Transformer, a sensor that converts mechanical displacement into electric signal for output.



Environmental resistance

The IP65 equivalent amplifier and rubber cover prevent the ingress of cutting chips and water drops.

A new series that combines improved reliability and productivity!

Linearity correction adapter

Linearity F.S.±0.5%

With correction adapter: F.S.±0.5%

Without correction adapter: F.S.±3%

A correction adapter is adopted to improve the linear accuracy.

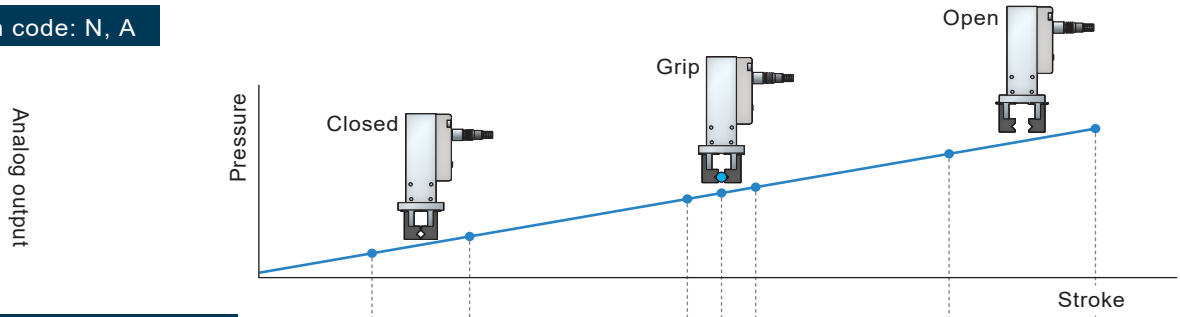
Switch output adapter

Easy setting

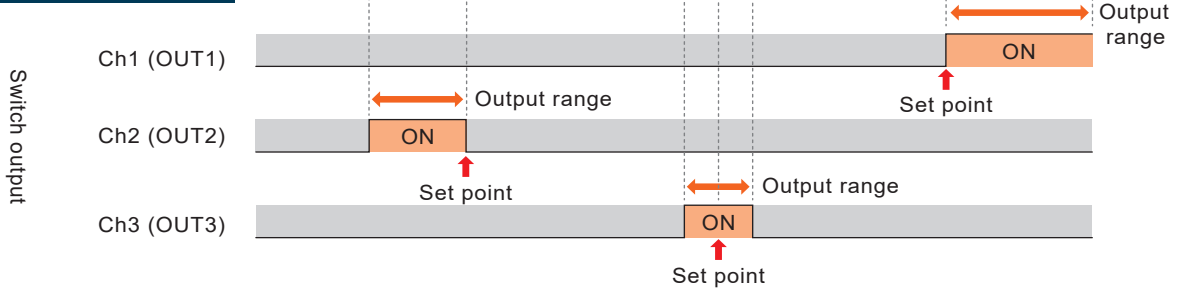
The operating range and output pattern can be easily selected with the rotary switch.Troublesome cylinder switches for adjustment work are not required. A fine operation range can also be selected with the high precision sensor.

Image of operation detection

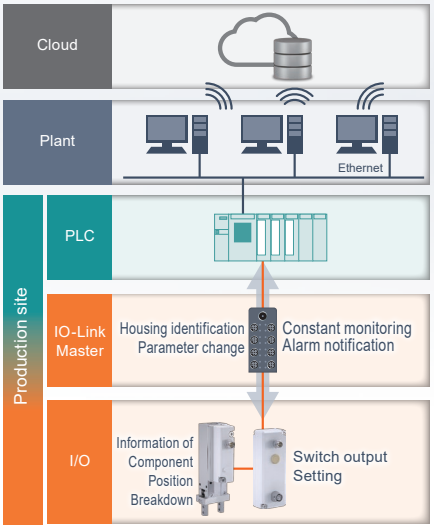
Option code: N, A



Option code: B, C
With switch output adapter



IO-Link adapter



Constant monitoring via digital data is possible.

Parameters can be set and changed via the network, enabling remote equipment operation.

Models, serial numbers, etc., can be confirmed on the network.

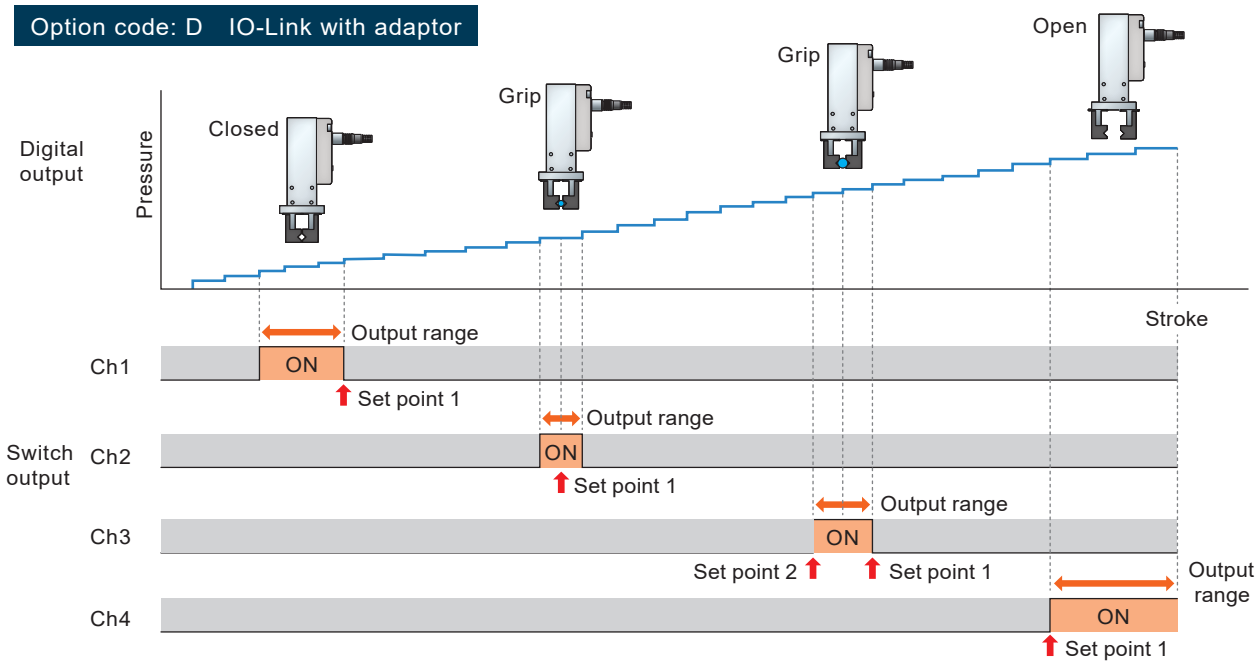
The settings can be copied from the master (scanner), making parameter reconfiguration after maintenance obsolete.

Device failure and disconnection can be confirmed.

It can also be converted to Ethernet networks and connected, enabling devices to be IoT-ready.

IO-Link is a digital communication standard for sensors/actuators at factory sites.(IEC 61131-9)
Unlike analog communication, it enables the transmission of parameters and event data.

Image of operation detection

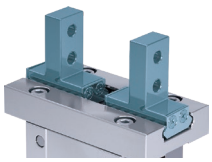


Extensive series variation

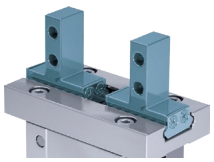
Amplifier
Side mounting

Amplifier
Front mounting

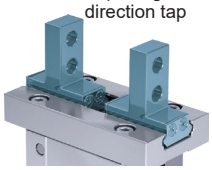
With rubber cover



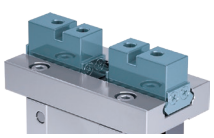
Basic opening/closing direction tap



Side tap



Opening/closing direction through hole

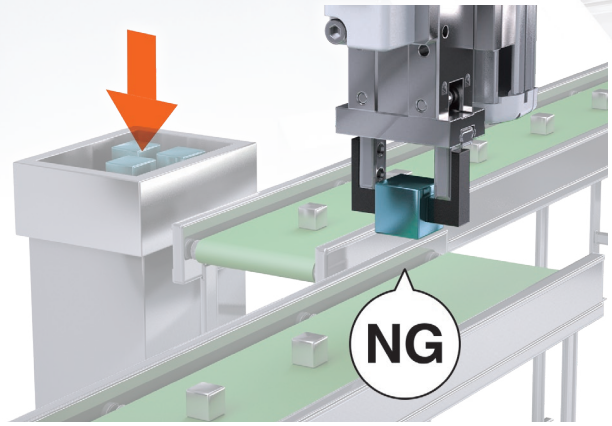


Flat

Case Study

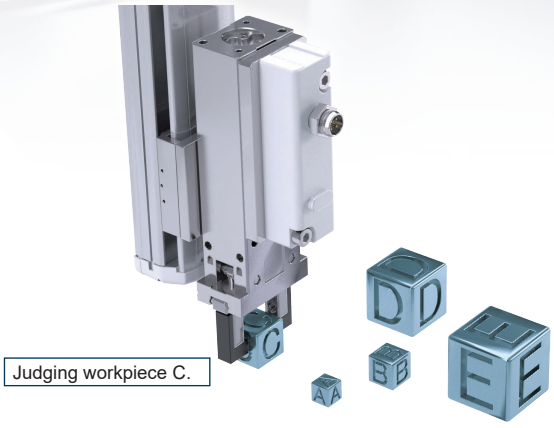
Workpiece foreign object judgment

Grips and measures simultaneously, reducing the number of inspection steps.



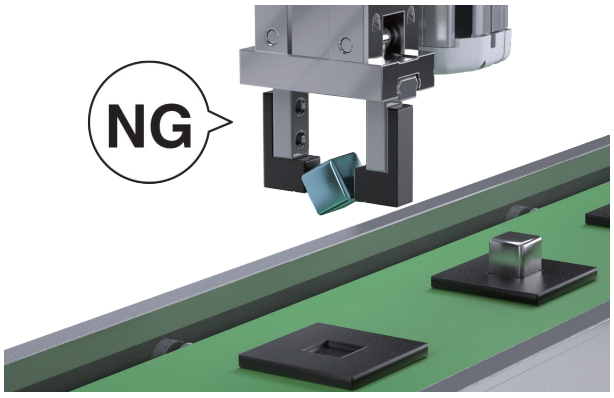
Workpiece model judgment

Capable of instantaneously judging minute differences in workpiece models.



Gripping orientation judgment

By detecting misaligned orientations when gripped, contact accidents can be prevented at the transported destination.

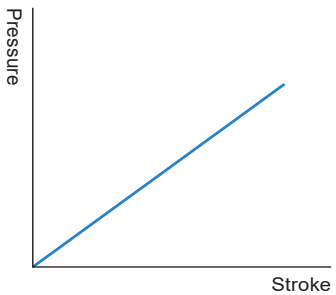


Minute workpiece gripping / missed grip judgment

Accurately judges whether even tiny workpieces were gripped or missed.

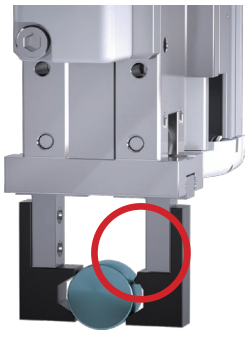
Elimination of human error

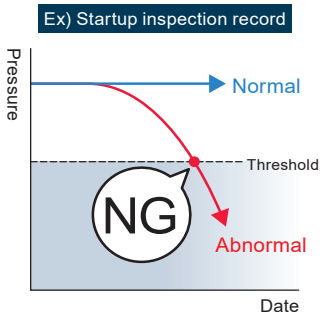
All strokes are output in detail, eliminating manual adjustment error as caused by conventional switches.



Predictive maintenance

Monitors abnormal wear and deformation of gripping fingers and jigs through changes in output to prevent equipment and robot damage.



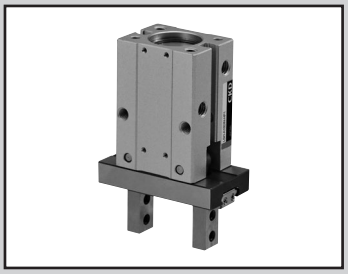


Series variation Linear Slide Hand LSH-HP Series

	Variation	Model No.	Bore size (mm)
HP1 Series	Double acting/single acting without rubber cover 	LSH-A	ø6
			ø10
			ø16
			ø20
			ø25
			ø32
	Double acting/single acting with rubber cover 	LSH-G LSH-F	ø6
			ø10
			ø16
			ø20
			ø25
			ø32
	Double acting long stroke length without rubber cover 	LSHL-A	ø10
			ø16
			ø20
			ø25
	Double acting long stroke length with rubber cover 	LSHL-G LSHL-F	ø10
			ø16
			ø20
HP2 Series	With length measuring function, double acting without rubber cover 	LSHM-A	ø10
			ø16
			ø20
			ø25
	With length measuring function, double acting with rubber cover 	LSHM-G LSHM-F	ø10
			ø16
			ø20
			ø25

Gripping power (N) 5 10 50 100 200	Operation Stroke (mm)	Switches Model No.	Description Page
	4	F2S F3S	1
	6		
	10		
	14		
	22		
	4	F2H/V	11
	6	F3H/V	
	10		
	14	F3PH/V	
	22	T2H/V	
	8	T3H/V	21
	12		
	18	T2H/VR3	
	22	T3PH/V	
	8		29
	12		
	18		
	4	—	35
	6		
	10		
	14		
	4	—	43
	6		
	10		
	14		

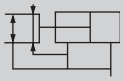
*Range of gripping power at supply pressure 0.5 MPa and jaw length 20 mm

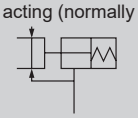


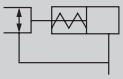
Linear Slide Hand double acting / single acting

LSH-A Series

● Operating stroke length: 4, 6, 10, 14, 22 mm

Double acting 

Single acting (normally open) 

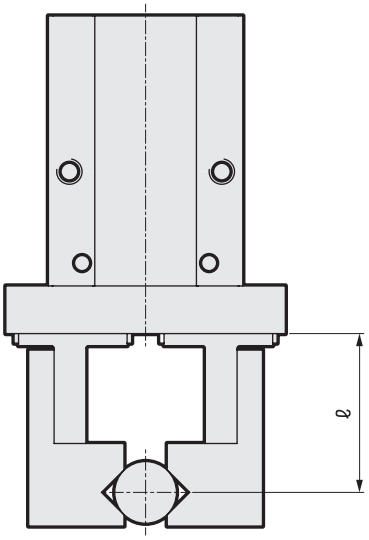
Single acting (normally closed) 

RoHS

Specifications

Item			LSH-A					
Bore size		mm	ø6	ø10	ø16	ø20	ø25	ø32
Actuation			Double acting / single acting (normally open / normally closed)					
Working fluid			Compressed air					
Max. working pressure		MPa	0.7					
Min. working pressure	MPa	Double acting	0.15	0.2	0.1			
		Single acting	0.3	0.35	0.25			
Port size			M3		M5			
Ambient temperature		°C	-10 to 60 (no freezing)					
Operating stroke length		mm	4		6	10	14	22
Repeatability		mm	±0.01					
Weight Double acting type (Single acting) kg	Finger OP: 1, 2, 3		0.032	0.06	0.135	0.275 (0.28)	0.49 (0.495)	0.73 (0.78)
	Finger OP: 4				0.14	0.28 (0.285)	0.495 (0.5)	0.76 (0.81)
Lubrication			Not required					

Gripping power



Unit: N

Bore size (mm)	Double acting	
	Open side	Closed side
ø6	6.1	3.3
ø10	17	11
ø16	45	34
ø20	66	42
ø25	104	65
ø32	193	158

Bore size (mm)	Single acting (normally open)	
		Closed side
ø6	-	1.9
ø10		7.1
ø16		27
ø20		33
ø25		45
ø32		131

Bore size (mm)	Single acting (normally closed)	
	Open side	
ø6	3.7	-
ø10	13	
ø16	38	
ø20	57	
ø25	83	
ø32	161	

* At supply pressure of 0.5 MPa, ℓ = 20 mm, stroke center

Switch specifications

Item	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 light	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 F type switch uses a bend-resistant lead wire by default.

Item	Proximity 2-wire		Proximity 3-wire	
	T2H/T2V	T2HR3/T2VR3 (Lead wire, a bend-resistant type)	T3H/T3V	T3PH/T3PV
Applications	Programmable Controller dedicated		Programmable For controller, relay	
Output method	–	–	NPN output	PNP output
Power supply voltage	–	–	DC10 to 28V	
Load voltage/ current	10 to 30 VDC 5 to 20 mA	10 to 30 VDC 5 to 20 mA	30 VDC or less 100 mA or less	
Display lamp	Red LED (Lit when ON)	Red LED (Lit when ON)	Red LED (Lit when ON)	Yellow LED (Lit when ON)
Leakage current	1 mA or less	1 mA or less	10 μA or less	
Impact resistance	980 m/s^2			
Weight g	1 m: 18 g 3 m: 49 g			

How to order

Without switch (built-in magnet for switch)

LSH - A 06 D 1 R — HP1

With switch (built-in magnet for switch)

LSH - A 06 D 1 R - F2H - D - HP1

Ⓐ Rubber cover
Ⓑ Bore size
Ⓒ Actuation
Ⓓ Finger
Ⓔ Grip center reference, high precision positioning hole
Ⓕ Switch model No.
Ⓖ Switch quantity

Code	Description
Ⓐ Rubber cover	
A	Without rubber cover
Ⓑ Bore size (mm)	
06	ø6
10	ø10
16	ø16
20	ø20
25	ø25
32	ø32
Ⓒ Actuation	
D	Double acting
S	Single acting / normally open
C	Single acting / normally closed
Ⓓ Finger * Refer to the Dimensions for details.**	
1	Basic
2	Side tap
3	Through hole
4	Flat
Ⓔ Grip center reference, high precision positioning hole	
N	None
L	Refer to the figure at left.
R	

Ⓕ Switch model No.

Blank	No switch, with F type switch rail
N	No switch, no switch rail
A	No switch, with T type switch rail (ø32 only)

Axial lead wire	Radial lead wire	Contact	Voltage AC	Voltage DC	Display	Lead wire
–	**F2S***	Proximity		●	1-color display	2-wire
–	**F3S***			●		3-wire
F2H*	**F2V***			●		2-wire
F3H*	**F3V***			●		3-wire
F3PH*	**F3PV***			●		3-wire
T2H*	**T2V***			●		2-wire
T2HR3	**T2VR3**			●		2-wire
T3H*	**T3V***			●		3-wire
T3PH*	**T3PV***			●		3-wire

*** Lead wire length**

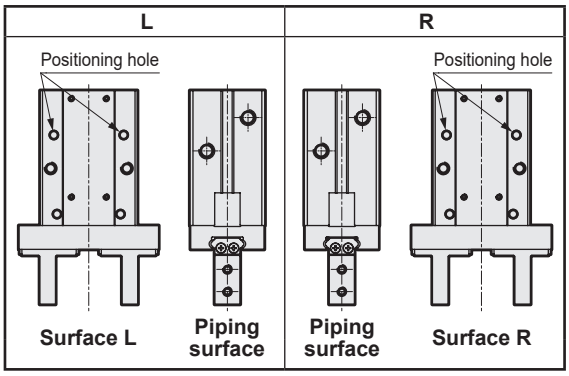
Blank	1 m (standard)
3	3 m (option)

Ⓖ Switch quantity

R	1 on open side
H	1 on closed side
D	2

*1: If the one with the switch is selected, the product comes with a rail plate corresponding to the switch.
*2: Only ø32 can be selected with the T switch.
*3: Refer to page 65 for cylinder switch precautions.

Grip center reference, high precision positioning hole position diagram



Refer to the Dimensions (pages 5 to 10) and page 60 for details.

How to order switch

SW - F2H*

Switch model No. (Item Ⓕ above)

Switch mounting availability table

Model No.	Switch model No.	Side mounting	Rail mounting
LSH-A06	F2/3□	●	–
	F2/3S	–	●
LSH-A10	F2/3□	●	●
	F2/3S	●	●
LSH-A16	F2/3□	●	●
	F2/3S	●	●
LSH-A20	F2/3□	●	●
	F2/3S	●	●
LSH-A25	F2/3H·PH	–	●
	F2/3V·PV	●	●
	F2/3S	●	●
LSH-A32	F2/3□	●	●
	F2/3S	●	●
	T2/3□	–	●

[Example of model No.]

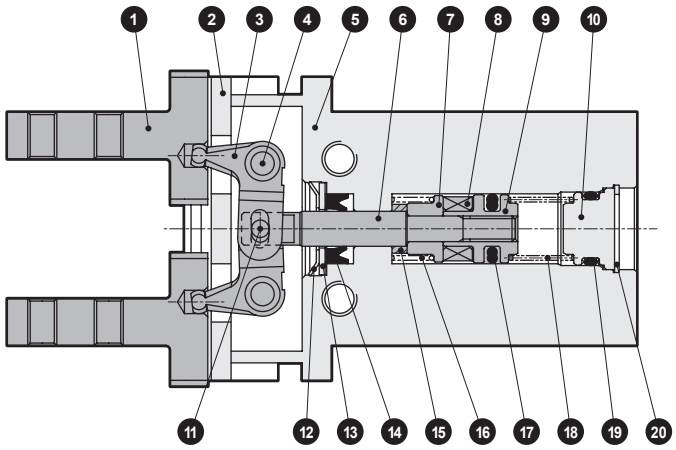
LSH-A06D1R-F2H-D-HP1

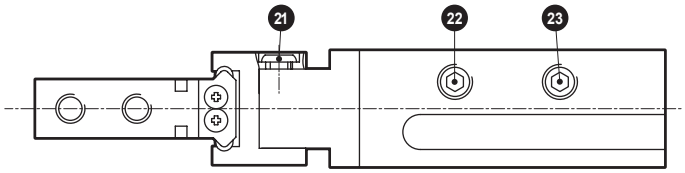
Model: Linear Slide Hand

Ⓐ Rubber cover	: Without rubber cover
Ⓑ Bore size	: ø6
Ⓒ Actuation	: Double acting
Ⓓ Finger	: Basic
Ⓔ Grip center reference, high precision positioning hole	: R
Ⓕ Switch model No.	: Proximity F2H, lead wire 1 m
Ⓖ Switch quantity	: 2

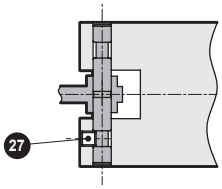
Internal structure and parts list

● LSH-A06

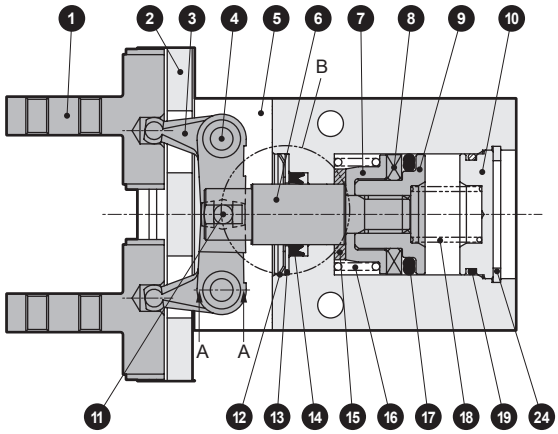


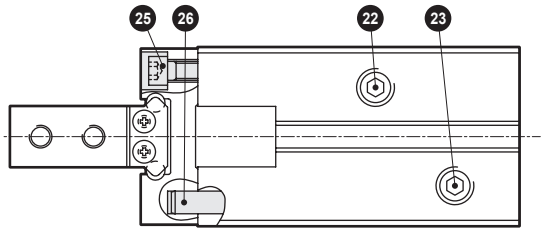


Cross-section A-A

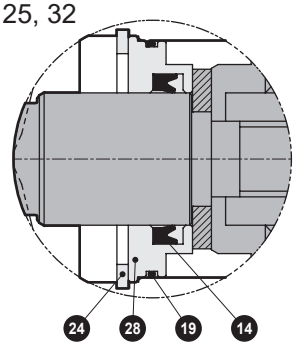


● LSH-A10 to 16





B part ø20, 25, 32



Parts list

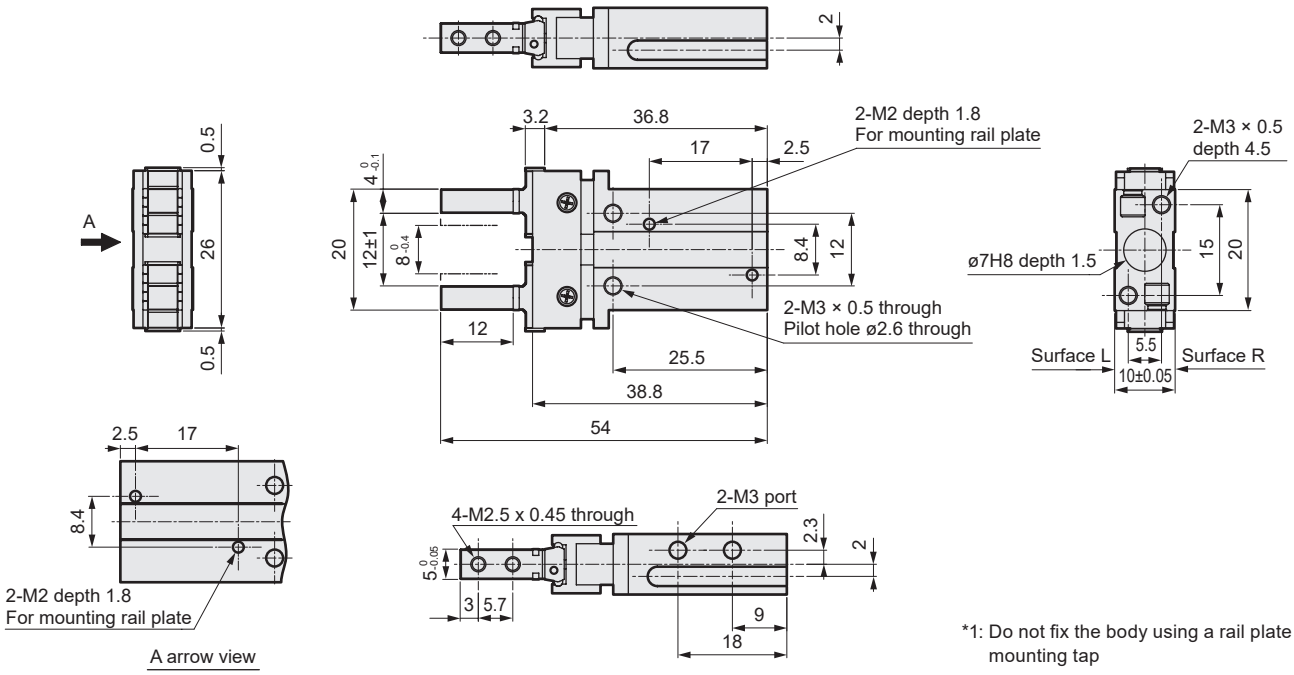
No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Finger	Stainless steel		15	Cushion rubber	Urethane rubber	
2	Linear guide	Stainless steel		16	Coil spring	Piano wire	Single acting C
3	Lever	Stainless steel		17	Piston packing	Nitrile rubber	
4	Fulcrum axis	Steel		18	Coil spring	Piano wire	Single acting S
5	Body	Aluminum alloy		19	O-ring	Nitrile rubber	
6	Piston rod	Stainless steel		20	C-snap ring	Steel	
7	Spring bracket	Aluminum alloy		21	Pan head machine screw	Stainless steel	
8	Magnet			22	Plug	Stainless steel	Single acting C
9	Piston	Aluminum alloy		23	Plug	Stainless steel	Single acting S
10	Head cover	Aluminum alloy		24	C-snap ring	Stainless steel	
11	Operation shaft	Steel alloy		25	Hexagon socket head cap screw	Stainless steel	ø32 is steel
12	CR ring	Stainless steel		26	Pin	Steel	
13	Cap	Stainless steel		27	Hexagon socket set screw	Stainless steel	
14	Rod packing	Nitrile rubber		28	Rod metal	Aluminum alloy	

Repair parts list

Bore size (mm)	Kit No.	Repair part No.	Rail plate kit No.		
			For F type switch	For T type switch	Description
ø6	Cannot be disassembled	-	LSH-RPF-06-HP	–	Rail plate small screw
ø10	LSH-10K-HP	⑫⑭⑰⑲	LSH-RPF-10-HP	–	
ø16	LSH-16K-HP		LSH-RPF-16-HP	–	
ø20	LSH-20K-HP	⑭⑰⑲	LSH-RPF-20-HP	–	
ø25	LSH-25K-HP		LSH-RPF-25-HP	–	
ø32	LSH-32K-HP		LSH-RPF-32-HP	LSH-RPT-32-HP	

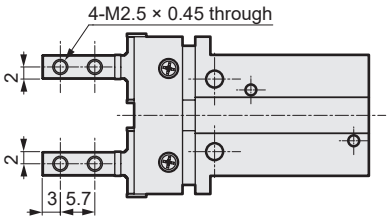
Dimensions (bore size: ø6)

● LSH-A06*1N

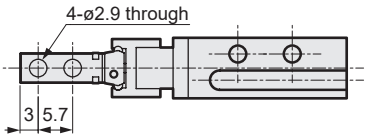


*1: Do not fix the body using a rail plate mounting tap

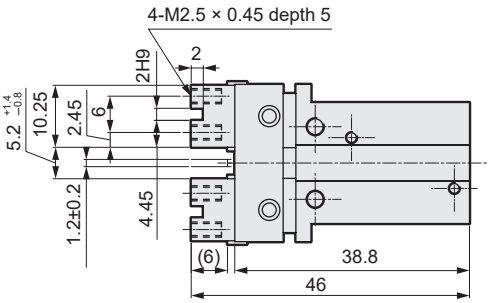
● LSH-A06*2N



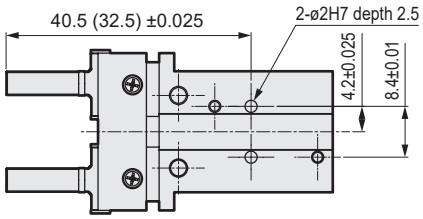
● LSH-A06*3N



● LSH-A06*4N

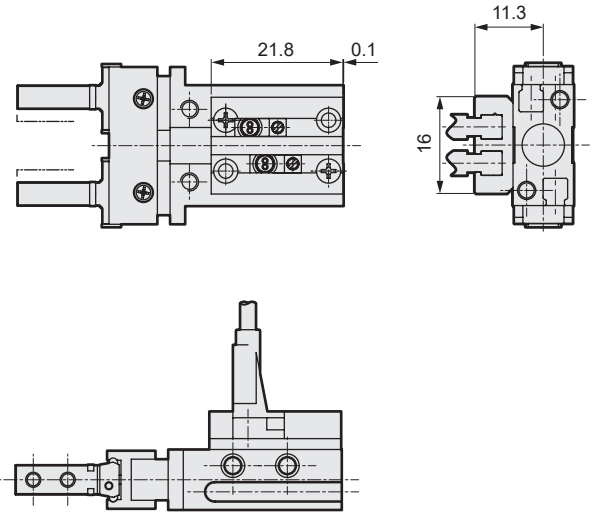


● LSH-A06**R / L



*2: Positioning holes are machined on surface R for LSH-A06**R and surface L for LSH-A06**L. Refer to page 60 for the base line.
*3: The dimensions in parentheses are the dimensions for LSH-A06*4.

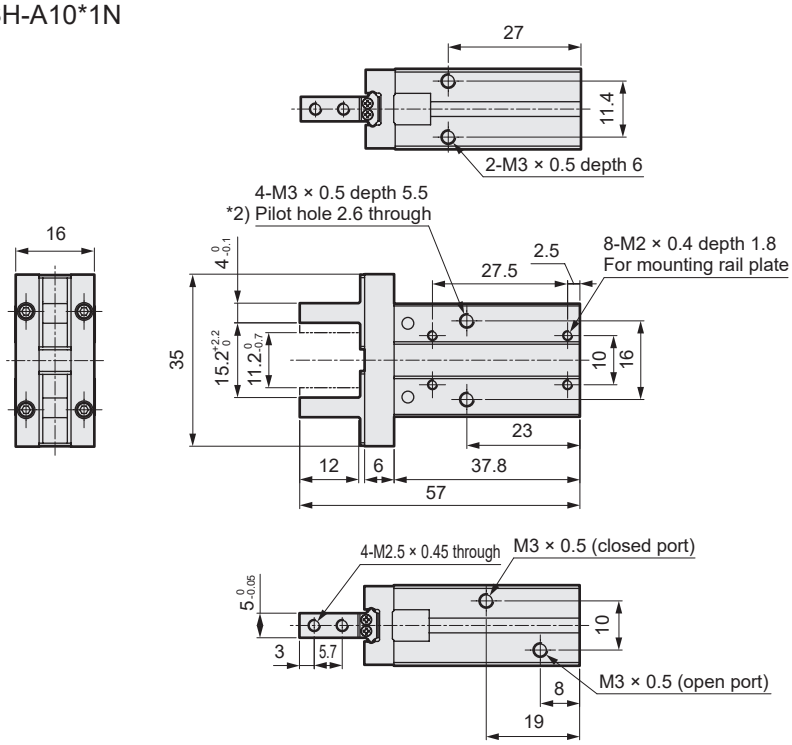
● With switch, rail assembly



*4: Refer to Page 69 for cylinder switch precautions.
*5: Use fittings with an outer diameter of ø9 or less to prevent them from interfering with each other.

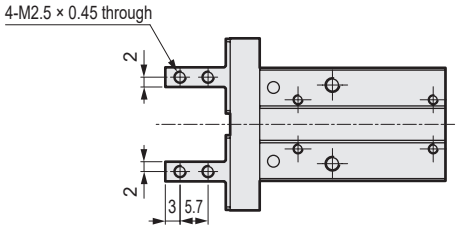
Dimensions (bore size: ø10)

● LSH-A10*1N

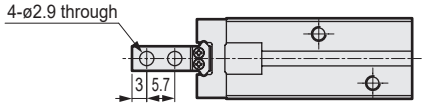


*1: Do not fix the body using a rail plate mounting tap
*2: For switch side/rail mounting, the through hole cannot be used.

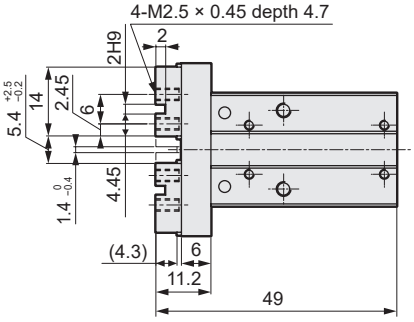
● LSH-A10*2N



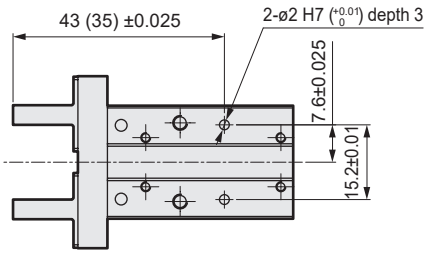
● LSH-A10*3N



● LSH-A10*4N

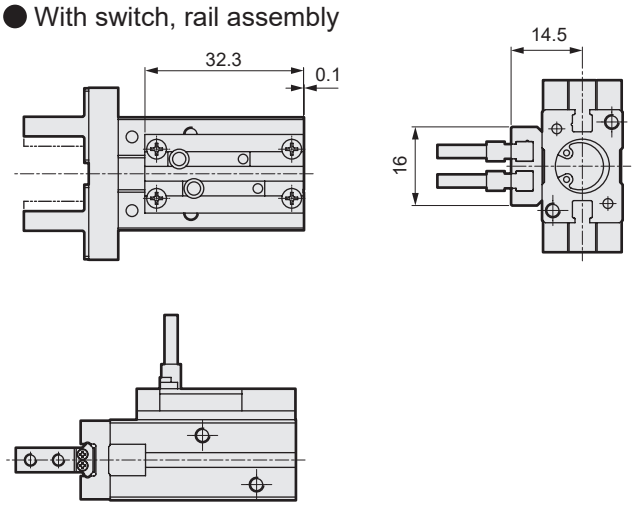


● LSH-A10**R / L



*3: Positioning holes are machined on surface R for LSH-A10**R and surface L for LSH-A10**L. Refer to page 60 for the base line.
*4: The dimensions in parentheses are the dimensions for LSH-A10*4.

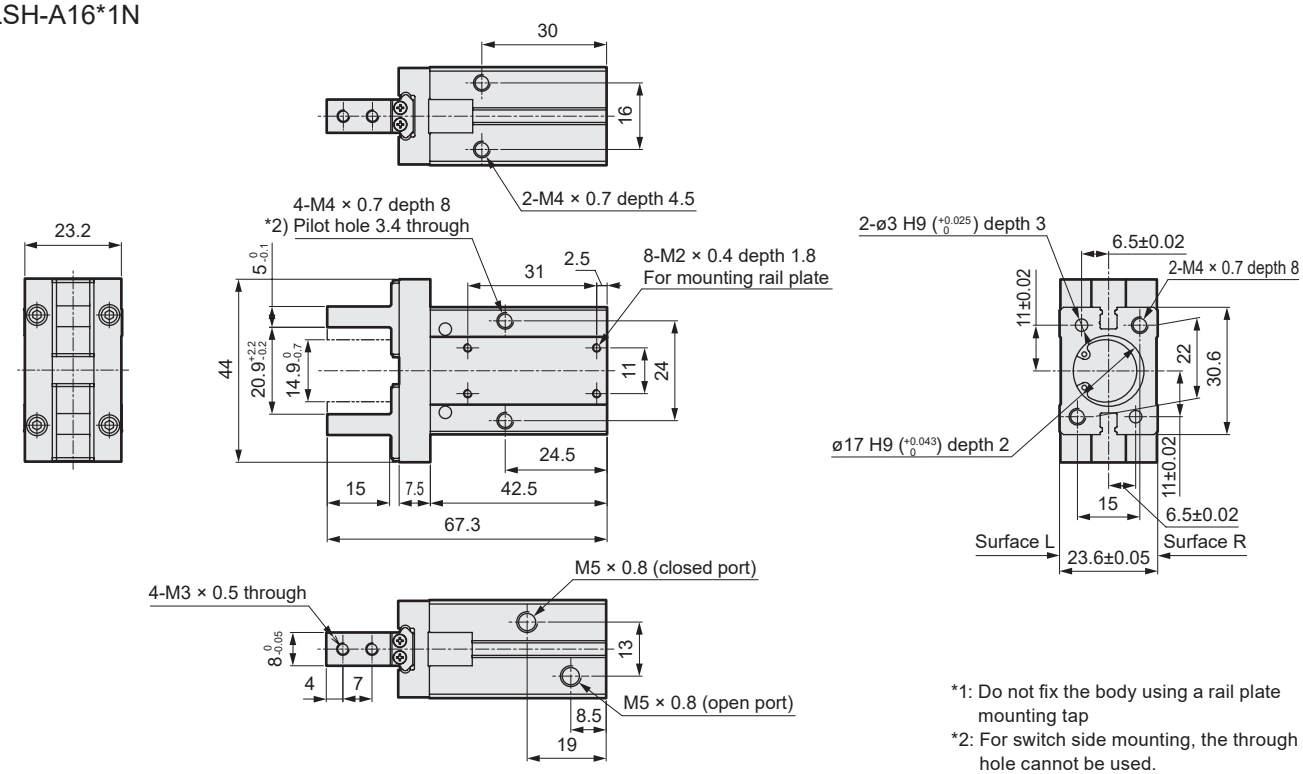
● With switch, rail assembly



*5: Refer to Page 69 for cylinder switch precautions.

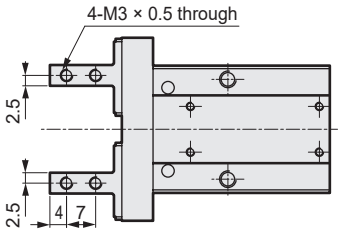
Dimensions (bore size: ø16)

● LSH-A16*1N

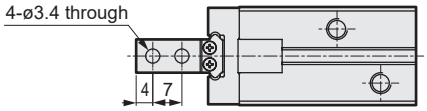


*1: Do not fix the body using a rail plate mounting tap
*2: For switch side mounting, the through hole cannot be used.

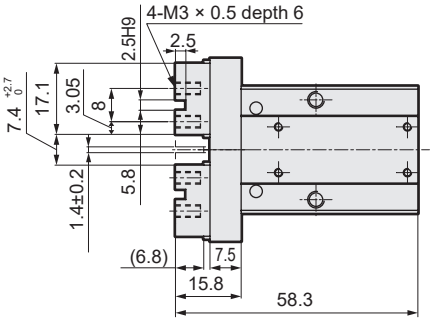
● LSH-A16*2N



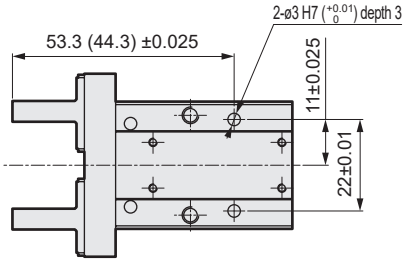
● LSH-A16*3N



● LSH-A16*4N

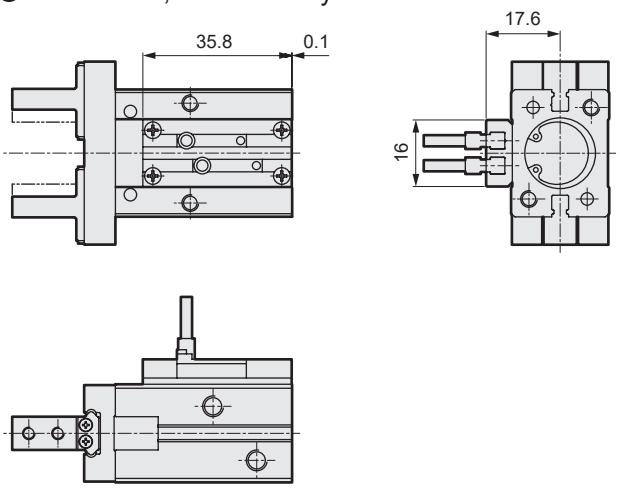


● LSH-A16**R / L



*3: Positioning holes are machined on surface R for LSH-A16**R and surface L for LSH-A16**L. Refer to page 60 for the base line.
*4: The dimensions in parentheses are the dimensions for LSH-A16*4.

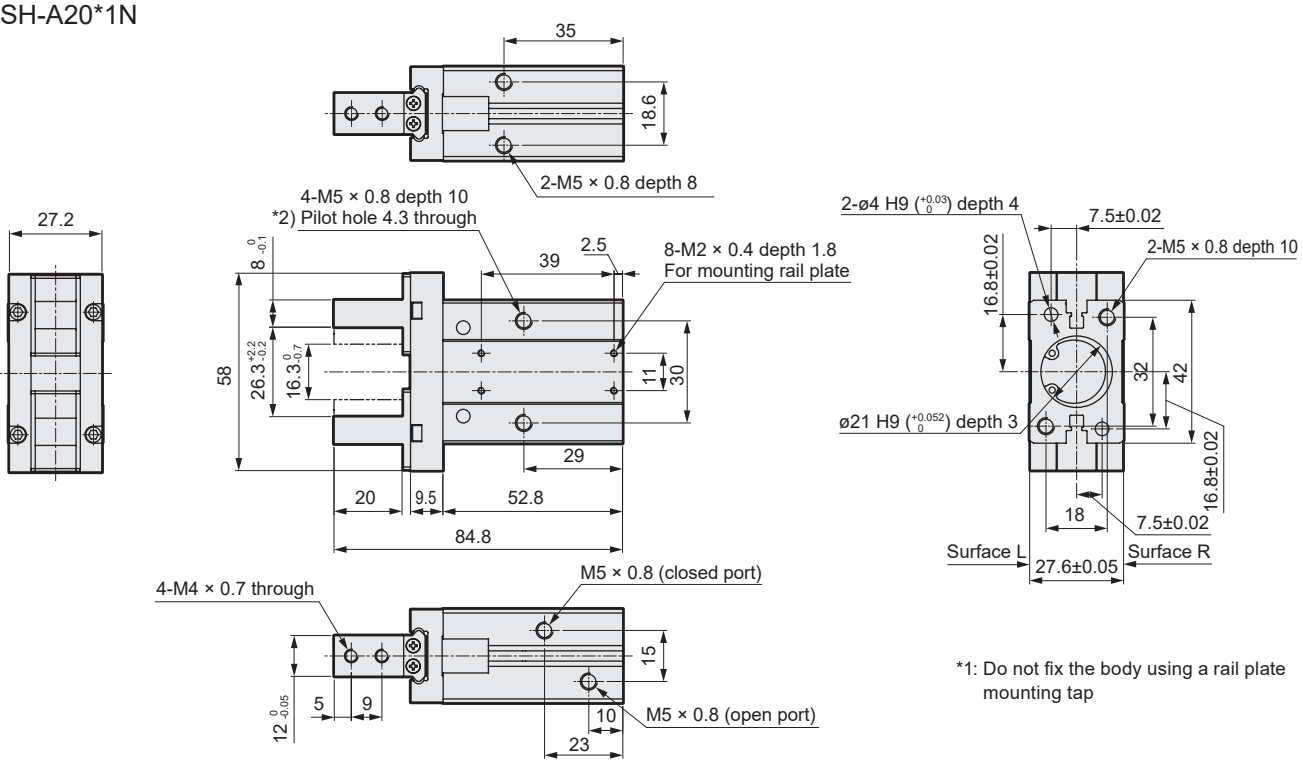
● With switch, rail assembly



*5: Refer to Page 69 for cylinder switch precautions.

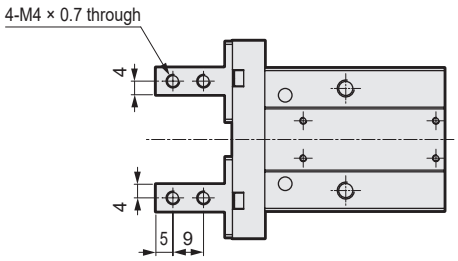
Dimensions (bore size: ø20)

● LSH-A20*1N

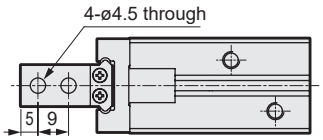


*1: Do not fix the body using a rail plate mounting tap

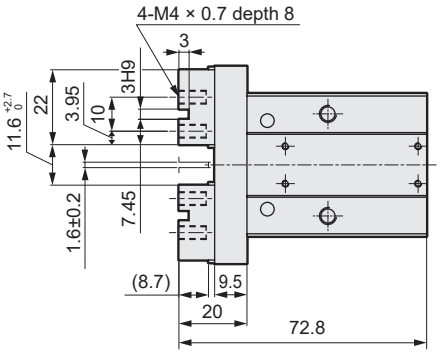
● LSH-A20*2N



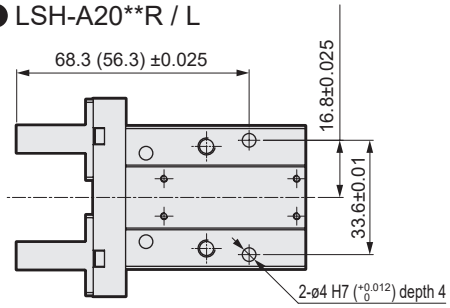
● LSH-A20*3N



● LSH-A20*4N

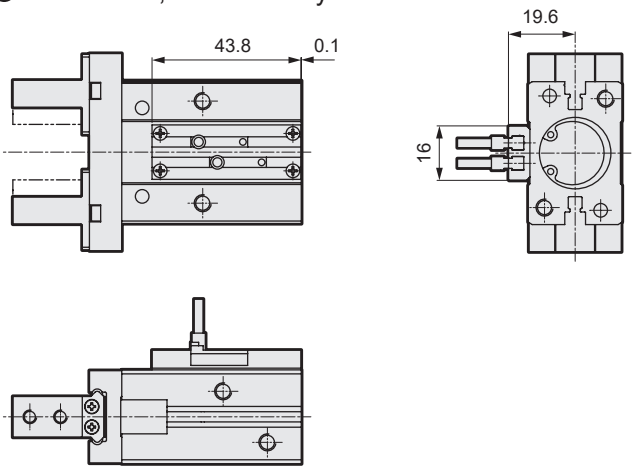


● LSH-A20**R / L



*3: Positioning holes are machined on surface R for LSH-A20**R and surface L for LSH-A20**L. Refer to page 60 for the base line.
*4: The dimensions in parentheses are the dimensions for LSH-A20*4.

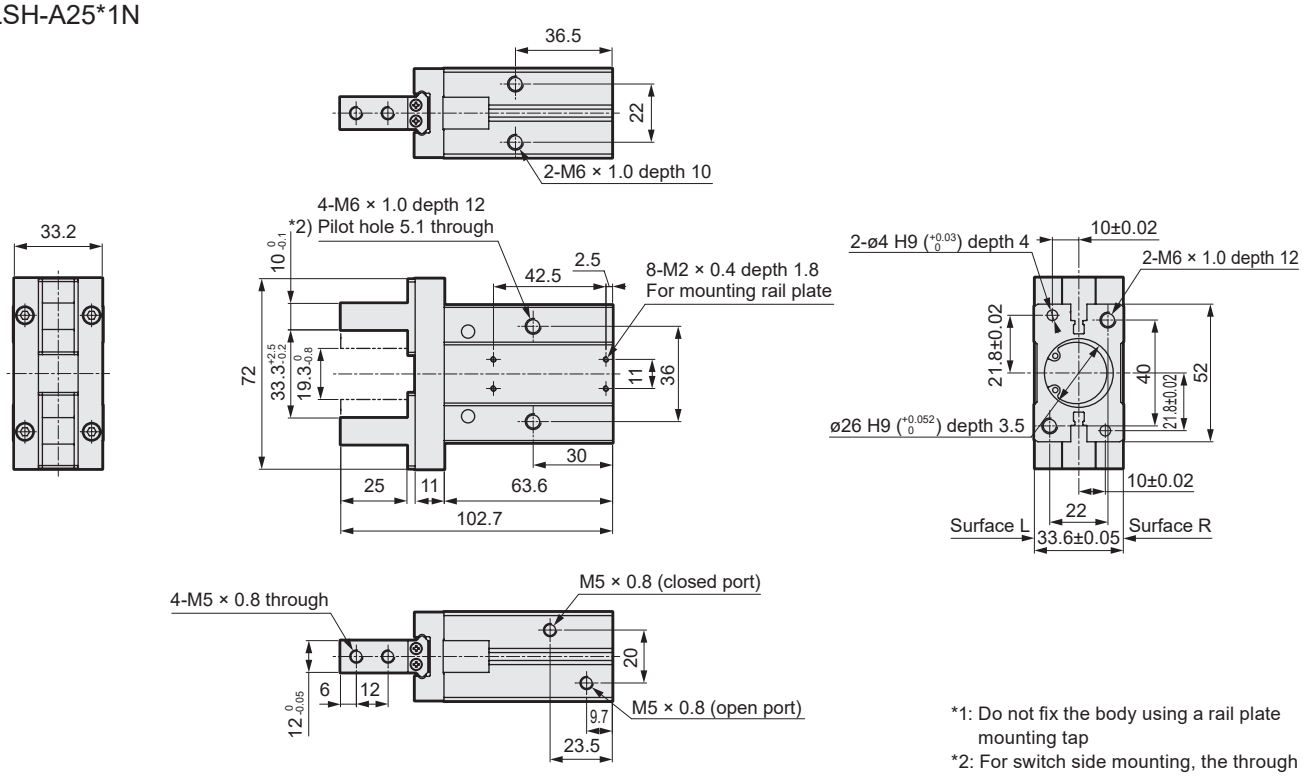
● With switch, rail assembly



*5: Refer to Page 69 for cylinder switch precautions.

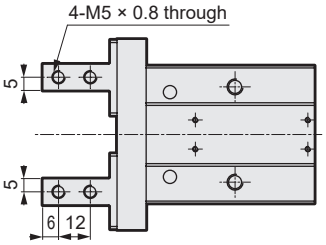
Dimensions (bore size: ø25)

● LSH-A25*1N

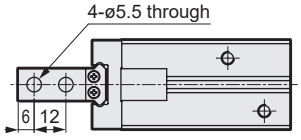


*1: Do not fix the body using a rail plate mounting tap
*2: For switch side mounting, the through hole cannot be used.

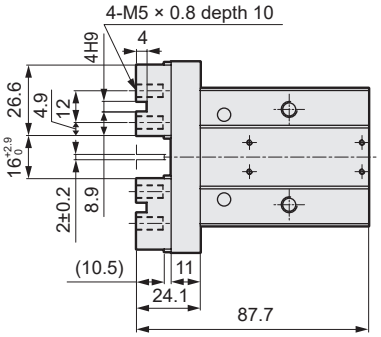
● LSH-A25*2N



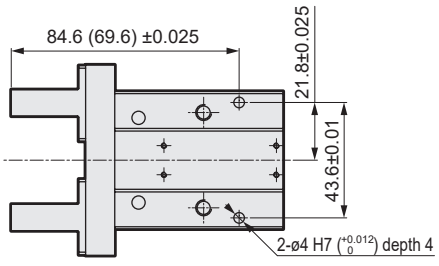
● LSH-A25*3N



● LSH-A25*4N

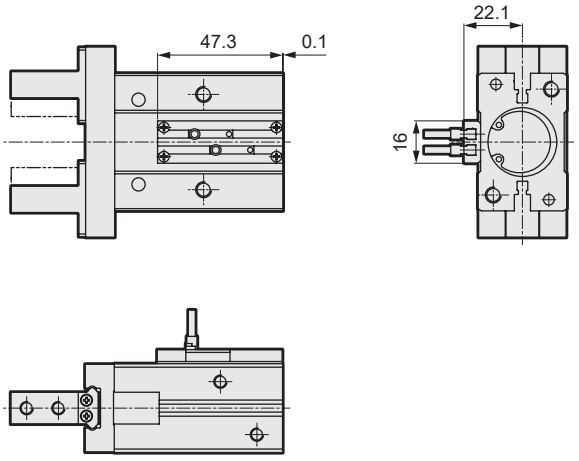


● LSH-A25**R / L



*3: Positioning holes are machined on surface R for LSH-A25**R and surface L for LSH-A25**L. Refer to page 60 for the base line.
*4: The dimensions in parentheses are the dimensions for LSH-A25*4.

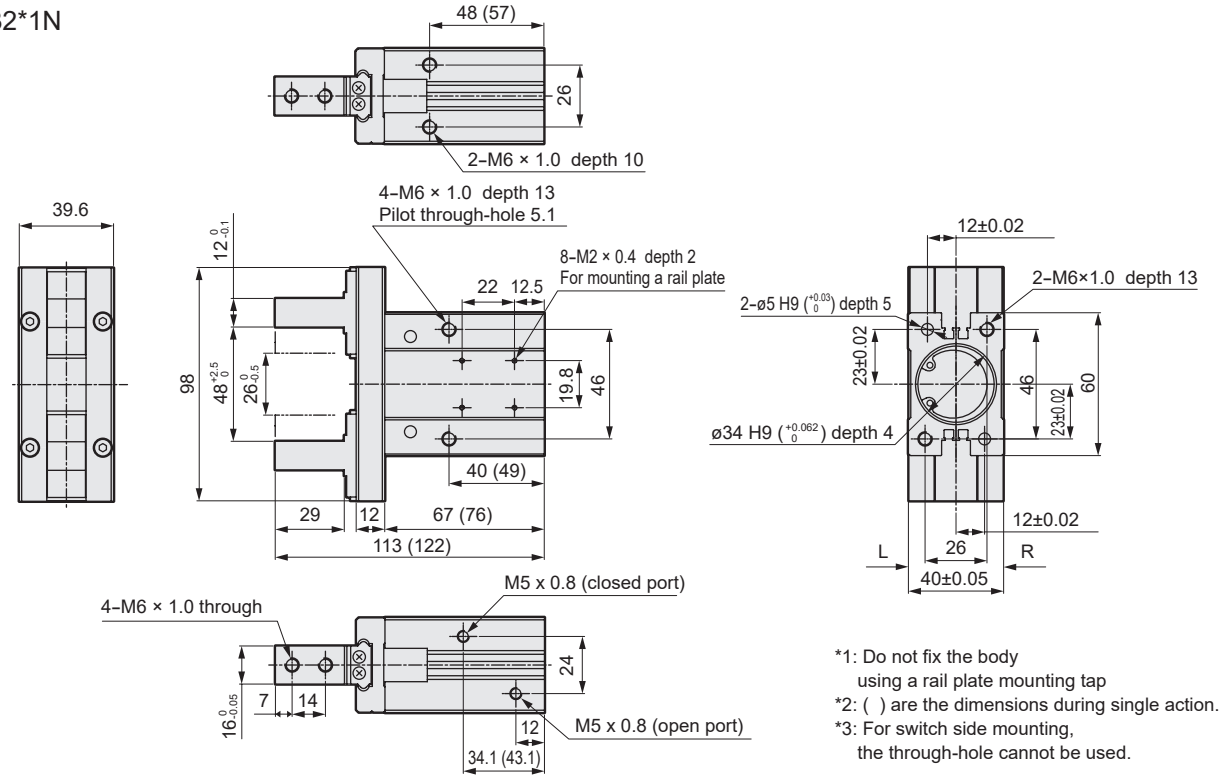
● With switch, rail assembly



*5: Refer to Page 69 for cylinder switch precautions.

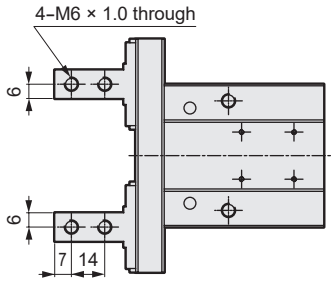
Dimensions (bore size: ø32)

● LSH-A32*1N

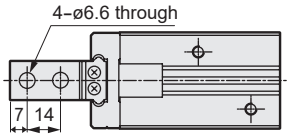


*1: Do not fix the body using a rail plate mounting tap
*2: ( ) are the dimensions during single action.
*3: For switch side mounting, the through-hole cannot be used.

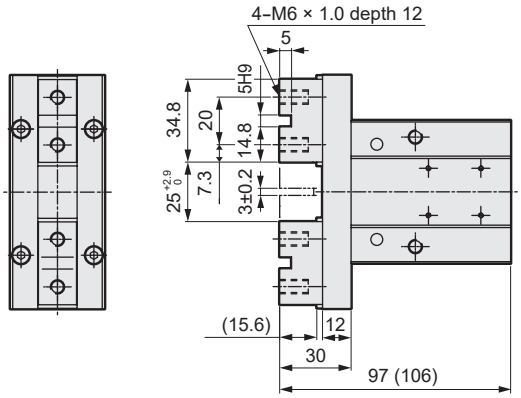
● LSH-A32*2N



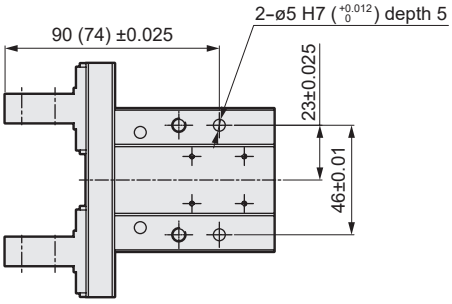
● LSH-A32*3N



● LSH-A32*4N

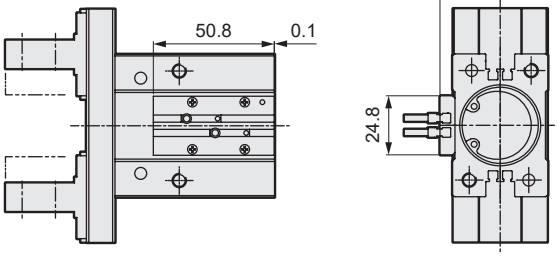


● LSH-A32*1/2/3R/L

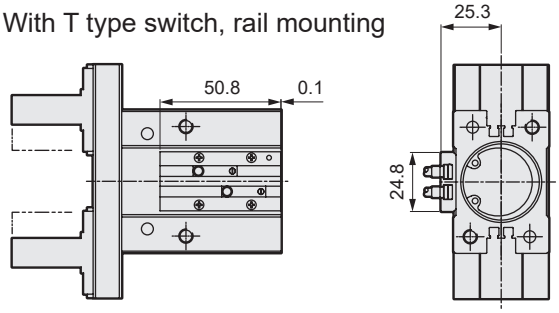


*4: Positioning holes are machined on surface R for LSH-A32**R and L for LSH-A32**L. Refer to page 60 for the base line.
*5: The dimensions in parentheses are the dimensions for LSH-A32*4.

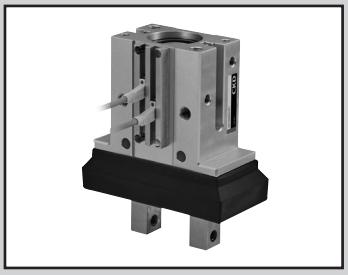
● With F type switch, rail mounting



● With T type switch, rail mounting



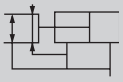
*6: Refer to page 69 for cylinder switch precautions.

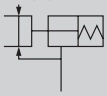


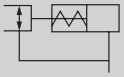
Linear Slide Hand double acting / single acting with rubber cover

LSH-G / LSH-F Series

● Operating stroke length: 4, 6, 10, 14 , 22 mm

Double acting 

Single acting (normally open) 

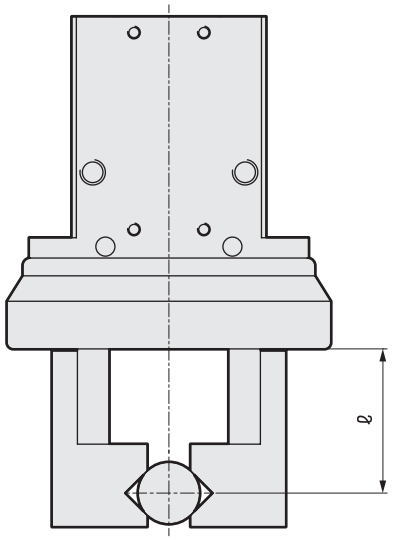
Single acting (normally closed) 

RoHS

Specifications

Item		LSH-G, F					
Bore size mm		ø6	ø10	ø16	ø20	ø25	ø32
Actuation		Double acting / single acting (normally open / normally closed)					
Working fluid		Compressed air					
Max. working pressure MPa		0.7					
Min. working pressure MPa	Double acting	0.15	0.2	0.1			
	Single acting	0.3	0.35	0.25			–
Port size		M3		M5			
Ambient temperature °C		-10 to 60°C (no freezing)					
Operating stroke length mm		4		6	10	14	22
Repeatability mm		±0.01					
Weight Double acting (single acting) kg		0.033	0.07	0.15	0.3 (0.35)	0.53 (0.535)	0.81
Lubrication		Not required					

Gripping power



Unit: N

Bore size (mm)	Double acting	
	Open side	Closed side
ø6	6.1	3.3
ø10	17	9.8
ø16	40	30
ø20	66	42
ø25	104	65
ø32	193	158

Bore size (mm)	Single acting (normally open)	
		Closed side
ø6	–	1.9
ø10		6.3
ø16		24
ø20		28
ø25		45

Bore size (mm)	Single acting (normally closed)	
	Open side	
ø6	3.7	–
ø10	12	
ø16	31	
ø20	56	
ø25	83	

* At supply pressure of 0.5 MPa, ℓ = 20 mm, stroke center

Switch specifications

Item	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 light	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 F type switch uses a bend-resistant lead wire by default.

Item	Proximity 2-wire		Proximity 3-wire	
	T2H/T2V	T2HR3/T2VR3 (Lead wire, a bend-resistant type)	T3H/T3V	T3PH/T3PV
Applications	Programmable Controller dedicated		Programmable For controller, relay	
Output method	–	–	NPN output	PNP output
Power supply voltage	–	–	DC10 to 28V	
Load voltage/ current	10 to 30 VDC 5 to 20 mA	10 to 30 VDC 5 to 20 mA	30 VDC or less 100 mA or less	
Indicator light	Red LED (Lit when ON)	Red LED (Lit when ON)	Red LED (Lit when ON)	Yellow LED (Lit when ON)
Leakage current	1 mA or less	1 mA or less	10 μA or less	
Shock resistance	980 m/s^2			
Weight g	1 m: 18 g 3 m: 49 g			

LSH-G / LSH-F Series

How to order

Without switch (built-in magnet for switch)

LSH - G 06 D 1 R — HP1

With switch (built-in magnet for switch)

LSH - G 06 D 1 R - F2H - D - HP1

Ⓐ Rubber cover
Ⓑ Bore size
Ⓒ Actuation
Ⓓ Finger
Ⓔ Grip center reference, high precision positioning hole
Ⓕ Switch model No.
Ⓖ Switch quantity

Code	Description
Ⓐ Rubber cover	
G	Chloroprene rubber
F	Fluoro rubber
Ⓑ Bore size (mm)	
06	ø6
10	ø10
16	ø16
20	ø20
25	ø25
32	ø32
Ⓒ Actuation	
D	Double acting
S	Single acting / normally open (ø32 cannot be selected)
C	Single acting / normally closed (ø32 cannot be selected)
Ⓓ Finger	
1	Basic
Ⓔ Grip center reference, high precision positioning hole	
N	None
L	Refer to the figure at left.
R	

Ⓕ Switch model No.

Blank	No switch, with F type switch rail					
N	No switch, no switch rail					
A	No switch, with T type switch rail (ø32 only)					
Axial lead wire	Radial lead wire	Contact	Voltage AC	Voltage DC	Display	Lead wire
–	**F2S***	Proximity		●	1-color display	2-wire
–	**F3S***			●		3-wire
F2H*	**F2V***			●		2-wire
F3H*	**F3V***			●		3-wire
F3PH*	**F3PV***			●		3-wire
T2H*	**T2V***			●		2-wire
T2HR3	**T2VR3**			●		2-wire
T3H*	**T3V***			●		3-wire
T3PH*	**T3PV***			●		3-wire

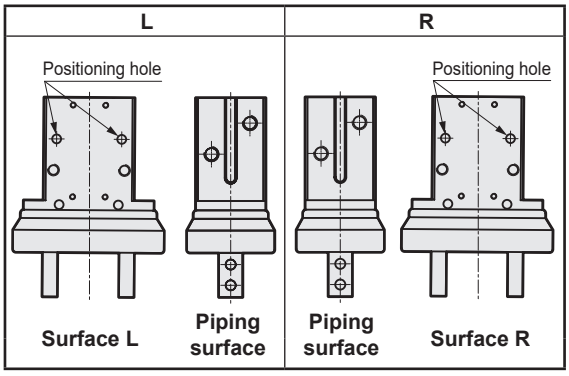
*** Lead wire length**	
Blank	1 m (standard)
3	3 m (option)

Ⓖ Switch quantity

R	1 on open side
H	1 on closed side
D	2

*1: If the one with the switch is selected, the product comes with a rail plate corresponding to the switch.
*2: Only ø32 can be selected with the T switch.
*3: Refer to page 70 for cylinder switch precautions.

Grip center reference, high precision positioning hole position diagram



Refer to the Dimensions (pages 15 to 20) and page 60 for details.

How to order switch

SW - F2H*

Switch model No. (Item Ⓕ above)

Switch mounting availability table

Model No.	Switch model No.	Side mounting	Rail mounting
LSH-G/F06	F2/3□	●	–
	F2/3S	–	●
LSH-G/F10	F2/3□	●	●
	F2/3S	●	●
LSH-G/F16	F2/3□	●	●
	F2/3S	●	●
LSH-G/F20	F2/3□	●	●
	F2/3S	●	●
LSH-G/F25	F2/3H·PH·PV	–	●
	F2/3V	●	●
	F2/3S	●	●
LSH-G/F32	F2/3□	●	●
	F2/3S	●	●
	T2/3□	–	●

[Example of model No.]

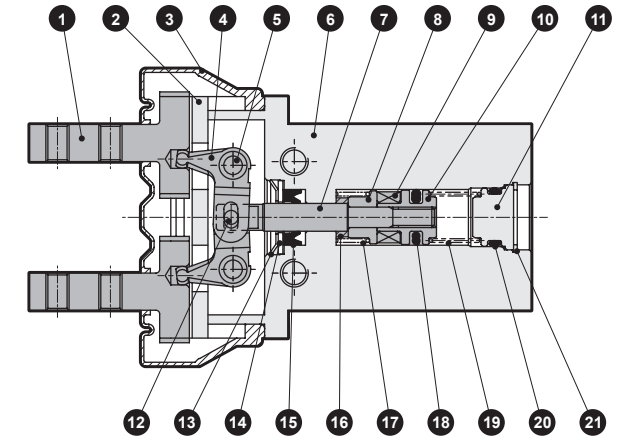
LSH-G06D1R-F2H-D-HP1

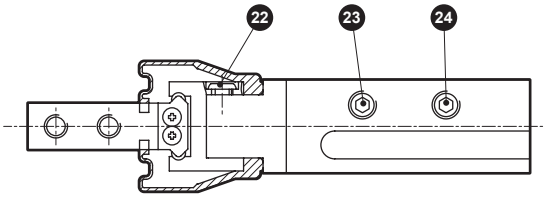
Model: Linear Slide Hand

Ⓐ Rubber cover	: Chloroprene rubber
Ⓑ Bore size	: ø6
Ⓒ Actuation	: Double acting
Ⓓ Finger	: Basic
Ⓔ Grip center reference, high precision positioning hole	: R
Ⓕ Switch model No.	: Proximity F2H, lead wire 1 m
Ⓖ Switch quantity	: 2

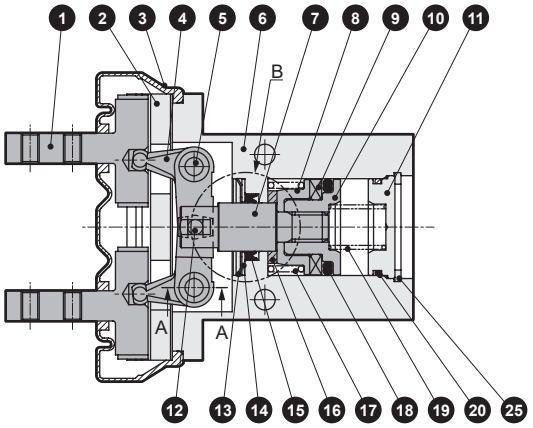
Internal structure and parts list

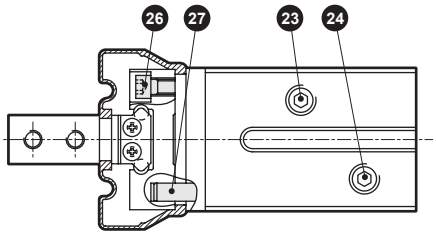
● LSH-G06 / LSH-F06



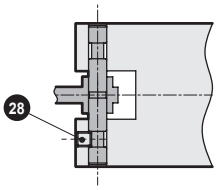


● LSH-G10 to G25 / LSH-F10 to F25

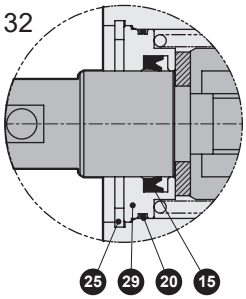




Cross-section A-A



B part ø20, 25, 32



Parts list

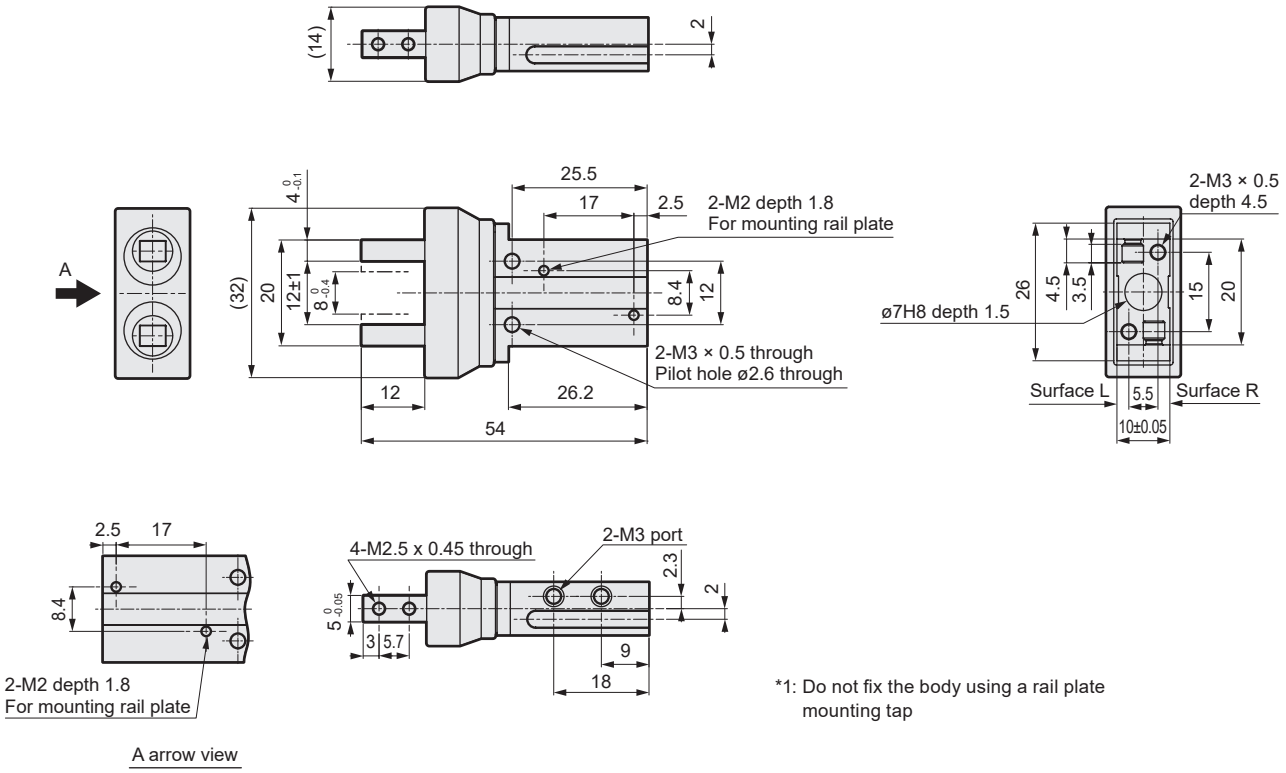
No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Finger	Stainless steel		16	Cushion rubber	Urethane rubber	
2	Linear guide	Stainless steel		17	Coil spring	Piano wire	Single acting C
3	Rubber cover	LSH-G : Chloroprene LSH-F : Fluorine		18	Piston packing	Nitrile rubber	
4	Lever	Stainless steel		19	Coil spring	Piano wire	Single acting S
5	Fulcrum axis	Steel		20	O-ring	Nitrile rubber	
6	Body	Aluminum alloy		21	C-snap ring	Steel	
7	Piston rod	Stainless steel		22	Pan head machine screw	Stainless steel	
8	Spring bracket	Aluminum alloy		23	Plug	Stainless steel	Single acting C
9	Magnet			24	Plug	Stainless steel	Single acting S
10	Piston	Aluminum alloy		25	C-snap ring	Stainless steel	
11	Head cover	Aluminum alloy		26	Hexagon socket head cap screw	Stainless steel	ø32 is steel
12	Operation shaft	Steel alloy		27	Pin	Steel	
13	CR ring	Stainless steel		28	Hexagon socket set screw	Stainless steel	
14	Cap	Stainless steel		29	Rod metal	Aluminum alloy	
15	Rod packing	Nitrile rubber					

Repair parts list

Bore size	Kit No.	Repair part No.	Rubber cover (part No. 3)		Rail plate kit No.		
			LSH-G Chloroprene	LSH-F Fluorine	For F type switch	For T type switch	Description
ø6	Cannot be disassembled	–	LSH-G06K	LSH-F06K	LSH-RPF-06-HP	–	Rail plate small screw
ø10	LSH-10K-HP	13 15 18 20	LSH-G10K	LSH-F10K	LSH-RPF-10-HP	–	
ø16	LSH-16K-HP		LSH-G16K	LSH-F16K	LSH-RPF-16-HP	–	
ø20	LSH-20K-HP	15 18 20	LSH-G20K	LSH-F20K	LSH-RPF-20-HP	–	
ø25	LSH-25K-HP		LSH-G25K	LSH-F25K	LSH-RPF-25-HP	–	
ø32	LSH-32K-HP		LSH-G32K	LSH-F32K	LSH-RPF-32-HP	LSH-RPT-32-HP	

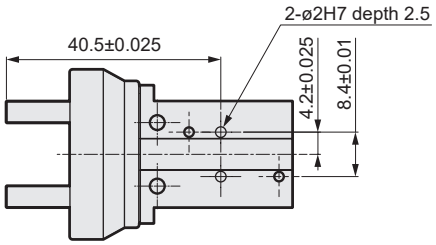
Dimensions (bore size: ø6)

● LSH-G06, LSH-F06



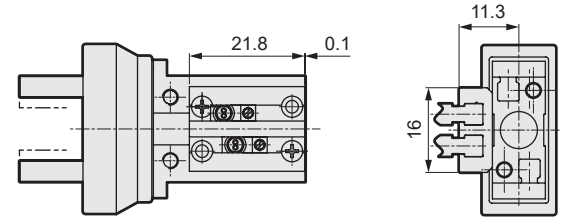
*1: Do not fix the body using a rail plate mounting tap

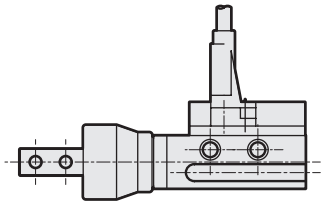
● LSH-G06*1R / L, LSH-F06*1R / L



*2: Pin holes are machined on surface R for LSH-G06*1R and L for LSH-G06*1L. Refer to page 60 for the base line.

● With switch, rail assembly

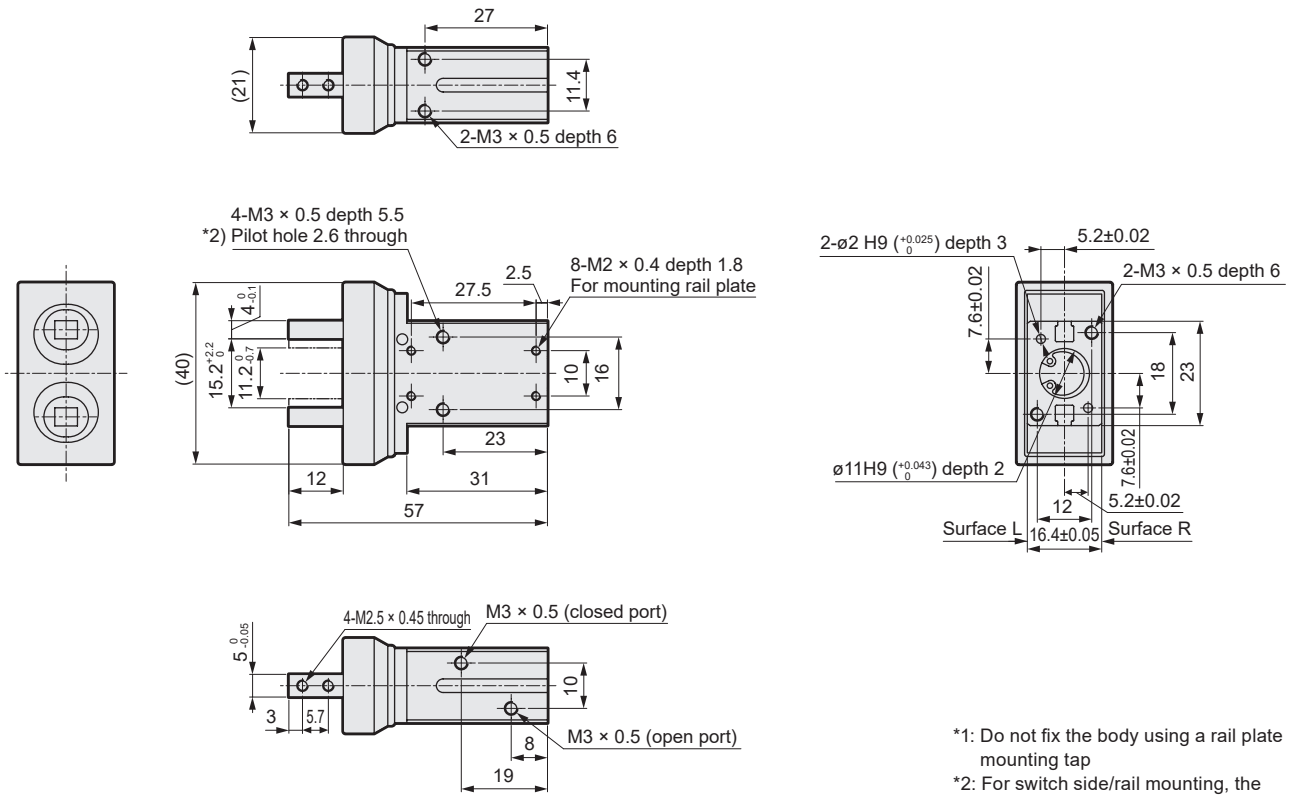




*3: Refer to Page 70 for cylinder switch precautions.
*4: Use fittings with an outer diameter of ø9 or less to prevent them from interfering with each other.

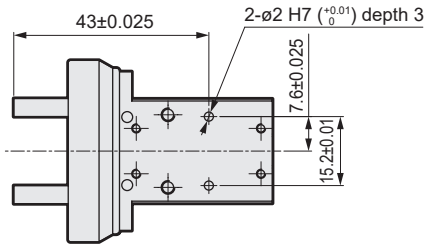
Dimensions (bore size: ø10)

● LSH-G10, LSH-F10



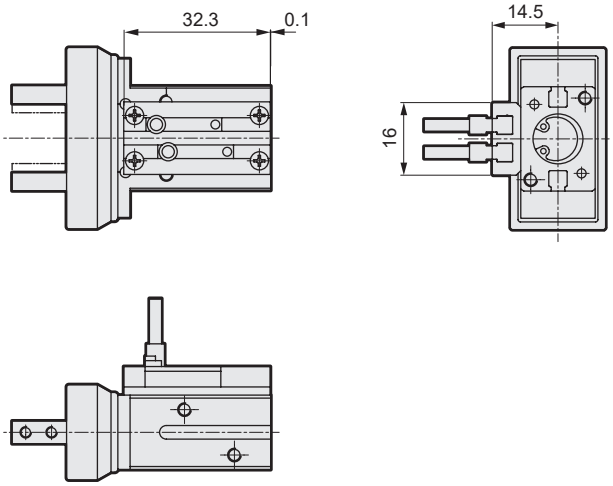
*1: Do not fix the body using a rail plate mounting tap
*2: For switch side/rail mounting, the through hole cannot be used.

● LSH-G10*1R / L, LSH-F10*1R / L



*3: Pin holes are machined on surface R for LSH-G10*1R and L for LSH-G10*1L. Refer to page 60 for the base line.

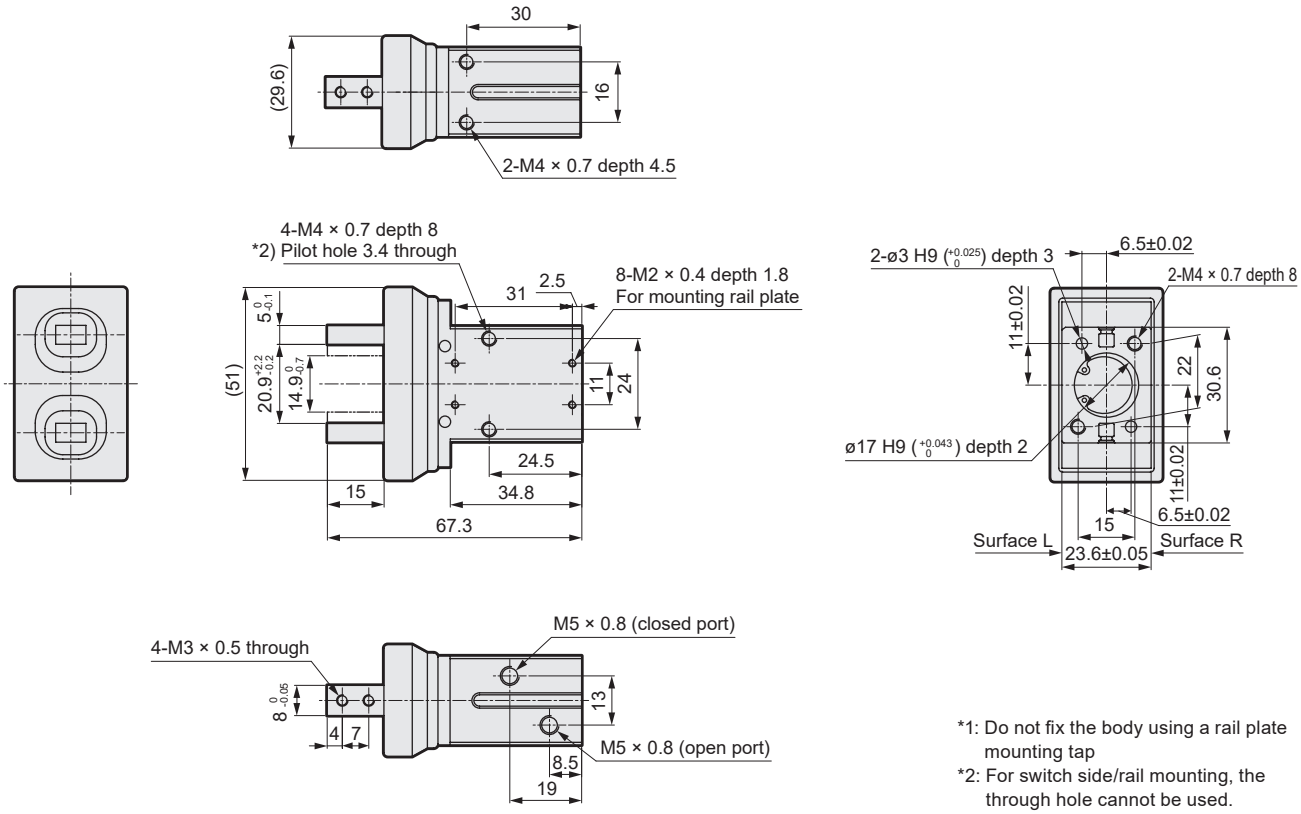
● With switch, rail assembly



*4: Refer to Page 70 for cylinder switch precautions.

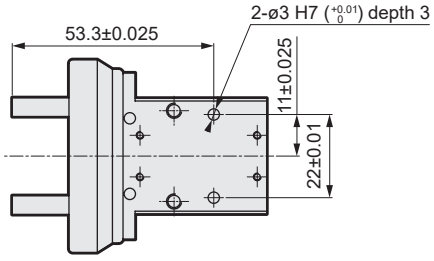
Dimensions (bore size: ø16)

● LSH-G16, LSH-F16



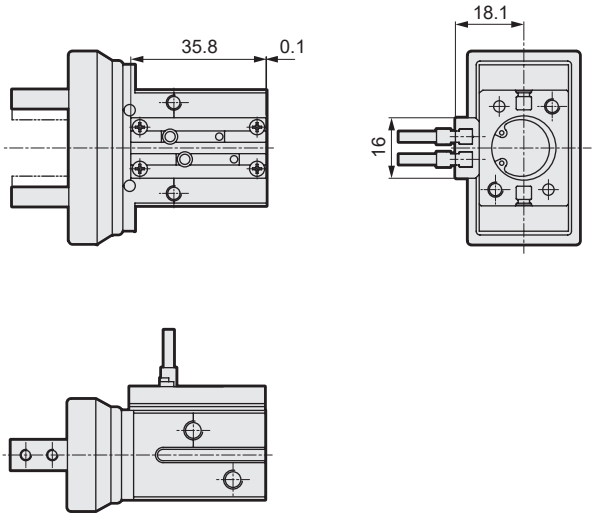
*1: Do not fix the body using a rail plate mounting tap
*2: For switch side/rail mounting, the through hole cannot be used.

● LSH-G16*1R / L, LSH-F16*1R / L



*3: Pin holes are machined on surface R for LSH-G16*1R and L for LSH-G16*1L. Refer to page 60 for the base line.

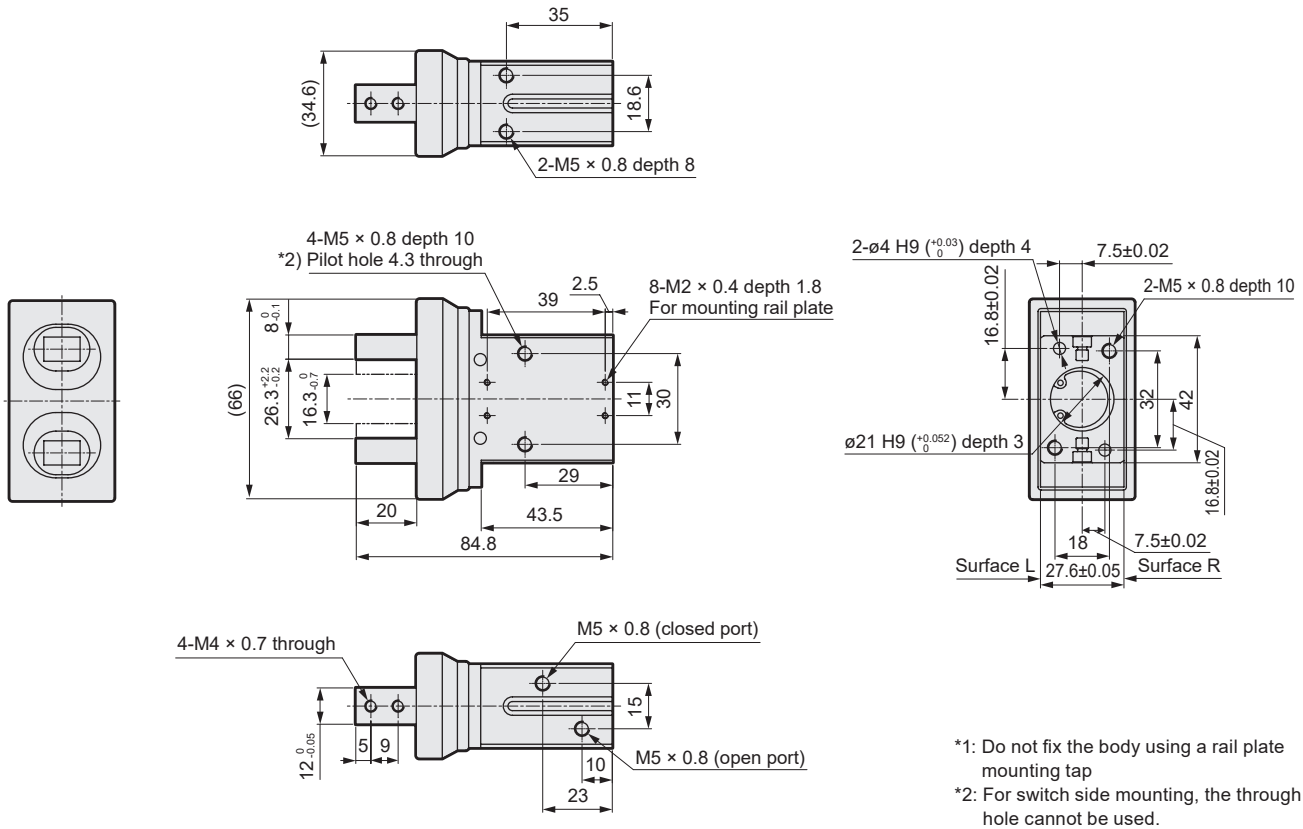
● With switch, rail assembly



*4: Refer to Page 70 for cylinder switch precautions.

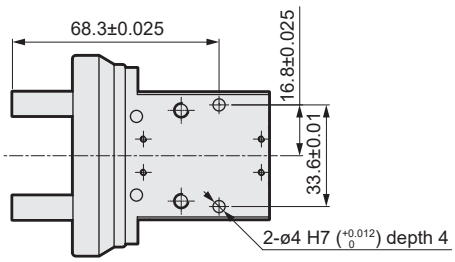
Dimensions (bore size: ø20)

● LSH-G20, LSH-F20



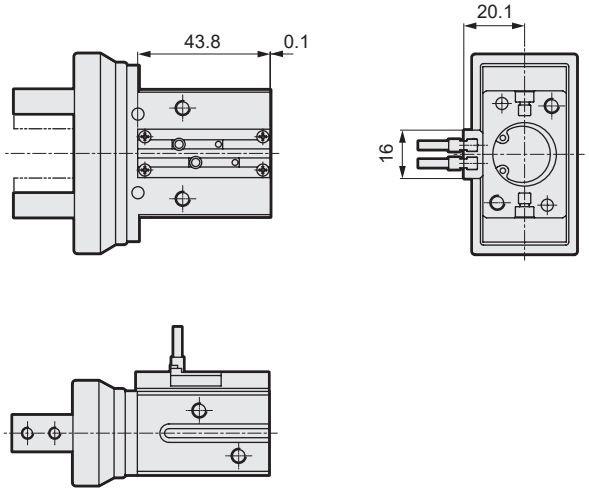
*1: Do not fix the body using a rail plate mounting tap
*2: For switch side mounting, the through hole cannot be used.

● LSH-G20*1R / L, LSH-F20*1R / L



*3: Pin holes are machined on surface R for LSH-G20*1R and L for LSH-G20*1L. Refer to page 60 for the base line.

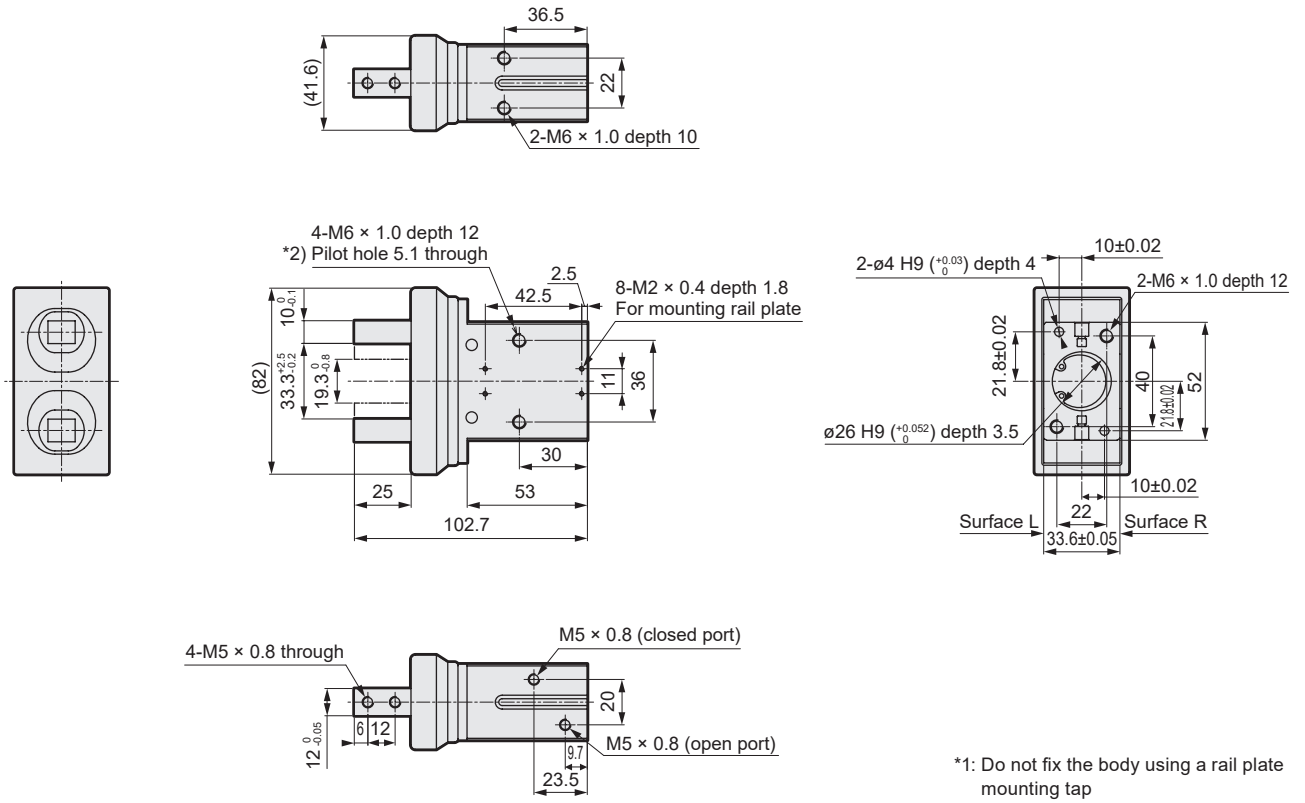
● With switch, rail assembly



*4: Refer to Page 70 for cylinder switch precautions.

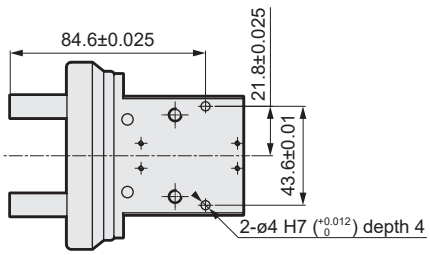
Dimensions (bore size: ø25)

● LSH-G25, LSH-F25



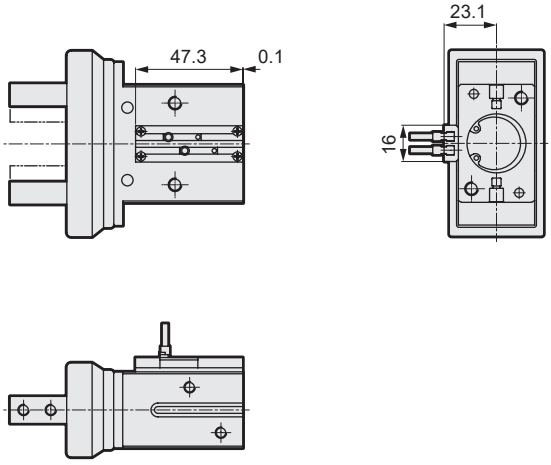
*1: Do not fix the body using a rail plate mounting tap
*2: For switch side mounting, the through hole cannot be used.

● LSH-G25*1R / L, LSH-F25*1R / L



*3: Positioning holes are machined on surface R for LSH-G25*1R and L for LSH-G25*1L.
Refer to page 60 for the base line.

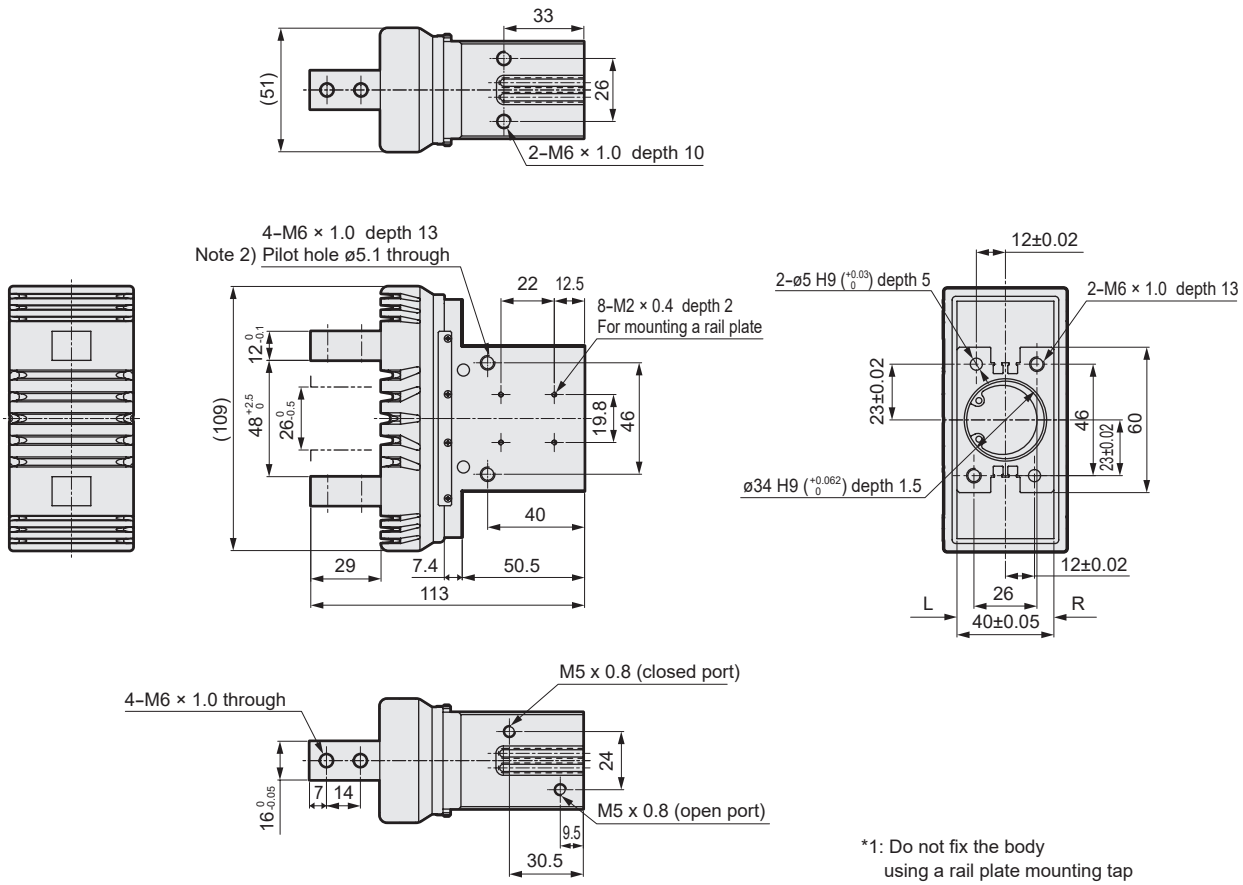
● With switch, rail assembly



*4: Refer to Page 70 for cylinder switch precautions.

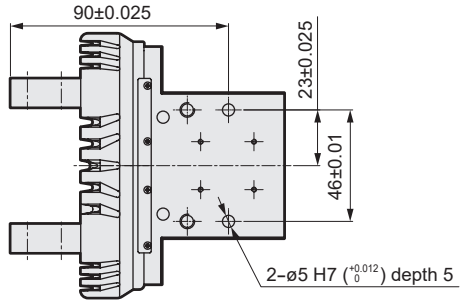
Dimensions (bore size: ø32)

● LSH-G32, LSH-F32



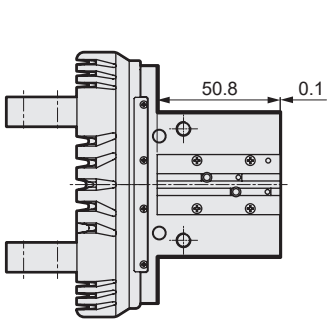
*1: Do not fix the body using a rail plate mounting tap

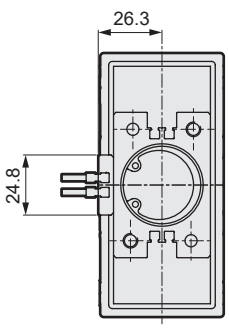
● LSH-G32D1R/L, LSH-F32D1R/L



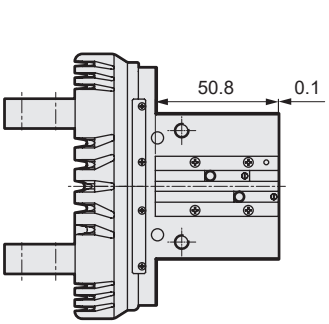
*2: Positioning holes are machined on surface R for LSH-G32D1R and L for LSH-G32D1L. Refer to page 60 for the base line.

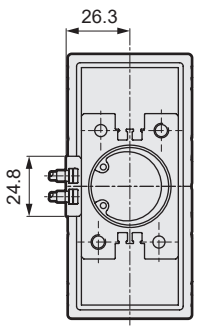
● With F type switch, rail mounting





● With T type switch, rail mounting



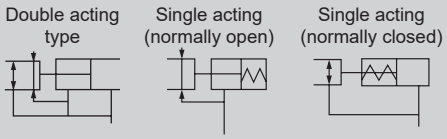


*3: Refer to page 70 for cylinder switch precautions.

Linear Slide Hand long stroke Double acting/single acting

LSHL-A Series

● Operating stroke length: 8, 12, 18, 22 mm

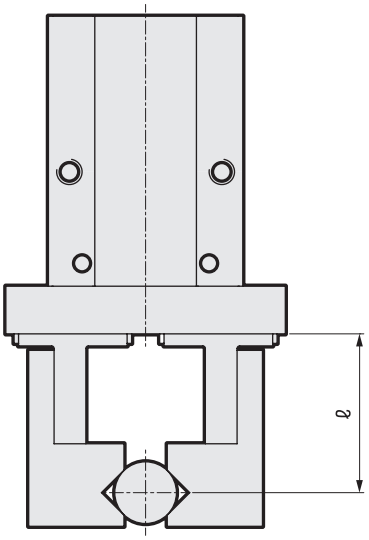


RoHS

Specifications

Item			LSHL-A			
Bore size		mm	ø10	ø16	ø20	ø25
Actuation			Double acting			
Working fluid			Compressed air			
Max. working pressure		MPa	0.7			
Min. working pressure	Double acting type	MPa	0.2	0.1		
	Single acting	MPa	0.35	0.25		
Port size			M3	M5		
Ambient temperature		°C	-10 to 60 (no freezing)			
Operating stroke length		mm	8	12	18	22
Repeatability		mm	±0.01			
Weight Double acting	Finger OP: 1, 2, 3	kg	0.065 (0.075)	0.155 (0.165)	0.315 (0.335)	0.54 (0.585)
type (Single acting)	Finger OP: 4	kg		0.16 (0.17)	0.32 (0.34)	0.545 (0.59)
Lubrication			Not required			

Gripping power



Unit: N

Bore size (mm)	Double acting	
	Open side	Closed side
ø10	17	11
ø16	45	34
ø20	66	42
ø25	104	65

Bore size (mm)	Single acting (normally open)	
		Closed side
ø10	—	7.1
ø16		27
ø20		33
ø25		50

Bore size (mm)	Single acting (normally closed)	
	Open side	
ø10	13	—
ø16	38	
ø20	57	
ø25	85	

* At supply pressure of 0.5 MPa, ℓ = 20 mm, stroke center

Switch specifications

Item	Proximity 2-wire	Proximity 3-wire	Proximity 2-wire	Proximity 3-wire	
	F2S	F3S	F2H / F2V	F3H / F3V	F3PH / F3PV
Applications	Dedicated for programmable controller	For programmable controller, relay	Dedicated for programmable controller	For programmable 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	
Display 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	
Impact resistance	980 m / s^2				
Weight g	1 m:10 3 m:29				

*1: The F type switch uses a bend-resistant lead wire by default.

How to order

Without switch (built-in magnet for switch)

LSHL - A 10 D 1 R ——— HP1

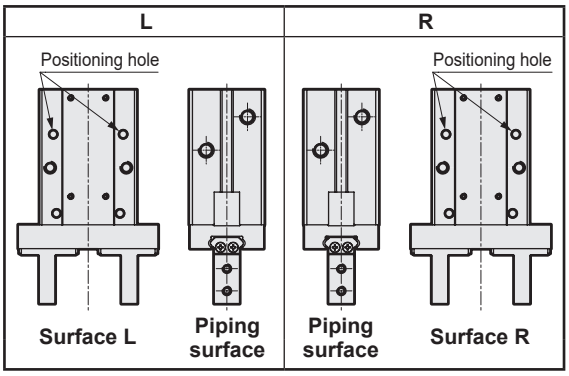
With switch (built-in magnet for switch)

LSHL - A 10 D 1 R - F2H - D - HP1

Code	Description
Ⓐ Rubber cover	
A	Without rubber cover
Ⓑ Bore size (mm)	
10	ø10
16	ø16
20	ø20
25	ø25
Ⓒ Actuation	
D	Double acting
S	Single acting/normally open
C	Single acting/normally closed
Ⓓ Finger	
1	Basic
2	Side tap
3	Through hole
4	Flat
Ⓔ Grip center reference, high precision positioning hole	
N	None
L	Refer to the figure at left.
R	

Ⓐ Rubber cover
Ⓑ Bore size
Ⓒ Actuation
Ⓓ Finger
Ⓔ Grip center reference, high precision positioning hole
Ⓕ Switch model No.
Ⓖ Switch quantity

Grip center reference, high precision positioning hole position diagram



Refer to the Dimensions (page 24 to 27) and page 60 for details.

Ⓕ Switch model No.						
Blank	Without switch, rail plate attached					
N	Without switch or rail plate					
Axial lead wire	Radial lead wire	Contact	Voltage AC	Voltage DC	Display	Lead wire
–	**F2S***	Proximity		●	1-color display	2-wire
–	**F3S***			●		3-wire
F2H*	**F2V***			●		2-wire
F3H*	**F3V***			●		3-wire
F3PH*	**F3PV***			●		3-wire
*** Lead wire length**						
Blank	1 m (standard)					
3	3 m (option)					

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

*1: When selecting “With switch”, a rail plate is attached.
*2: Refer to page 67 for cylinder switch precautions.

How to order switch

SW - F2H*

Switch model No.
(Item Ⓕ above)

[Example of model No.]

LSHL-A10D1R-N-HP1

Model: Linear Slide Hand, long stroke

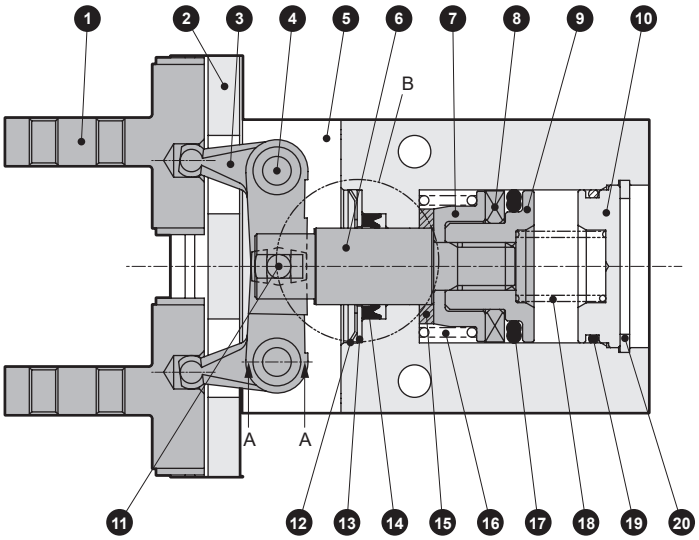
ⒶRubber cover	: Without rubber cover
ⒷBore size	: ø10
ⒸActuation	: Double acting
ⒹFinger	: Basic
ⒺGrip center reference, high precision positioning hole	: R
ⒻSwitch model No.	: Without switch or rail plate

Switch mounting availability table

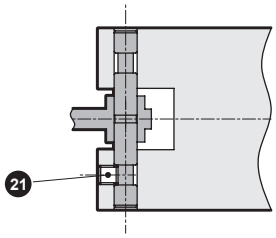
Model No.	Switch model No.	Side mounting	Rail mounting
LSHL-A10	F2/3□	●	●
	F2/3S	●	●
LSHL-A16	F2/3□	●	●
	F2/3S	●	●
LSHL-A20	F2/3□	●	●
	F2/3S	●	●
LSHL-A25	F2/3□	●	●
	F2/3S	●	●

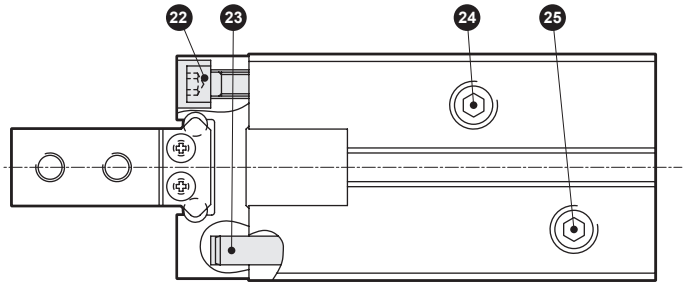
Internal structure and parts list

● LSHL-A10 to 25

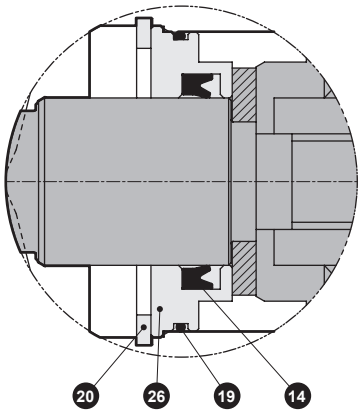


Cross-section A-A





B part ø20, 25



Parts list

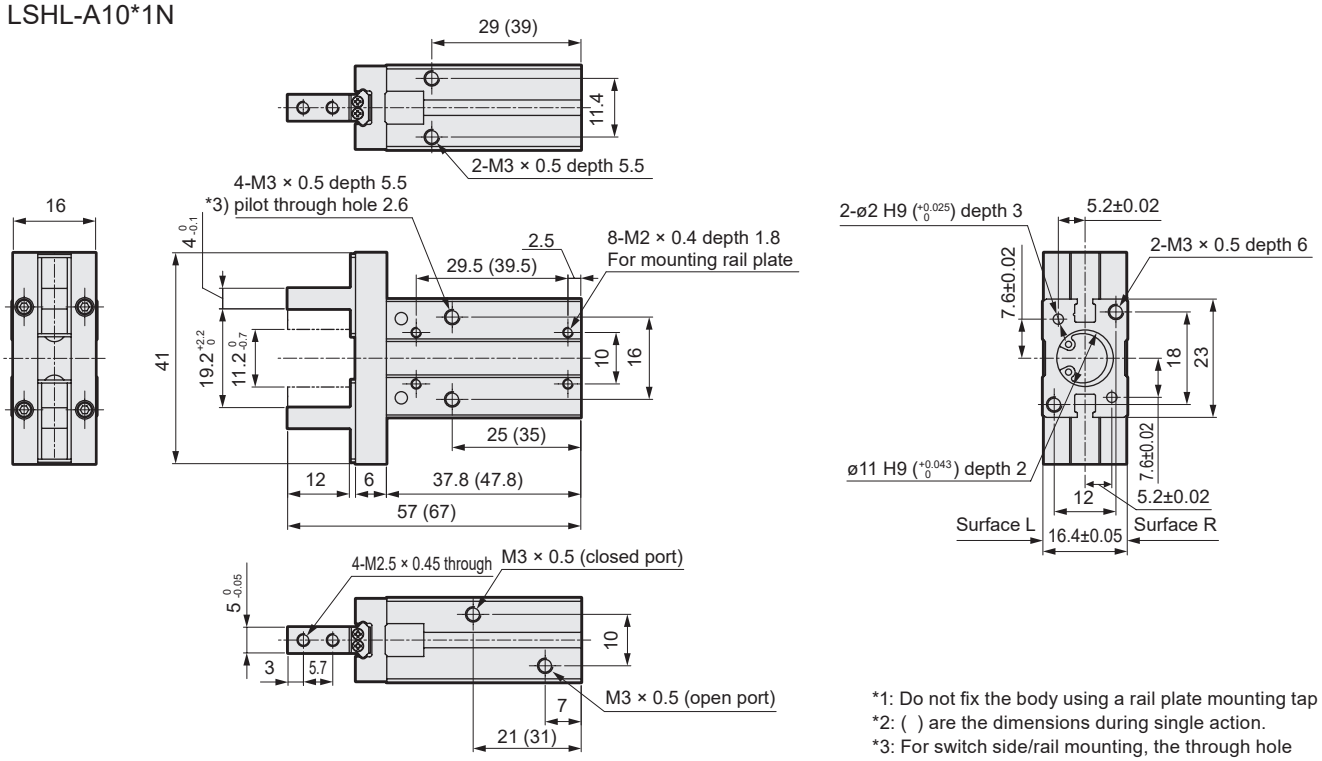
No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Finger	Stainless steel		14	Rod packing	Nitrile rubber	
2	Linear guide	Stainless steel		15	Cushion rubber	Urethane rubber	
3	Lever	Stainless steel		16	Cylindrical spring	Piano wire	Single acting C
4	Fulcrum axis	Steel		17	Piston packing	Nitrile rubber	
5	Body	Aluminum alloy		18	Cylindrical spring	Piano wire	Single acting S
6	Piston rod	Stainless steel		19	O-ring	Nitrile rubber	
7	Spring bracket	Aluminum alloy		20	C-snap ring	Stainless steel	
8	Magnet			21	Hexagon socket set screw	Stainless steel	
9	Piston	Aluminum alloy		22	Hexagon socket head cap screw	Stainless steel	
10	Head cover	Aluminum alloy		23	Pin	Steel	
11	Operation shaft	Steel alloy		24	Plug	Stainless steel	Single acting C
12	CR ring	Stainless steel		25	Plug	Stainless steel	Single acting S
13	Cap	Stainless steel		26	Rod metal	Aluminum alloy	

Repair parts list

Bore size	Kit No.	Repair part No.	Rail plate kit No.		
			For double acting	For single acting	Description
ø10	LSHL-10K-HP	⑫⑭⑰⑲	LSHL-RPF-10-HP	LSHL-RPF2-10-HP	Rail plate small screw
ø16	LSHL-16K-HP		LSHL-RPF-16-HP		
ø20	LSH-20K-HP	⑭⑰⑲	LSHL-RPF-20-HP		
ø25	LSH-25K-HP		LSHL-RPF-25-HP		

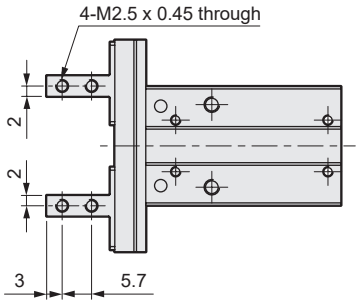
Dimensions (bore size: ø10)

● LSHL-A10*1N

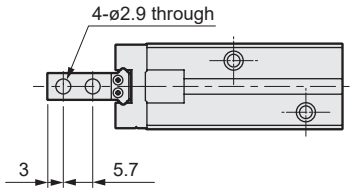


*1: Do not fix the body using a rail plate mounting tap
*2: ( ) are the dimensions during single action.
*3: For switch side/rail mounting, the through hole cannot be used.

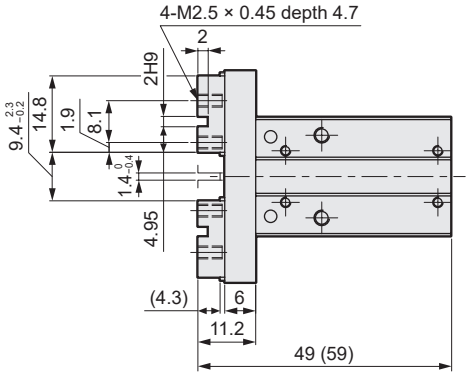
● LSHL-A10*2N



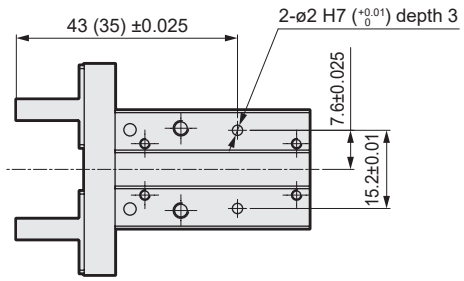
● LSHL-A10*3N



● LSHL-A10*4N

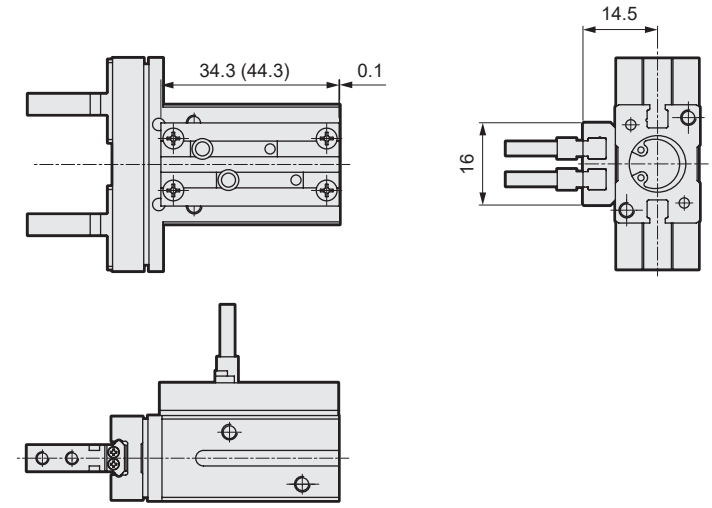


● LSHL-A10**R / L



*4: Pin holes are machined on surface R for LSHL-A10D1R and L for LSHL-A10D1L. Refer to page 60 for the base line.
*5: The dimensions in parentheses are the dimensions for LSHL-A10*4.

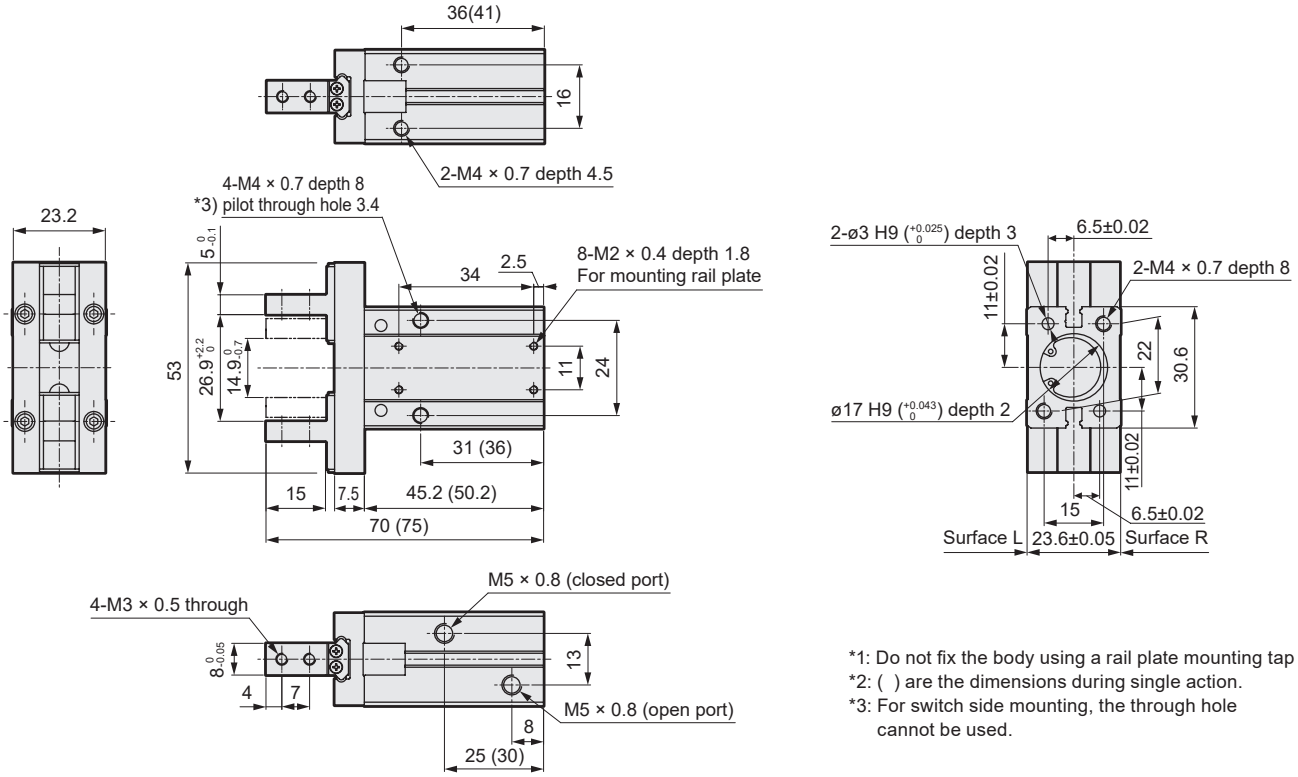
● With switch, rail assembly



*6: ( ) are the dimensions during single action.
*7: Refer to Page 71 for cylinder switch precautions.

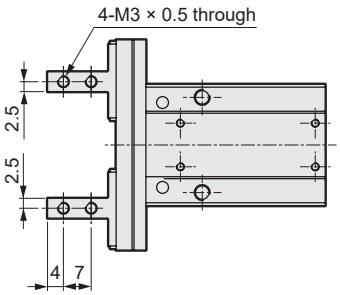
Dimensions (bore size: ø16)

● LSHL-A16*1N

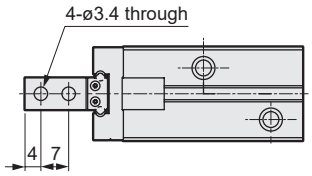


*1: Do not fix the body using a rail plate mounting tap
*2: ( ) are the dimensions during single action.
*3: For switch side mounting, the through hole cannot be used.

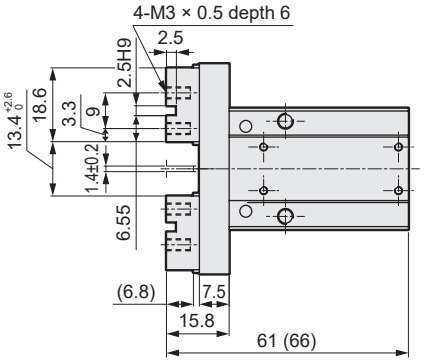
● LSHL-A16*2N



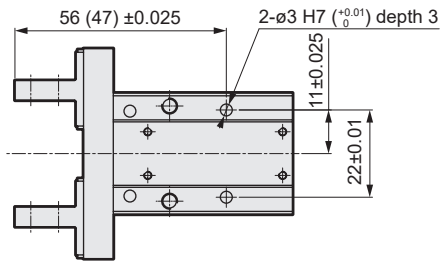
● LSHL-A16*3N



● LSHL-A16*4N

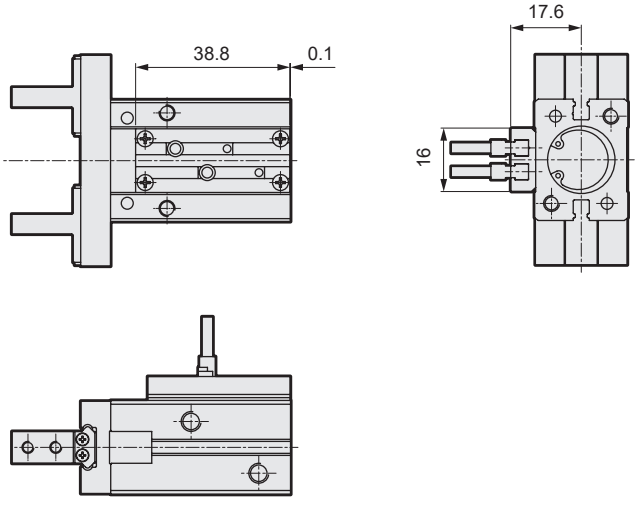


● LSHL-A16**R / L



*4: Pin holes are machined on surface R for LSHL-A16D1R and L for LSHL-A16D1L. Refer to page 60 for the base line.
*5: The dimensions in parentheses are the dimensions for LSHL-A16*4.

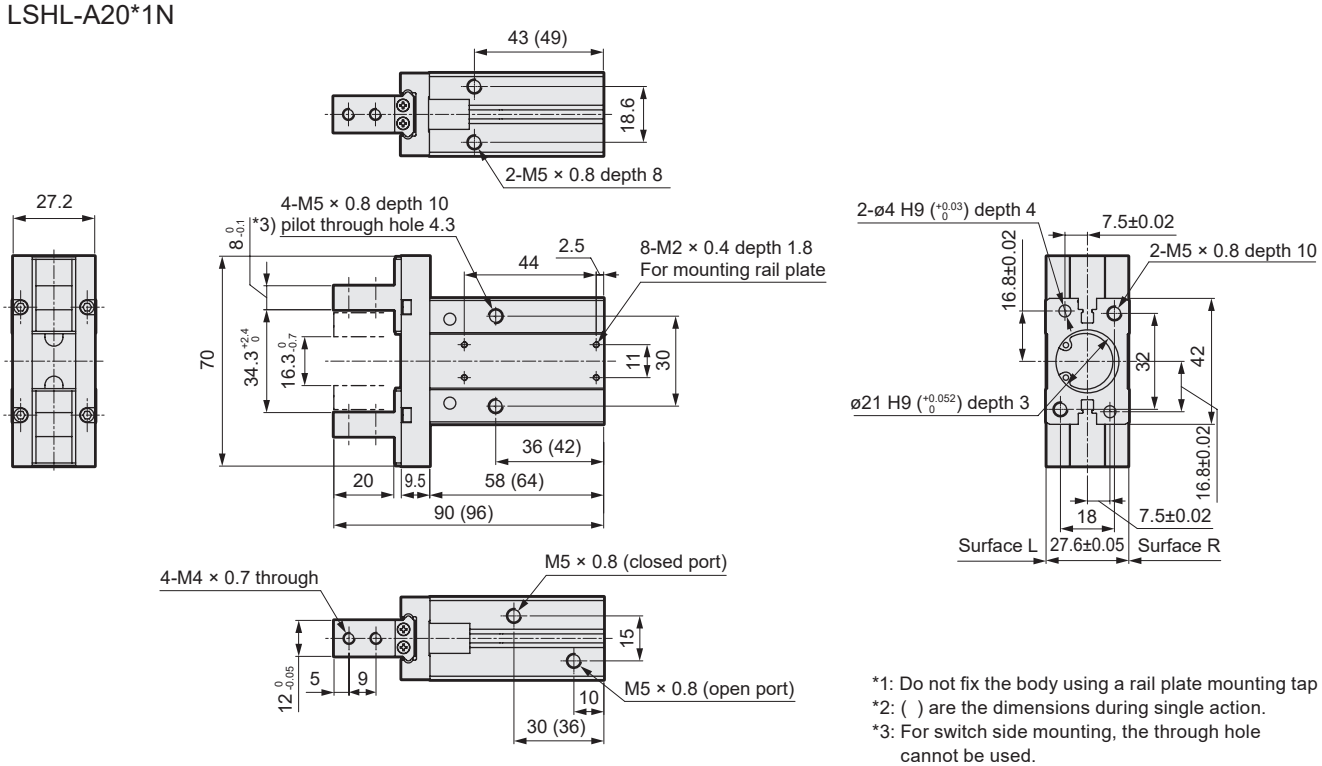
● With switch, rail assembly



*6: Refer to Page 71 for cylinder switch precautions.

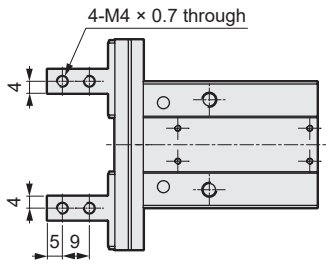
Dimensions (bore size: ø20)

● LSHL-A20*1N

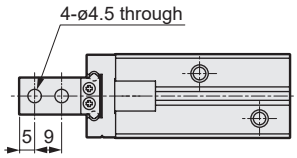


*1: Do not fix the body using a rail plate mounting tap
*2: ( ) are the dimensions during single action.
*3: For switch side mounting, the through hole cannot be used.

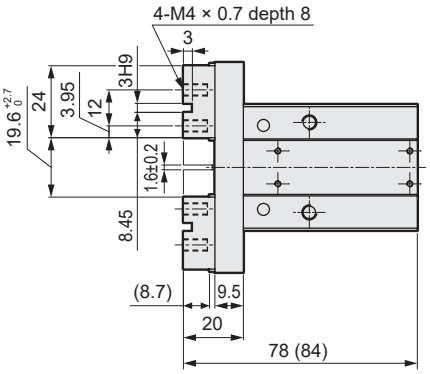
● LSHL-A20*2N



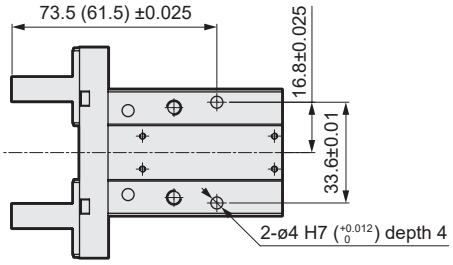
● LSHL-A20*3N



● LSHL-A20*4N

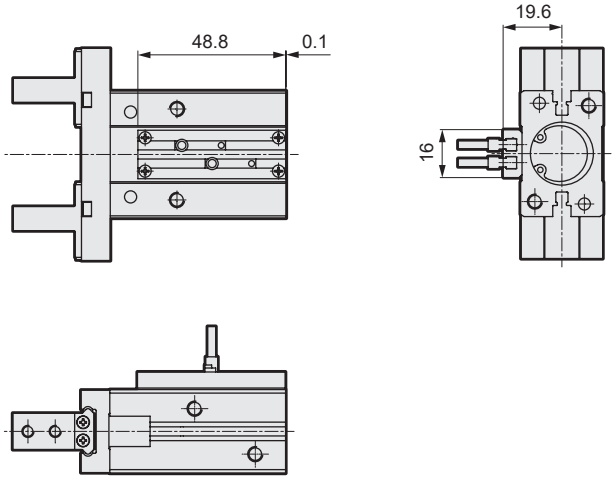


● LSHL-A20**R / L



*4: Pin holes are machined on surface R for LSHL-A20D1R and L for LSHL-A20D1L. Refer to page 60 for the base line.
*5: The dimensions in parentheses are the dimensions for LSHL-A20*4.

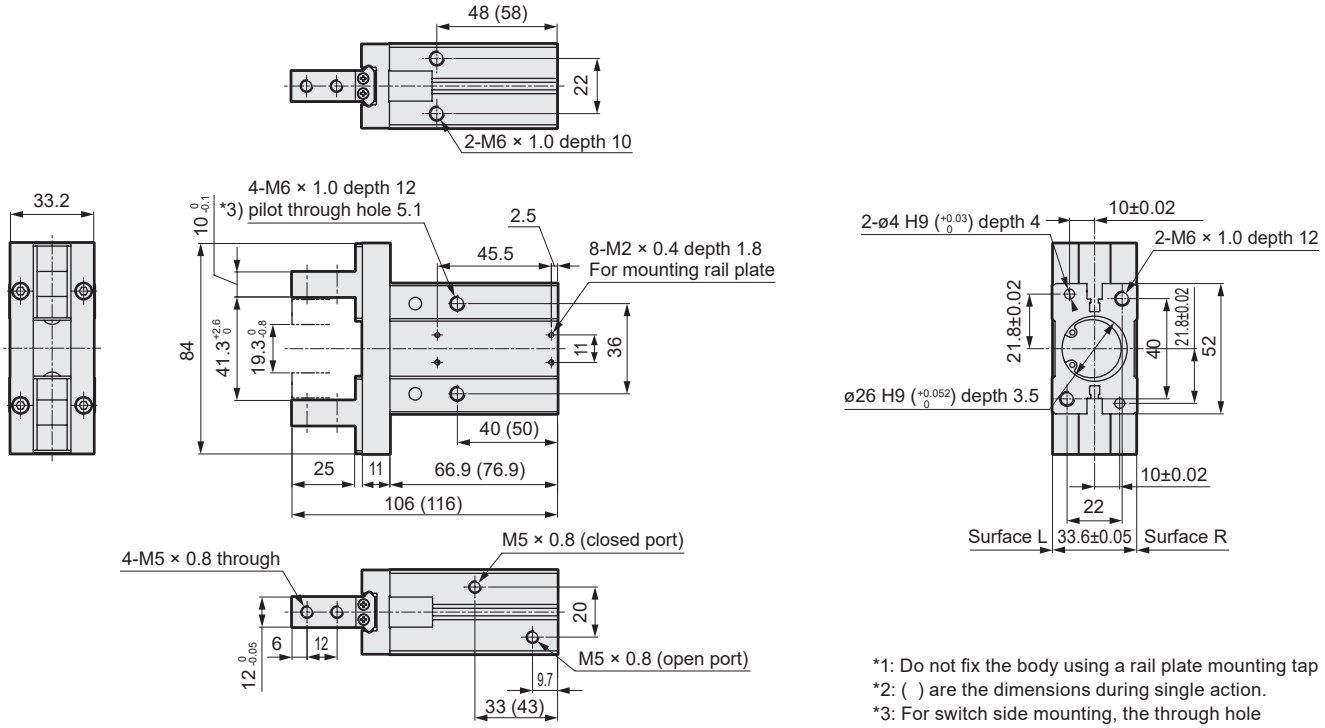
● With switch, rail assembly



*6: Refer to Page 71 for cylinder switch precautions.

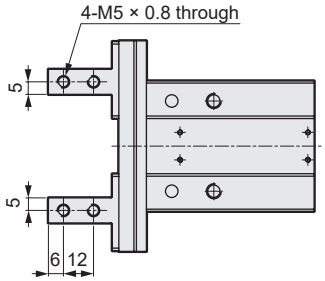
Dimensions (bore size: ø25)

● LSHL-A25*1N

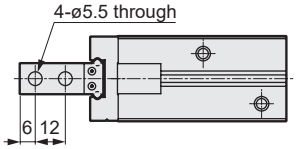


*1: Do not fix the body using a rail plate mounting tap
*2: ( ) are the dimensions during single action.
*3: For switch side mounting, the through hole cannot be used.

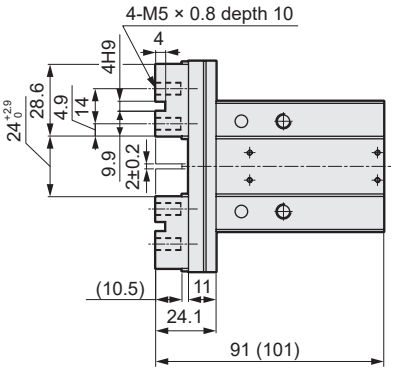
● LSHL-A25*2N



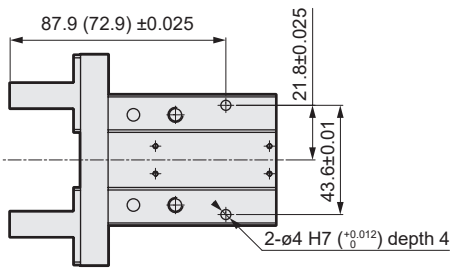
● LSHL-A25*3N



● LSHL-A25*4N

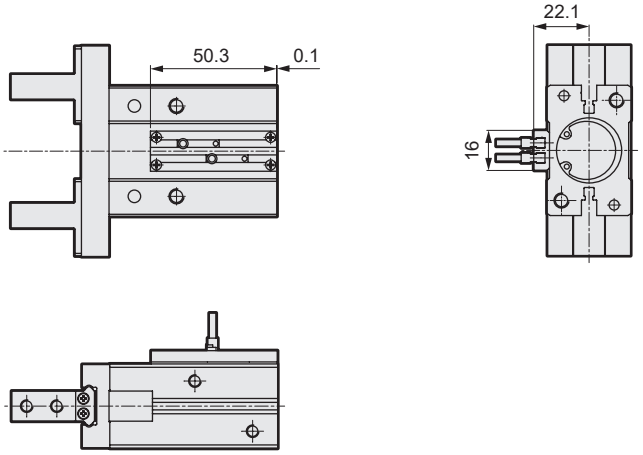


● LSHL-A25**R / L



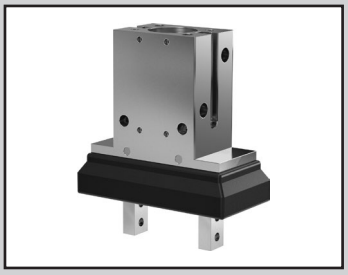
*4: Positioning holes are machined on surface R for LSHL-A25D1R and L for LSHL-A25D1L.
Refer to page 60 for the base line.
*5: The dimensions in parentheses are the dimensions for LSHL-A25*4.

● With switch, rail assembly



*6: Refer to Page 71 for cylinder switch precautions.

MEMO

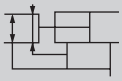


Linear Slide Hand, long stroke double acting with rubber cover

LSHL-G / LSHL-F Series

● Operating stroke length: 8, 12, 18 mm

Double acting

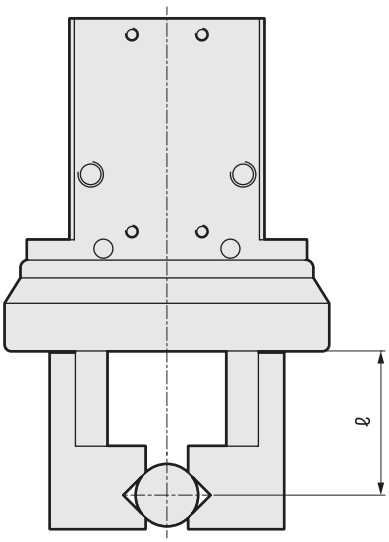


RoHS

Specifications

Item		LSHL-G, F		
Bore size	mm	ø10	ø16	ø20
Actuation		Double acting		
Working fluid		Compressed air		
Max. working pressure	MPa	0.7		
Min. working pressure	MPa	0.2	0.1	
Port size		M3	M5	
Ambient temperature	°C	-10 to 60°C (no freezing)		
Operating stroke length	mm	8	12	18
Repeatability	mm	±0.01		
Weight	kg	0.09	0.18	0.39
Lubrication		Not required		

Gripping power



Unit: N

Bore size (mm)	Double acting	
	Open side	Closed side
ø10	17	11
ø16	45	34
ø20	66	42

* At supply pressure of 0.5 MPa, ℓ = 20 mm, stroke center

Switch specifications

Item	Proximity 2-wire	Proximity 3-wire	Proximity 2-wire	Proximity 3-wire	
	F2S	F3S	F2H / F2V	F3H/F3V	F3PH / F3PV
Applications	Dedicated for programmable controller	For programmable controller, relay	Dedicated for programmable controller	For programmable 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	
Display 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	
Impact resistance	980 m / s^2				
Weight g	1 m:10 3 m:29				

*1: The F type switch uses a bend-resistant lead wire by default.

How to order

Without switch (built-in magnet for switch)

LSHL - G 10 D 1 R ——— HP1

With switch (built-in magnet for switch)

LSHL - G 10 D 1 R - F2H - D - HP1

Ⓐ Rubber cover
Ⓑ Bore size
Ⓒ Actuation
Ⓓ Finger
Ⓔ Grip center reference, high precision positioning hole
Ⓕ Switch model No.
Ⓖ Switch quantity

Code	Description
Ⓐ Rubber cover	
G	Chloroprene rubber
F	Fluoro rubber
Ⓑ Bore size (mm)	
10	ø10
16	ø16
20	ø20
Ⓒ Actuation	
D	Double acting
Ⓓ Finger	
1	Basic
Ⓔ Grip center reference, high precision positioning hole	
N	None
L	Refer to the figure at left.
R	

Ⓕ Switch model No.

Blank	Without switch, rail plate attached
N	Without switch or rail plate

Axial lead wire	Radial lead wire	Contact	Voltage AC	Voltage DC	Display	Lead wire
F2S*	**F2S***	Proximity		●	1-color display	2-wire
F3S*	**F3S***			●		3-wire
F2H*	**F2V***			●		2-wire
F3H*	**F3V***			●		3-wire
F3PH*	**F3PV***			●		3-wire

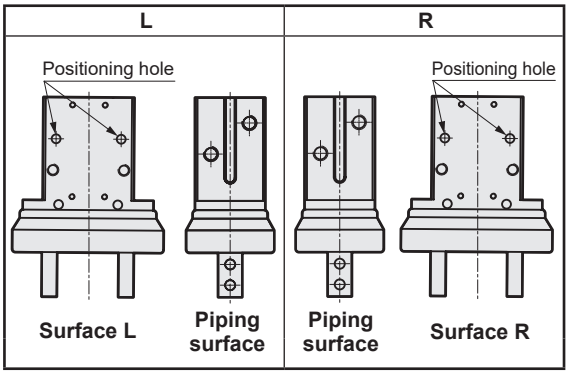
*** Lead wire length**	
Blank	1 m (standard)
3	3 m (option)

Ⓖ Switch quantity

R	1 on open side
H	1 on closed side
D	2

*1: When selecting “With switch”, a rail plate is attached.
*2: Refer to page 72 for cylinder switch precautions.

Grip center reference, high precision positioning hole position diagram



Refer to the Dimensions (pages 32 to 34) and page 60 for details.

How to order switch

SW - F2H*

Switch model No. (Item Ⓕ above)

Switch mounting availability table

Model No.	Switch model No.	Side mounting	Side mounting
LSHL-G/F10	F2/3□	●	●
	F2/3S	●	●
LSHL-G/F16	F2/3□	●	●
	F2/3S	●	●
LSHL-G/F20	F2/3□	●	●
	F2/3S	●	●

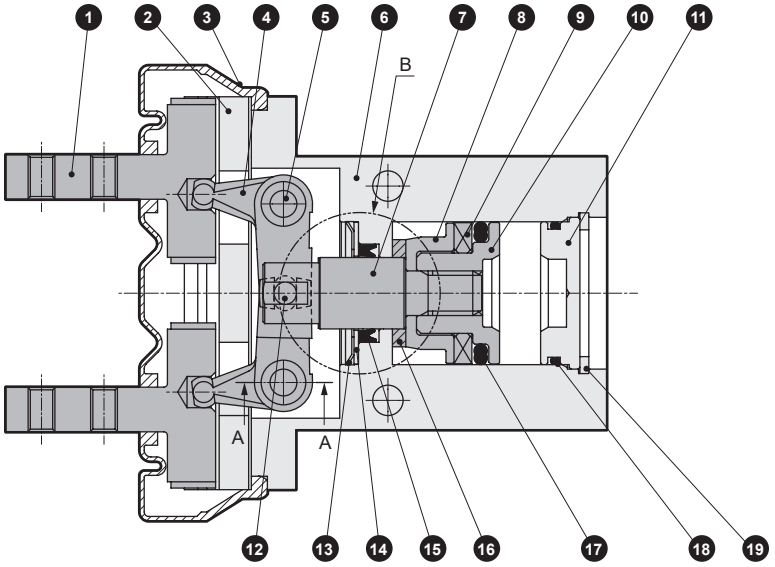
[Example of model No.]

LSHL-G10D1R-F2H-D-HP1

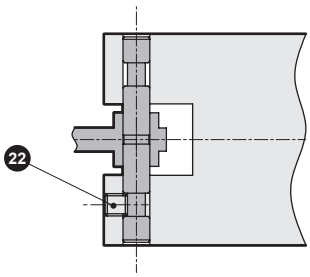
Model: Linear Slide Hand, long stroke
Ⓐ Rubber cover : Chloroprene rubber
Ⓑ Bore size : ø10
Ⓒ Actuation : Double acting
Ⓓ Finger : Basic
Ⓔ Grip center reference, high precision positioning hole : R
Ⓕ Switch model No. : Proximity F2H, lead wire 1 m
Ⓖ Switch quantity : 2

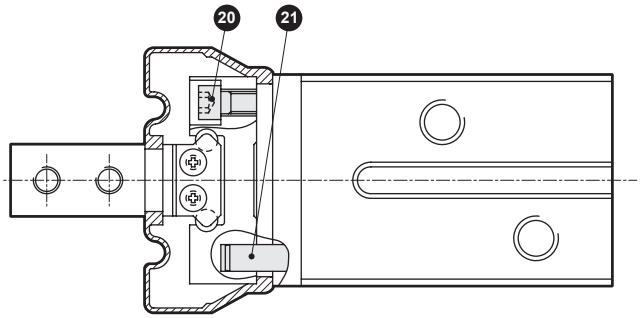
Internal structure and parts list

● LSHL-G10 to G20 / LSHL-F10 to F20

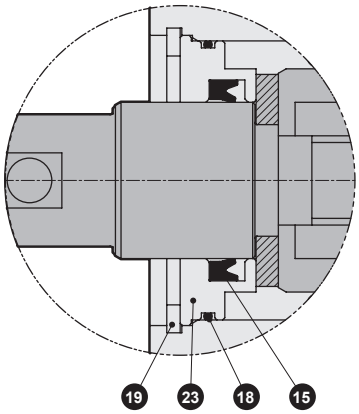


Cross-section A-A





B part ø20



Parts list

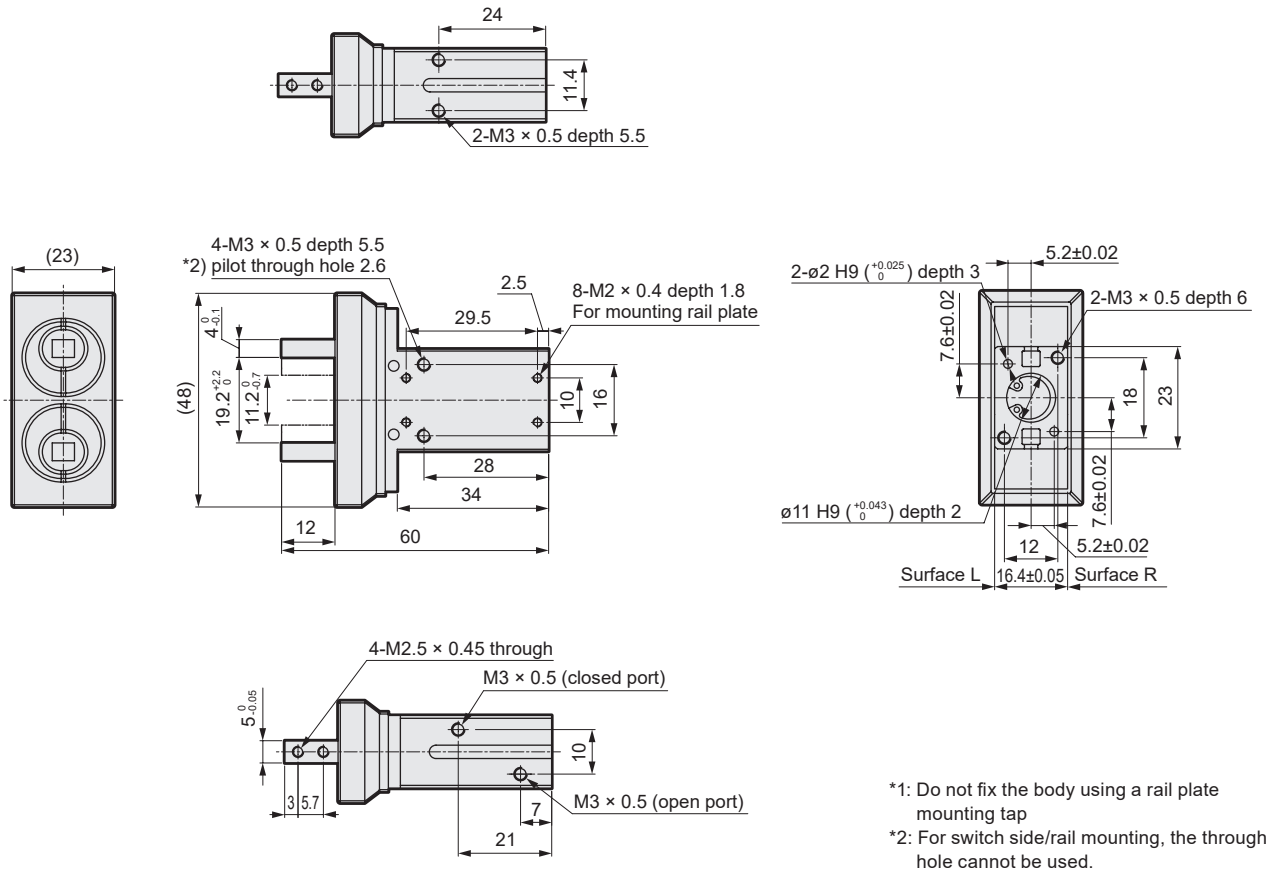
No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Finger	Stainless steel		13	CR ring	Stainless steel	
2	Linear guide	Stainless steel		14	Cap	Stainless steel	
3	Rubber cover	LSHL-G : Chloroprene LSHL-F : Fluorine		15	Rod packing	Nitrile rubber	
4	Lever	Stainless steel		16	Cushion rubber	Urethane rubber	
5	Fulcrum axis	Steel		17	Piston packing	Nitrile rubber	
6	Body	Aluminum alloy		18	O-ring	Nitrile rubber	
7	Piston rod	Stainless steel		19	C-snap ring	Stainless steel	
8	Spring bracket	Aluminum alloy		20	Hexagon socket head cap screw	Stainless steel	
9	Magnet			21	Pin	Steel	
10	Piston	Aluminum alloy		22	Hexagon socket set screw	Stainless steel	
11	Head cover	Aluminum alloy		23	Rod metal	Aluminum alloy	
12	Operation shaft	Steel alloy					

Repair parts list

Bore size (mm)	Kit No.	Repair part No.	Rubber cover (part No. 3)		Rail plate kit No.	Description
			LSHL-G Chloroprene	LSHL-F Fluorine		
ø10	LSHL-10K-HP	⑬⑮⑰⑱	LSHL-G10K	LSHL-F10K	LSHL-RPF-10-HP	Rail plate small screw
ø16	LSHL-16K-HP		LSHL-G16K	LSHL-F16K	LSHL-RPF-16-HP	
ø20	LSH-20K-HP	⑮⑰⑱	LSHL-G20K	LSHL-F20K	LSHL-RPF-20-HP	

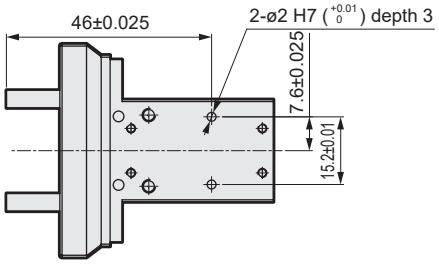
Dimensions (bore size: ø10)

● LSHL-G10D1N, LSHL-F10D1N



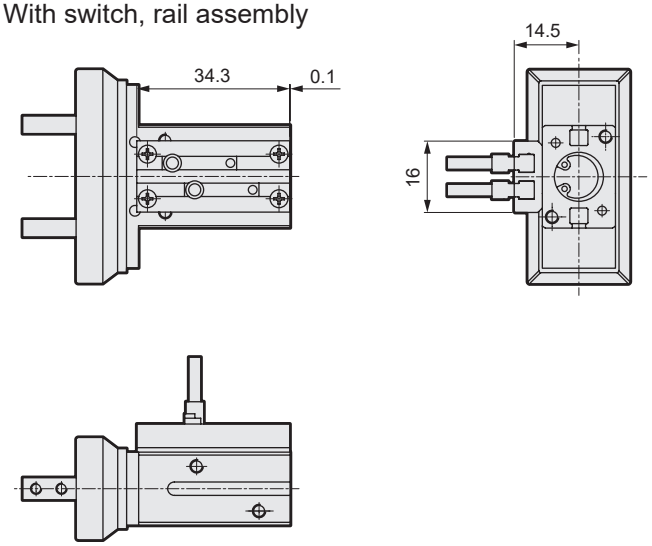
*1: Do not fix the body using a rail plate mounting tap
*2: For switch side/rail mounting, the through hole cannot be used.

● LSHL-G10D1R / L,LSHL-F10D1R / L



*3: Pin holes are machined on surface R for LSHL-G10D1R and L for LSHL-G10D1L.
Refer to page 60 for the base line.

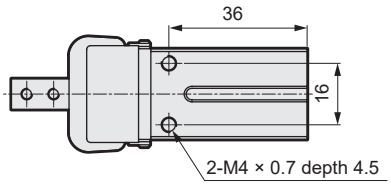
● With switch, rail assembly

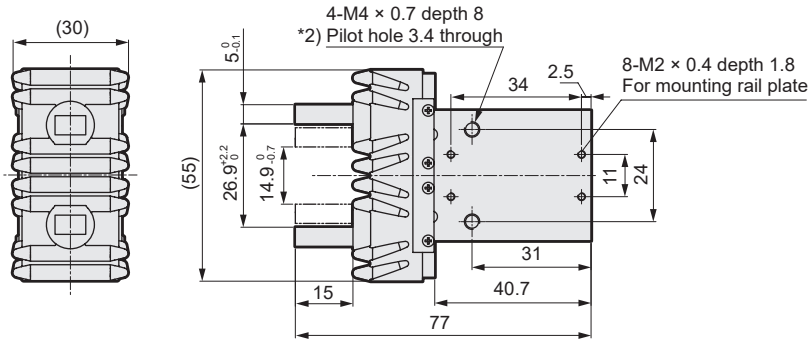


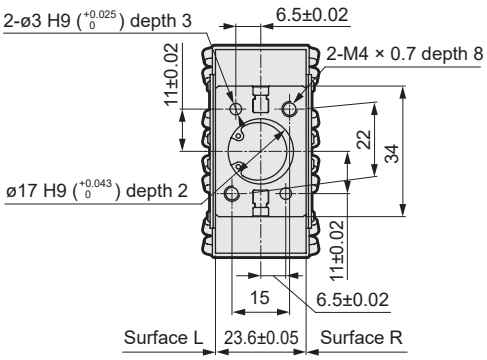
*4: Refer to Page 72 for cylinder switch precautions.

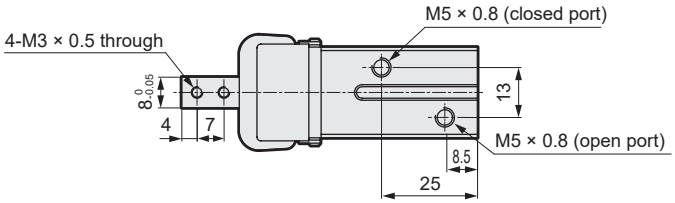
Dimensions (bore size: ø16)

● LSHL-G16D1N, LSHL-F16D1N



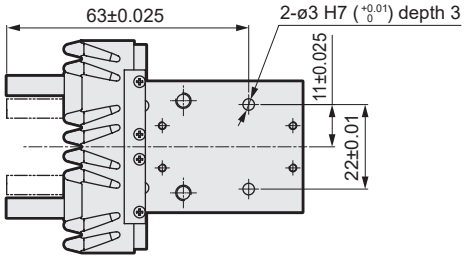






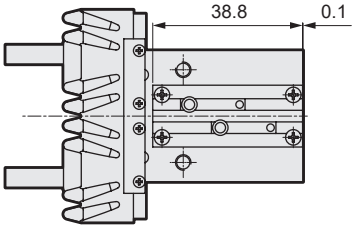
*1: Do not fix the body using a rail plate mounting tap
*2: For switch side mounting, the through hole cannot be used.

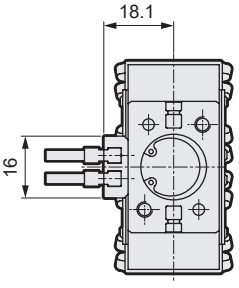
● LSHL-G16D1R / L, LSHL-F16D1R / L

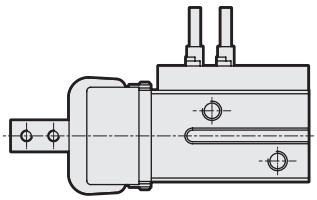


*3: Pin holes are machined on surface R for LSHL-G16D1R and L for LSHL-G16D1L. Refer to page 60 for the base line.

● With switch, rail assembly



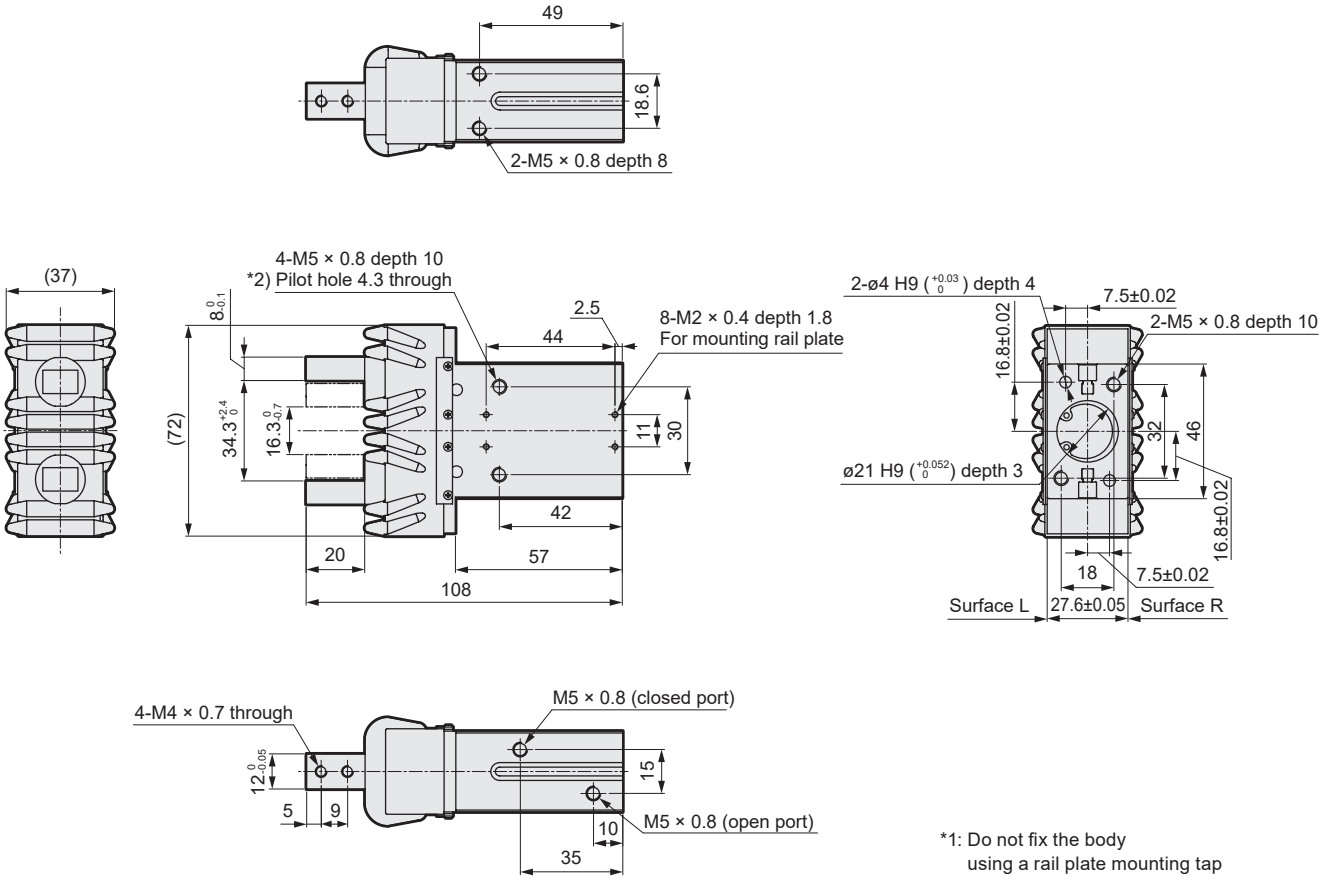




*4: Refer to Page 72 for cylinder switch precautions.

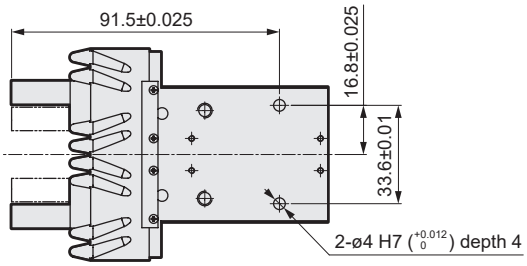
Dimensions (bore size: ø20)

● LSHL-G20D1N, LSHL-F20D1N



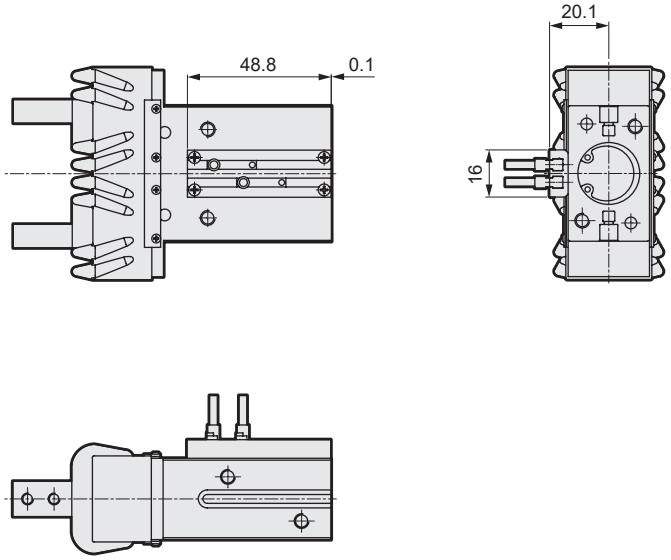
*1: Do not fix the body using a rail plate mounting tap
*2: For switch side mounting, the through hole cannot be used.

● LSHL-G20D1R / L, LSHL-F20D1R/L

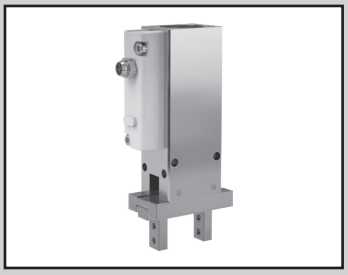


*3: Pin holes are machined on surface R for LSHL-G20D1R and L for LSHL-G20D1L. Refer to page 60 for the base line.

● With switch, rail assembly



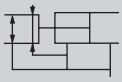
*4: Refer to Page 72 for cylinder switch precautions.



Linear Slide Hand with length measuring function, double acting

LSHM-A Series

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



RoHS

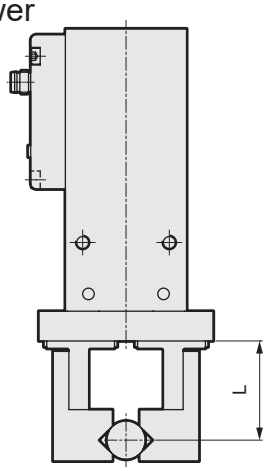
Specifications

Item			LSHM-A							
Bore size		mm	ø10		ø16		ø20		ø25	
Actuation			Double acting							
Working fluid			Compressed air							
Max. working pressure		MPa	0.7							
Min. working pressure		MPa	0.2		0.1		0.1		0.1	
Port size			M3		M5		M5		M5	
Operating stroke length		mm	4		6		10		14	
Power supply voltage			24 VDC ±10%							
Current consumption			25 mA or less							
Display lamp			Green LED ON when power applied							
Analog output			When fingers are closed: 1 V; when opened: 5 V [*1], connection load: 100 kΩ or more							
Analog output linearity	Without correction adapter		±3% F.S. or less (ambient temperature 25°C)							
	With correction adapter		±0.5% F.S. or less (ambient temperature 25°C)							
Repeatability of analog output			±0.02 mm or less (ambient temperature 25°C, no deformation or wear of actuator / jig)							
Valid measured range length		mm	4.5		6.5		10		14	
Impact resistance (sensor / amplifier section)			294 m / s^2							
Vibration resistance (sensor / amplifier section)			10 to 55 Hz compound amplitude 1.5 mm, 2 hours per X, Y, Z direction							
Degree of protection (sensor / amplifier section)			IEC standards IP65							
Ambient temperature, humidity			10 to 60°C, 85% RH or less (no freezing)							
Amplifier mounting position			Side	Front	Side	Front	Side	Front	Side	Front
Weight	Finger OP: 1, 2, 3	kg	0.108	0.120	0.221	0.238	0.437	0.457	0.752	0.773
	Finger OP: 4				0.226	0.243	0.442	0.462	0.782	0.803
Lubrication			Not required							

Note: Refer to page 51 for the correction adapter.

*1: There is output fluctuation of 1 mV / °C.

Gripping power

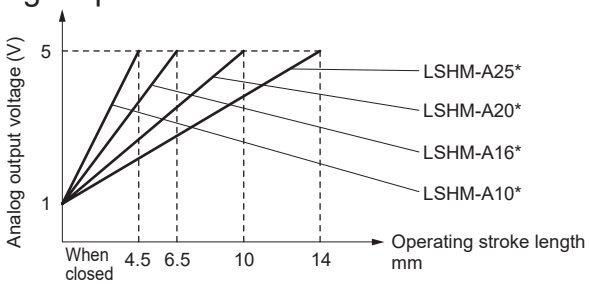


Unit: N

Bore size (mm)	Double acting	
	Open side	Closed side
ø10	17	11
ø16	45	34
ø20	66	42
ø25	104	65

*Supply pressure: 0.5 MPa, L = 20 mm, value at stroke center

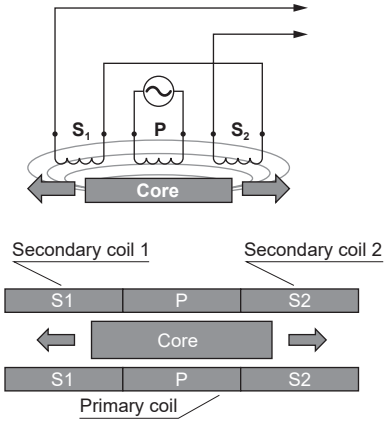
Analog output characteristics



*The analog output voltage at shipment is 1 V on the closed side and 5 V on the open side, with the port closed and pressurized.

LVDT displacement sensor operation principle

When exciting the primary coil (P), induced voltage is generated in the two secondary coils (S1 / S2) by electromagnetic induction. When the Hand is driven, the core position changes and a difference in induced voltage occurs between S1 and S2. This difference is used to output the position of the core as electric signals.



How to order

LSHM - A 10 D 2 A - N - HP2

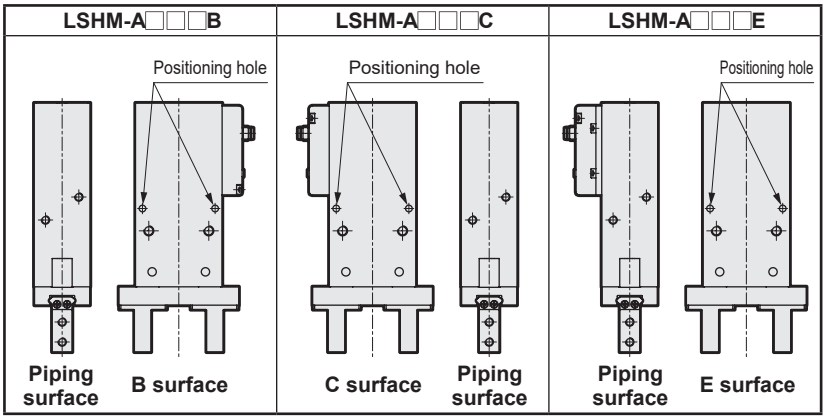
Ⓐ Rubber cover
Ⓑ Bore size
Ⓒ Actuation
Ⓓ Finger
Ⓔ Amp mounting position / grip center reference, high precision positioning hole
Ⓕ Adapter option

Code	Description
Ⓐ Rubber cover	
A	Without rubber cover
Ⓑ Bore size (mm)	
10	ø10
16	ø16
20	ø20
25	ø25
Ⓒ Actuation	
D	Double acting
Ⓓ Finger * Refer to the Dimensions for details.	
1	Basic
2	Side tap
3	Through hole
4	Flat
Ⓔ Amp mounting position / grip center reference, high precision positioning hole *1	
A	Amp side / no positioning hole
B	Amp side / rear with finger below and piping right
C	Amp side / rear with finger below and piping left
D	Amp front / no positioning hole
E	Amp front / rear with finger below and piping right
Ⓕ Adapter option *2	
N	Without adapter
A	Correction adapter
B	Switch output adaptor (NPN)
C	Switch output adaptor (PNP)
D	IO-Link adapter

*2: Shipped with the product.

*1

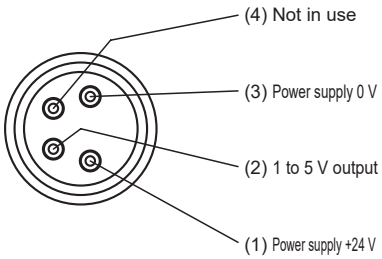
Amp mounting position / grip center reference, high precision positioning hole position diagram



Refer to the Dimensions (pages 39 to 42) and page 60 for details.

Plug contact array diagram

·Without correction adapter



[Example of model No.]

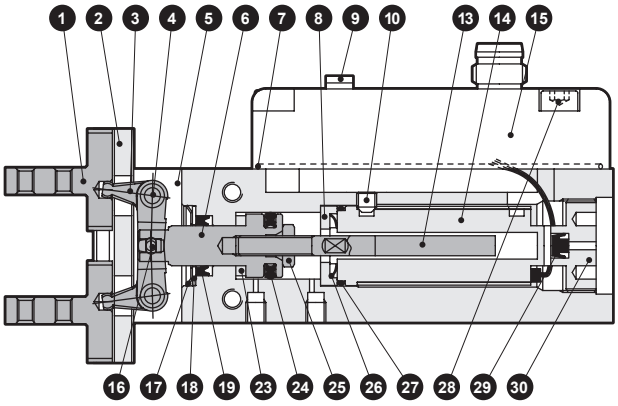
LSHM-A10D2A-N-HP2

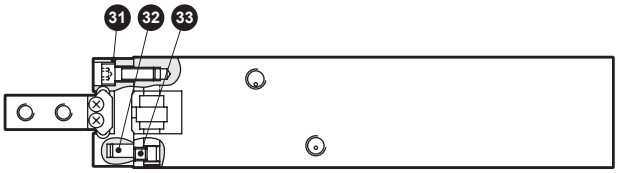
Model: Linear Slide Hand

ⒶRubber cover	: Without rubber cover
ⒷBore size	: ø10
ⒸActuation	: Double acting
ⒹFinger	: Side tap
ⒺAmp mounting position / grip center reference, high precision positioning hole	: Amp side / no positioning hole
ⒻAdapter option	: Without adapter

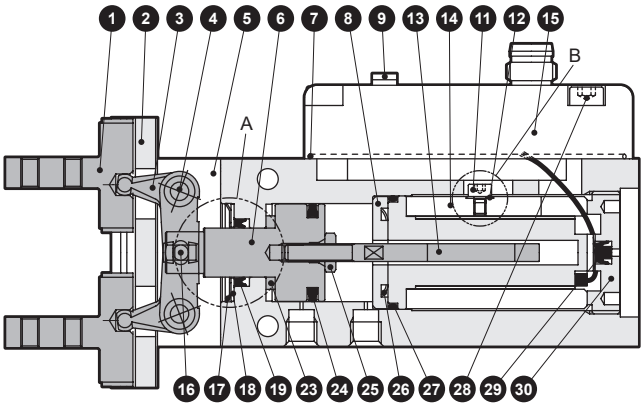
Internal structure and parts list

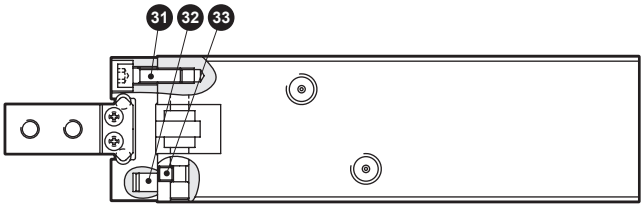
● Amplifier side mounting
ø10



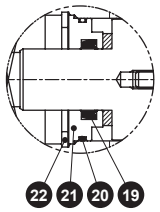


● Amplifier side mounting
ø16 to 25





A part ø20, 25



B part ø20, 25

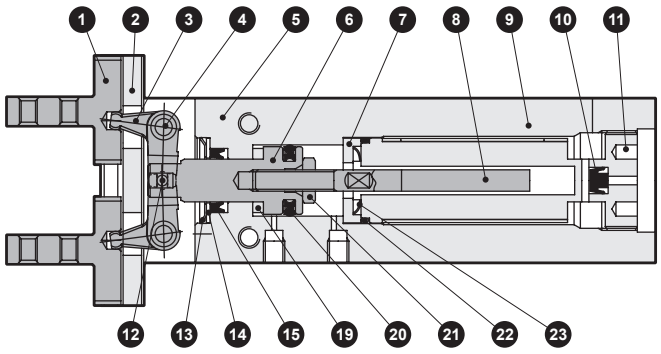
Cannot be disassembled

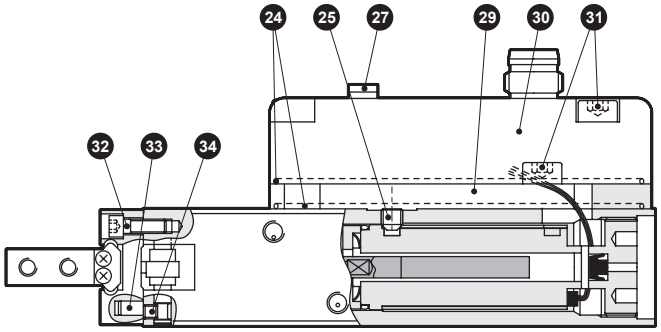
Parts list

No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Finger	Stainless steel		18	Cap	Stainless steel	
2	Linear guide	Stainless steel		19	Rod packing	Nitrile rubber	
3	Lever	Stainless steel		20	O-ring	Nitrile rubber	
4	Fulcrum axis	Steel		21	Rod metal	Aluminum alloy	
5	Body	Aluminum alloy		22	C-snap ring	Steel	
6	Piston rod	Stainless steel		23	Cushion rubber	Urethane rubber	
7	Gasket	Nitrile rubber		24	Piston packing	Nitrile rubber	
8	Washer retainer	Aluminum alloy		25	Nut	Stainless steel	
9	Plug	Nitrile rubber		26	Wave washer	Stainless steel	
10	Hexagon socket set screw	Stainless steel	ø10	27	O-ring	Nitrile rubber	
11	Hexagon socket head cap screw	Stainless steel	ø16 to 25	28	Hexagon socket head cap screw	Stainless steel	
12	Flat washer	Stainless steel	ø16	29	Check valve	Nitrile rubber	
13	Core shaft	Steel		30	Head cover	Aluminum alloy	
14	Sensor body	-		31	Hexagon socket head cap screw	Stainless steel	
15	Amplifier	-		32	Pin	Steel	
16	Fulcrum axis	Steel		33	Hexagon socket set screw	Stainless steel	
17	CR ring	Stainless steel					

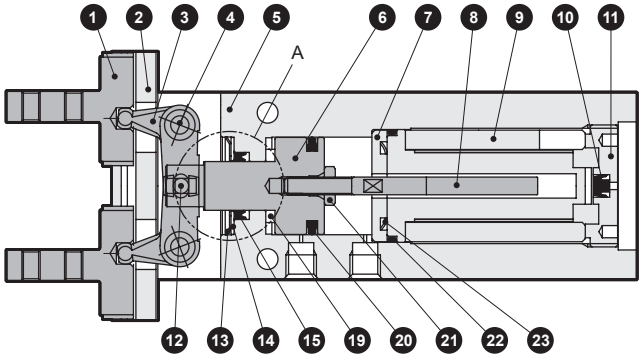
Internal structure and parts list

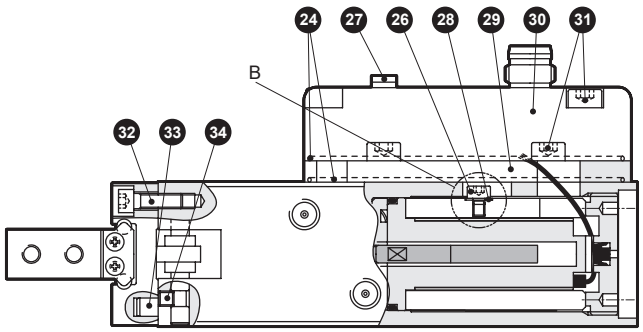
● Amplifier front mounting
ø10



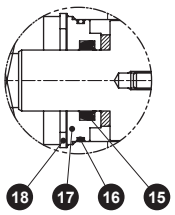


● Amplifier front mounting
ø16 to 25





A part ø20, 25



B part ø20, 25

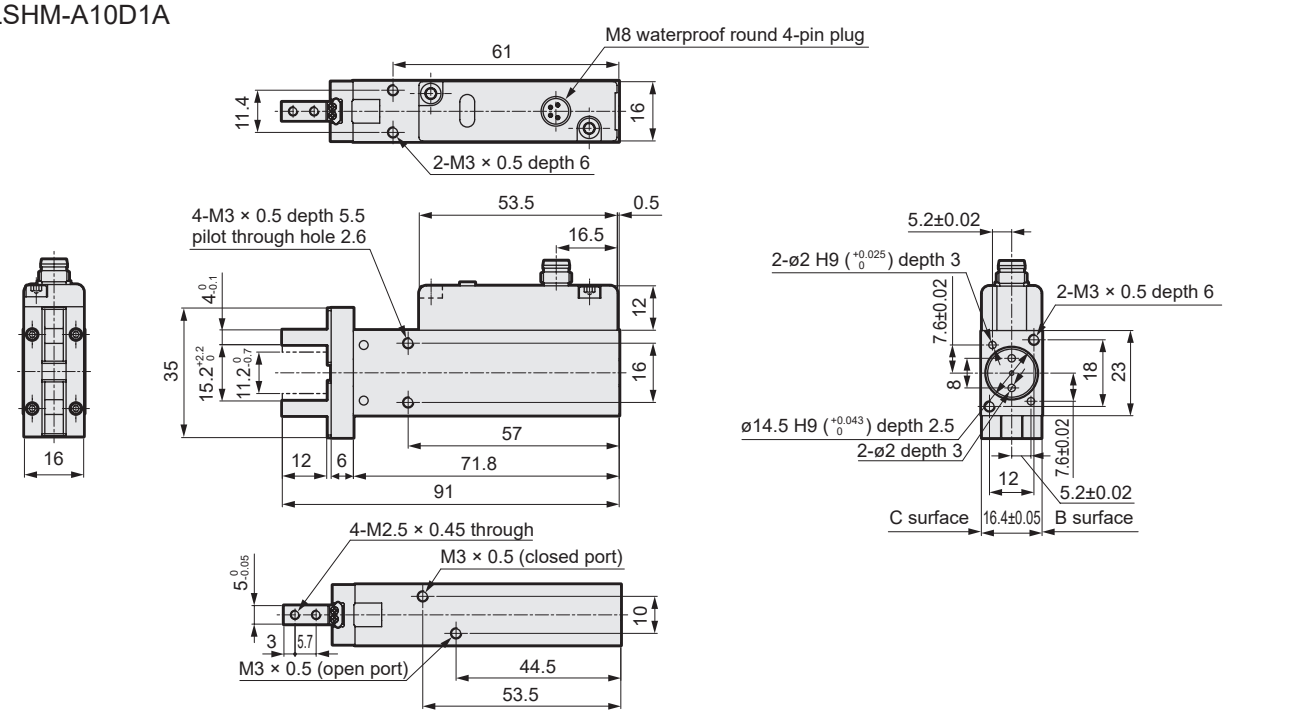
Cannot be disassembled

Parts list

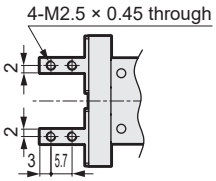
No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Finger	Stainless steel		18	C-snap ring	Steel	
2	Linear guide	Stainless steel		19	Cushion rubber	Urethane rubber	
3	Lever	Stainless steel		20	Piston packing	Nitrile rubber	
4	Fulcrum axis	Steel		21	Nut	Stainless steel	
5	Body	Aluminum alloy		22	O-ring	Nitrile rubber	
6	Piston rod	Stainless steel		23	Wave washer	Stainless steel	
7	Washer retainer	Aluminum alloy		24	Gasket	Nitrile rubber	
8	Core shaft	Steel		25	Hexagon socket set screw	Stainless steel	ø10
9	Sensor body	-		26	Hexagon socket head cap screw	Stainless steel	ø16 to 25
10	Check valve	Nitrile rubber		27	Plug	Nitrile rubber	
11	Head cover	Aluminum alloy		28	Flat washer	Stainless steel	ø16
12	Fulcrum axis	Steel		29	Amplifier adapter	Aluminum alloy	
13	CR ring	Stainless steel		30	Amplifier	-	
14	Cap	Stainless steel		31	Hexagon socket head cap screw	Stainless steel	
15	Rod packing	Nitrile rubber		32	Hexagon socket head cap screw	Stainless steel	
16	O-ring	Nitrile rubber		33	Pin	Steel	
17	Rod metal	Aluminum alloy		34	Hexagon socket set screw	Stainless steel	

Dimensions (bore size: ø10)

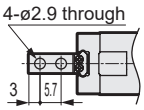
● LSHM-A10D1A



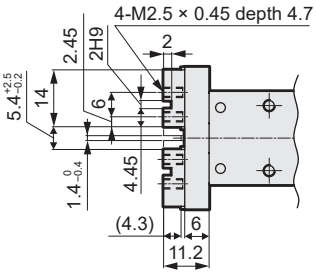
● LSHM-A10D2*



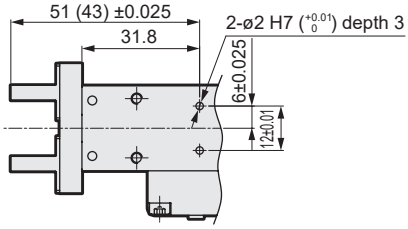
● LSHM-A10D3*



● LSHM-A10D4*



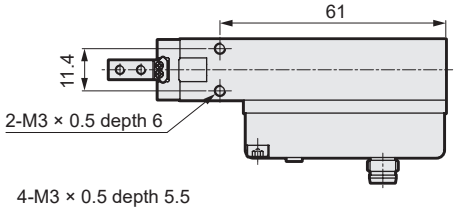
● LSHM-A10D*B/C

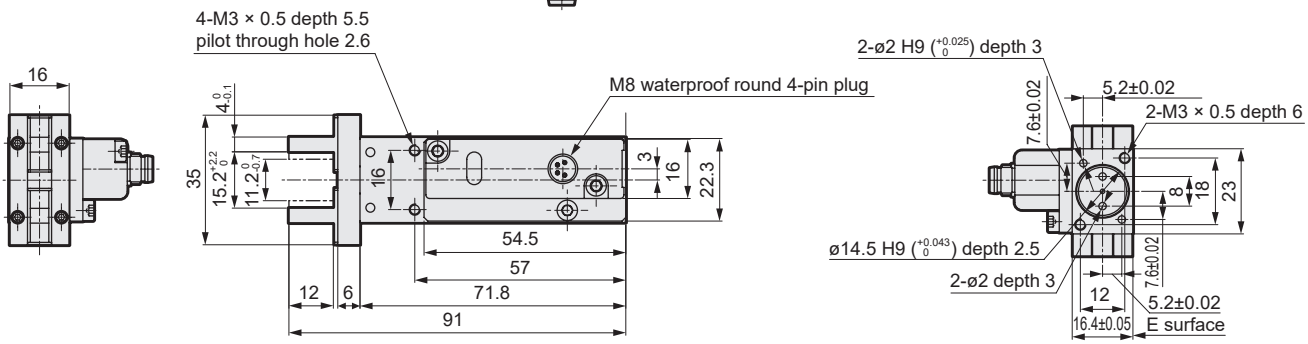


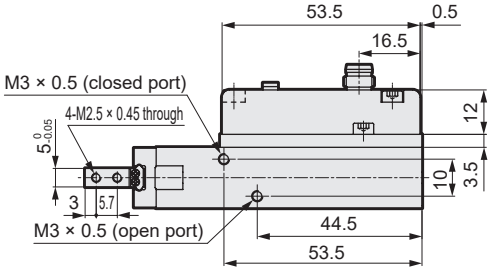
*1: Positioning holes are machined on B surface for LSHM-A10D*B and C surface for LSHM-A10D*C

*2: The dimensions in parentheses are the dimensions for LSHM-A10D4.

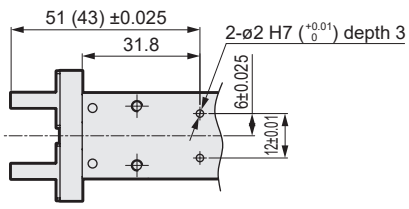
● LSHM-A10D1D





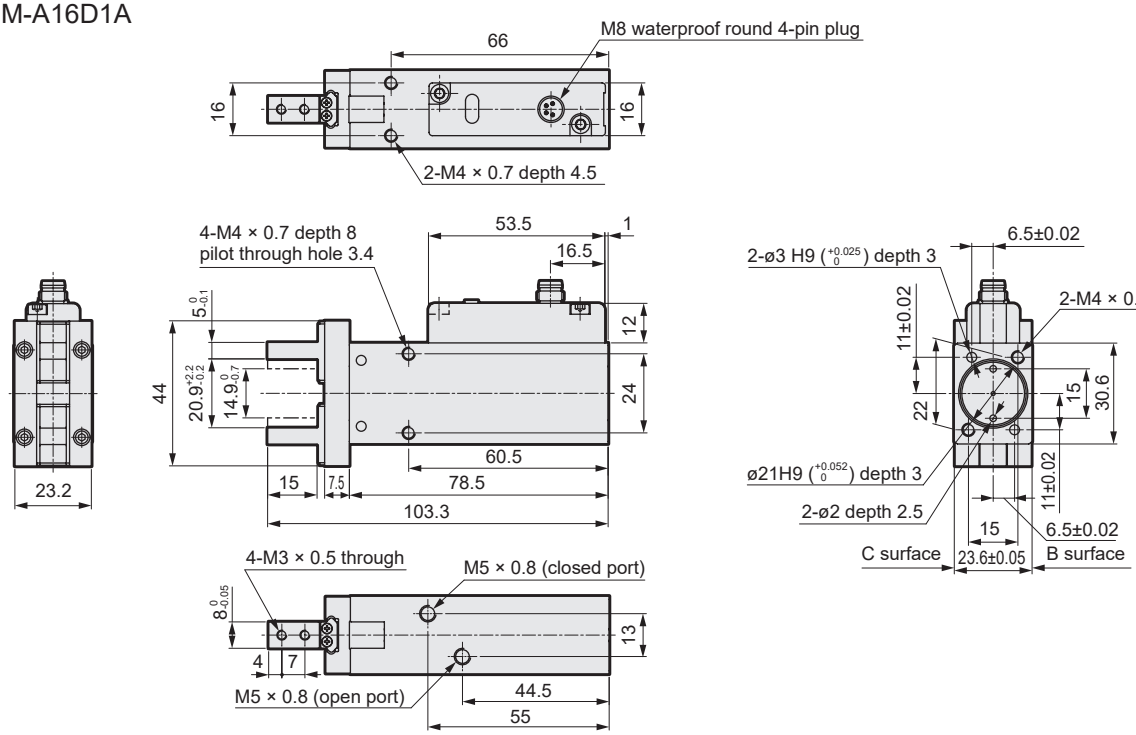


● LSHM-A10D*E

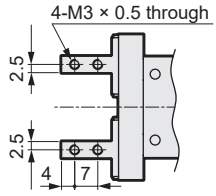


Dimensions (bore size: ø16)

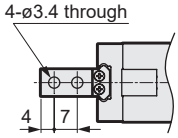
● LSHM-A16D1A



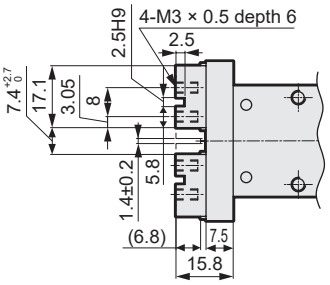
● LSHM-A16D2*



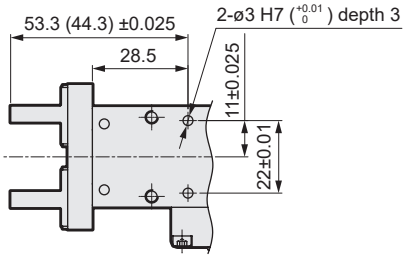
● LSHM-A16D3*



● LSHM-A16D4*

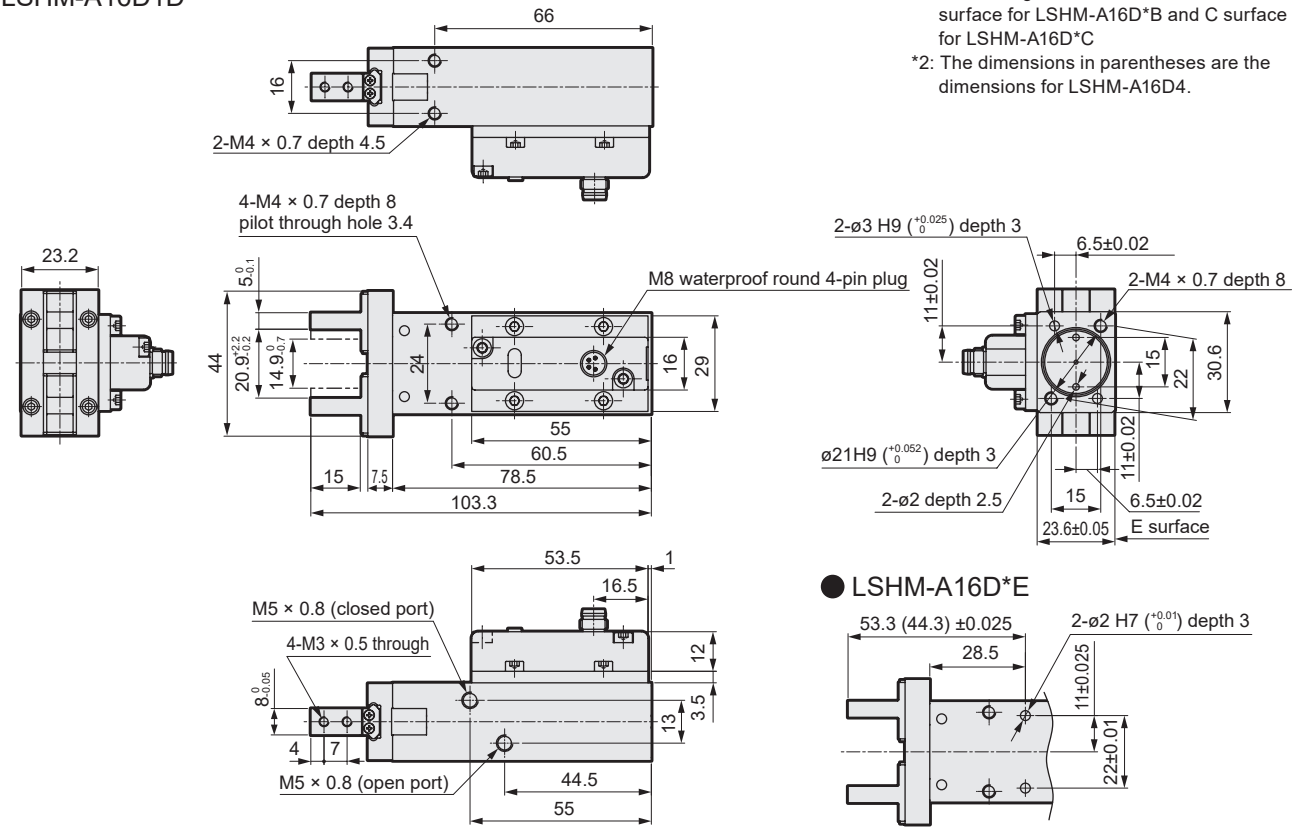


● LSHM-A16D*B / C



*1: Positioning holes are machined on B surface for LSHM-A16D*B and C surface for LSHM-A16D*C
*2: The dimensions in parentheses are the dimensions for LSHM-A16D4.

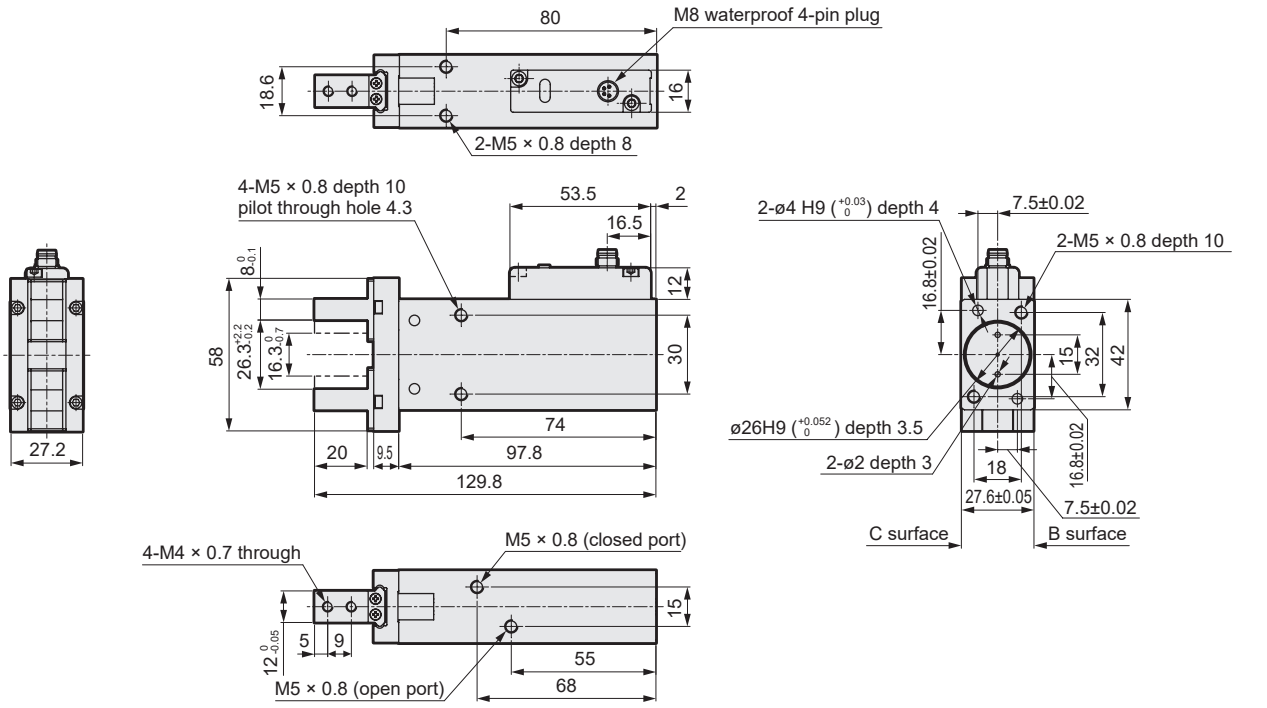
● LSHM-A16D1D



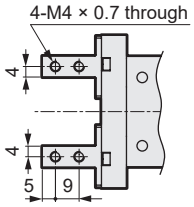
● LSHM-A16D*E

Dimensions (bore size: ø20)

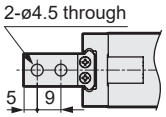
● LSHM-A20D1A



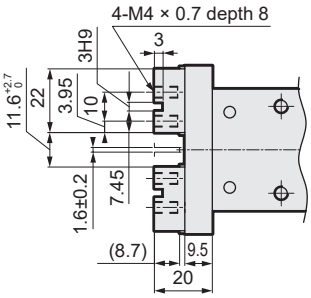
● LSHM-A20D2*



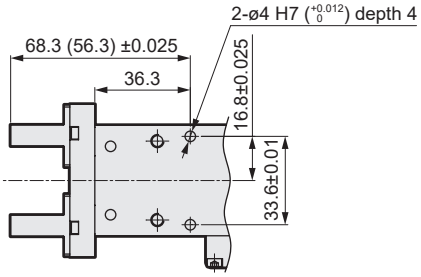
● LSHM-A20D3*



● LSHM-A20D4*

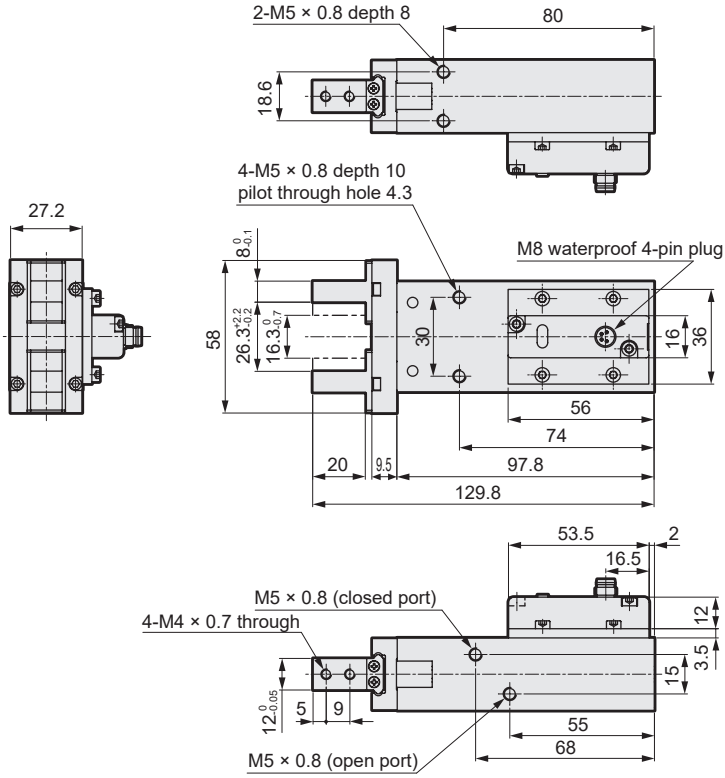


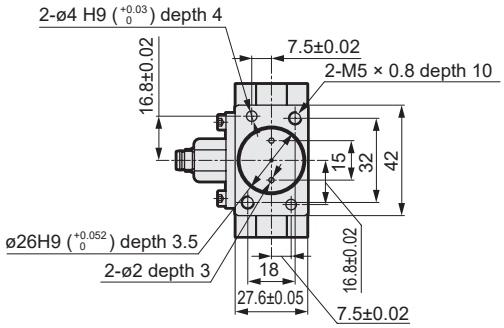
● LSHM-A20D*B / C



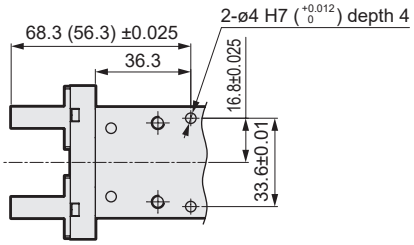
*1: Positioning holes are machined on B surface for LSHM-A20D*B and C surface for LSHM-A20D*C
*2: The dimensions in parentheses are the dimensions for LSHM-A20D4.

● LSHM-A20D1D



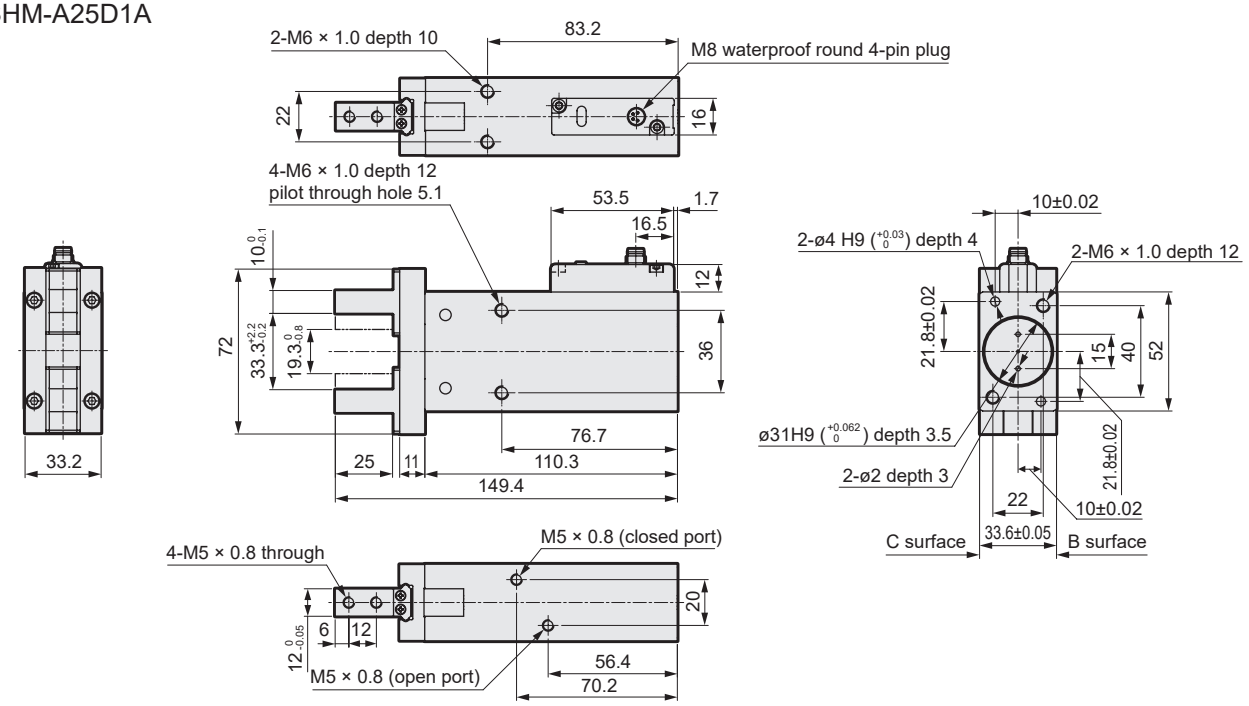


● LSHM-A20D*E

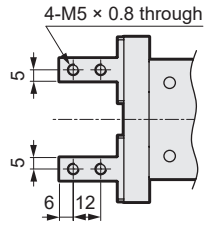


Dimensions (bore size: ø25)

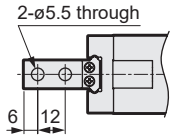
● LSHM-A25D1A



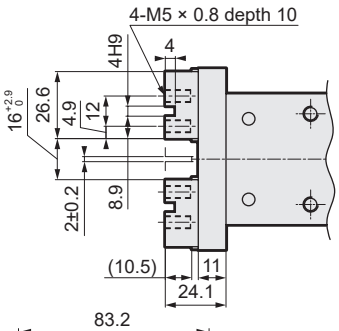
● LSHM-A25D2*



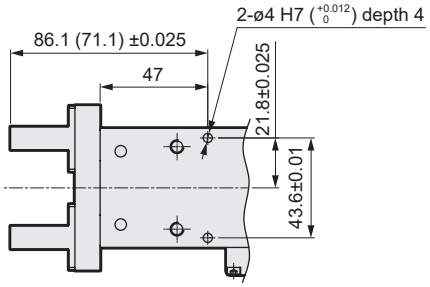
● LSHM-A20D3*



● LSHM-A25D4*

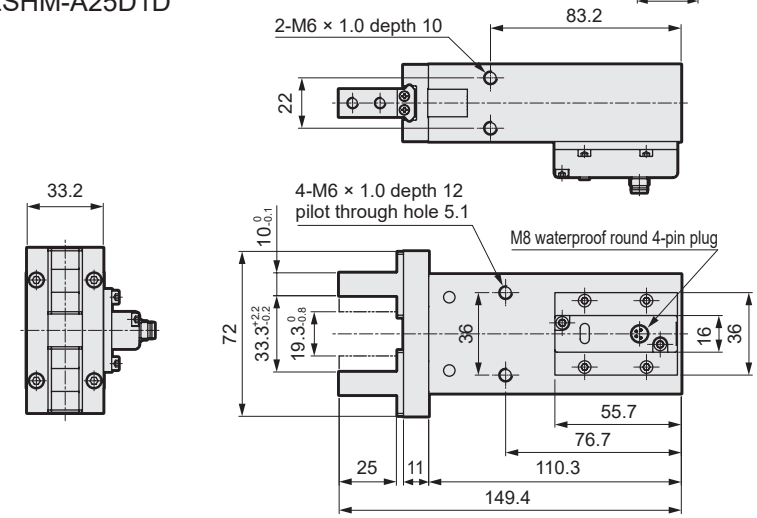


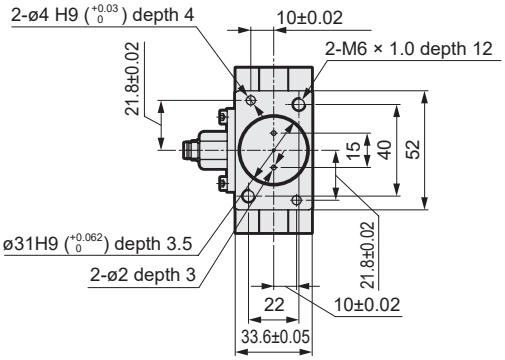
● LSHM-A25D*B / C



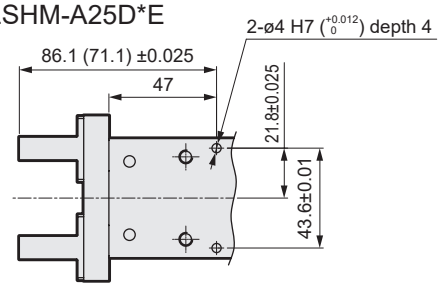
*1: Positioning holes are machined on B surface for LSHM-A25D*B and C surface for LSHM-A25D*C
*2: The dimensions in parentheses are the dimensions for LSHM-A25D4.

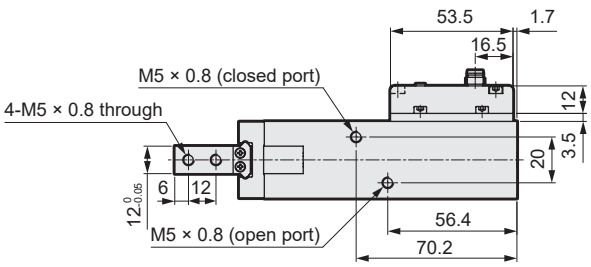
● LSHM-A25D1D

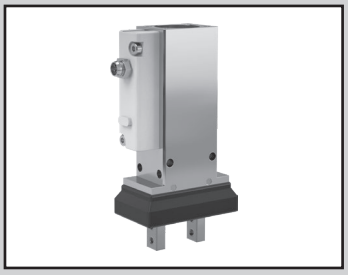




● LSHM-A25D*E



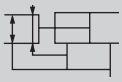




Linear Slide Hand with length measuring function, double acting with rubber cover

LSHM-G / LSHM-F Series

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



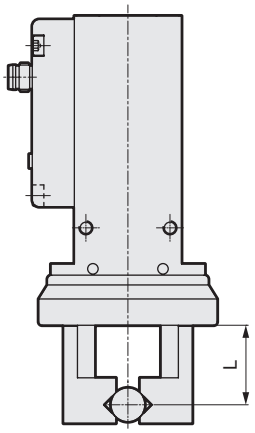
RoHS

Specifications

Item		LSHM-G / LSHM-F							
Bore size mm		ø10		ø16		ø20		ø25	
Actuation		Double acting							
Working fluid		Compressed air							
Max. working pressure MPa		0.7							
Min. working pressure MPa		0.2		0.1		0.1		0.1	
Port size		M3		M5		M5		M5	
Operating stroke length mm		4		6		10		14	
Power supply voltage		24 VDC ±10%							
Current consumption		25 mA or less							
Display lamp		Green LED ON when power applied							
Analog output		When fingers are closed: 1 V; when opened: 5 V *1, connection load: 100 kΩ or more							
Analog output linearity	Without correction adapter	±3% F.S. or less (ambient temperature 25°C)							
	With correction adapter	±0.5% F.S. or less (ambient temperature 25°C)							
Repeatability of analog output		±0.02 mm or less (ambient temperature 25°C, no deformation or wear of actuator / jig)							
Valid measured range length mm		4.5		6.5		10		14	
Impact resistance (sensor / amplifier section)		294 m / s^2							
Vibration resistance (sensor / amplifier section)		10 to 55 Hz compound amplitude 1.5 mm, 2 hours per X, Y, Z direction							
Degree of protection (sensor / amplifier section)		IEC standards IP65							
Ambient temperature, humidity		10 to 60°C, 85% RH or less (no freezing)							
Amplifier mounting position		Side	Front	Side	Front	Side	Front	Side	Front
Weight kg		0.113	0.125	0.236	0.253	0.462	0.482	0.792	0.813
Lubrication		Not required							

Note: Refer to page 51 for the correction adapter.
*1: There is output fluctuation of 1 mV / °C.

Gripping power

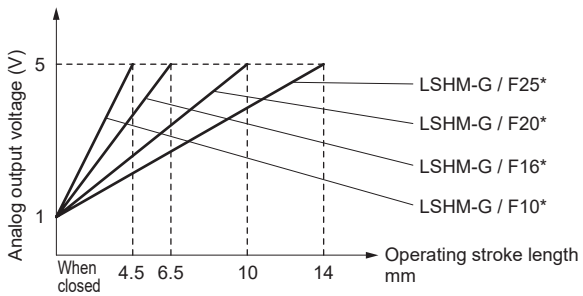


Unit: N

Bore size (mm)	Double acting	
	Open side	Closed side
ø10	17	11
ø16	45	34
ø20	66	42
ø25	104	65

*Supply pressure: 0.5 MPa, L = 20 mm, value at stroke center

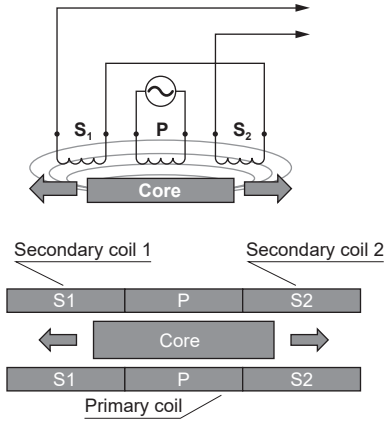
Analog output characteristics



*The analog output voltage at shipment is 1 V on the closed side and 5 V on the open side, with the port closed and pressurized.

LVDT displacement sensor operation principle

When exciting the primary coil (P), induced voltage is generated in the two secondary coils (S1 / S2) by electromagnetic induction. When the Hand is driven, the core position changes and a difference in induced voltage occurs between S1 and S2. This difference is used to output the position of the core as electric signals.



How to order

LSHM - G 10 D 1 A - N - HP2

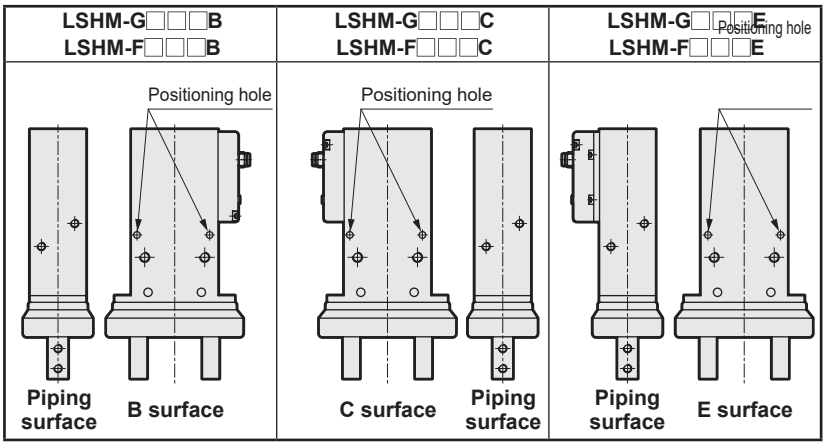
- A Rubber cover
- B Bore size
- C Actuation
- D Finger
- E Amp mounting position / grip center reference, high precision positioning hole
- F Correction adapter option

Code	Description
A Rubber cover	
G	Chloroprene rubber
F	Fluoro rubber
B Bore size (mm)	
10	ø10
16	ø16
20	ø20
25	ø25
C Actuation	
D	Double acting
D Finger	
1	Basic
E Amp mounting position / grip center reference, high precision positioning hole *1	
A	Amp side / no positioning hole
B	Amp side / rear with finger below and piping right
C	Amp side / rear with finger below and piping left
D	Amp front / no positioning hole
E	Amp front / rear with finger below and piping right
F Adapter option *2	
N	Without correction adapter
A	Correction adapter attached
B	Switch output adaptor (NPN)
C	Switch output adaptor (PNP)
D	IO-Link adapter

*2 Shipped with the product.

*1

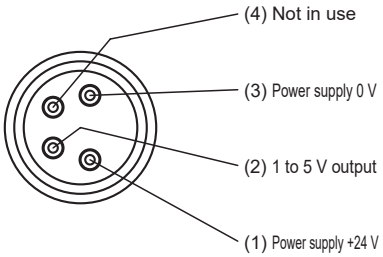
Amp mounting position / grip center reference, high precision positioning hole position diagram



Refer to the Dimensions (pages 47 to 50) and page 60 for details.

Plug contact array diagram

·Without correction adapter



[Example of model No.]

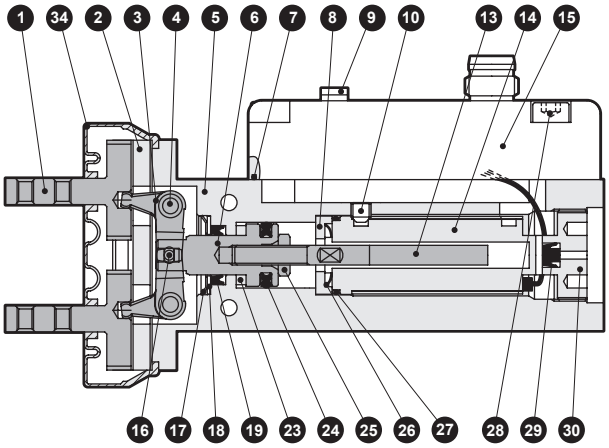
LSHM-G10D1A-N-HP2

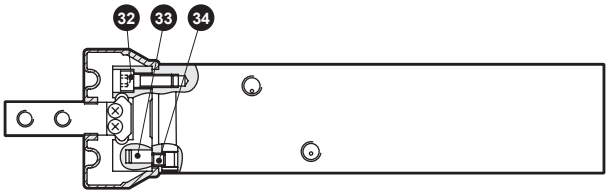
Model: Linear Slide Hand

A Rubber cover	: Chloroprene rubber
B Bore size	: ø10
C Actuation	: Double acting
D Finger	: Basic
E Amp mounting position / grip center reference, high precision positioning hole	: Amp side / no positioning hole
F Adapter option	: Without adapter

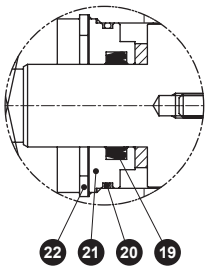
Internal structure and parts list

● Amplifier side mounting
ø10

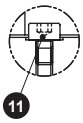




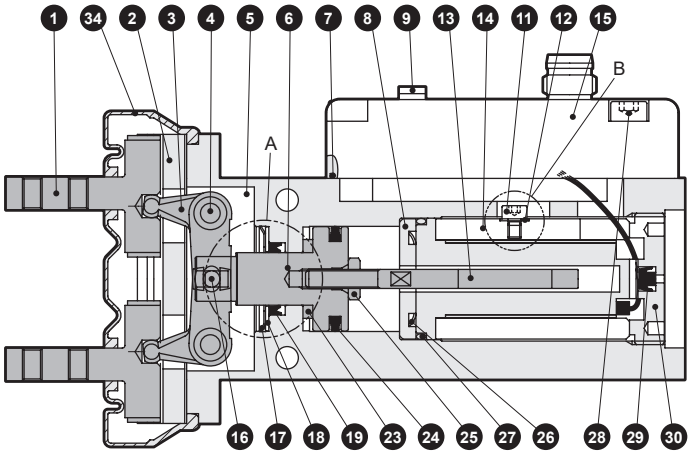
A part ø20, 25

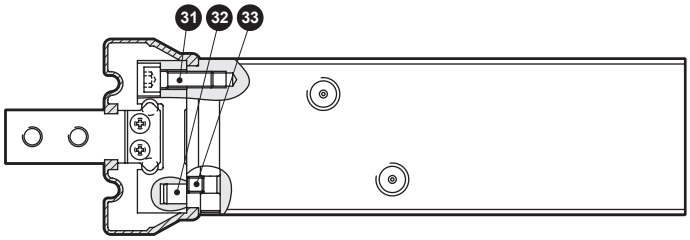


B part ø20, 25



● Amplifier side mounting
ø16 to 25





Cannot be disassembled

Parts list

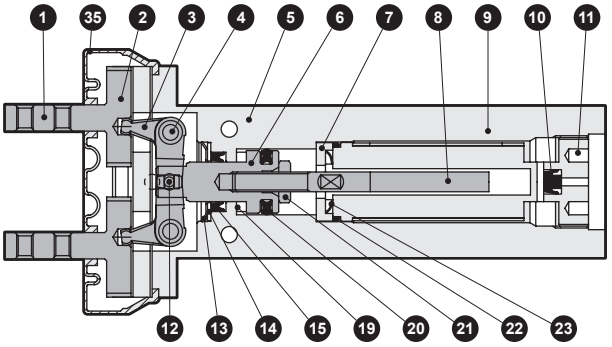
No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Finger	Stainless steel		19	Rod packing	Nitrile rubber	
2	Linear guide	Stainless steel		20	O-ring	Nitrile rubber	
3	Lever	Stainless steel		21	Rod metal	Aluminum alloy	
4	Fulcrum axis	Steel		22	C-snap ring	Steel	
5	Body	Aluminum alloy		23	Cushion rubber	Urethane rubber	
6	Piston rod	Stainless steel		24	Piston packing	Nitrile rubber	
7	Gasket	Nitrile rubber		25	Nut	Stainless steel	
8	Washer retainer	Aluminum alloy		26	Wave washer	Stainless steel	
9	Plug	Nitrile rubber		27	O-ring	Nitrile rubber	
10	Hexagon socket set screw	Stainless steel	ø10	28	Hexagon socket head cap screw	Stainless steel	
11	Hexagon socket head cap screw	Stainless steel	ø16 to 25	29	Check valve	Nitrile rubber	
12	Flat washer	Stainless steel	ø16	30	Head cover	Aluminum alloy	
13	Core shaft	Steel		31	Hexagon socket head cap screw	Stainless steel	
14	Sensor body	-		32	Pin	Steel	
15	Amplifier	-		33	Hexagon socket set screw	Stainless steel	
16	Fulcrum axis	Steel		34	Rubber cover	Chloroprene rubber	LSHM-G*
17	CR ring	Stainless steel				Fluoro rubber	LSHM-F*
18	Cap	Stainless steel					

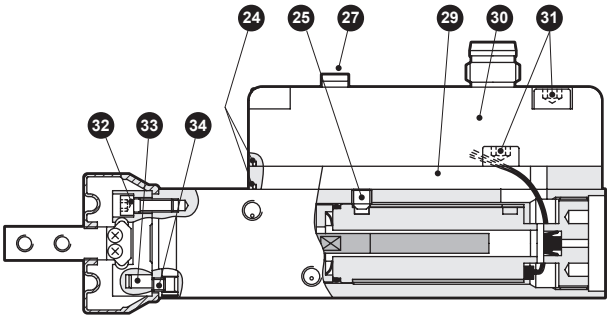
Repair parts list

Bore size (mm)	Material	Kit No.	Repair part No.	Bore size (mm)	Material	Kit No.	Repair part No.
ø10	Chloroprene rubber	LSH-G10K	34	ø20	Chloroprene rubber	LSH-G20K	34
	Fluoro rubber	LSH-F10K			Fluoro rubber	LSH-F20K	
ø16	Chloroprene rubber	LSH-G16K		ø25	Chloroprene rubber	LSH-G25K	
	Fluoro rubber	LSH-F16K			Fluoro rubber	LSH-F25K	

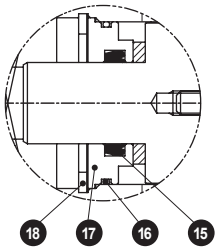
Internal structure and parts list

● Amplifier front mounting
ø10

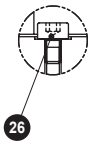




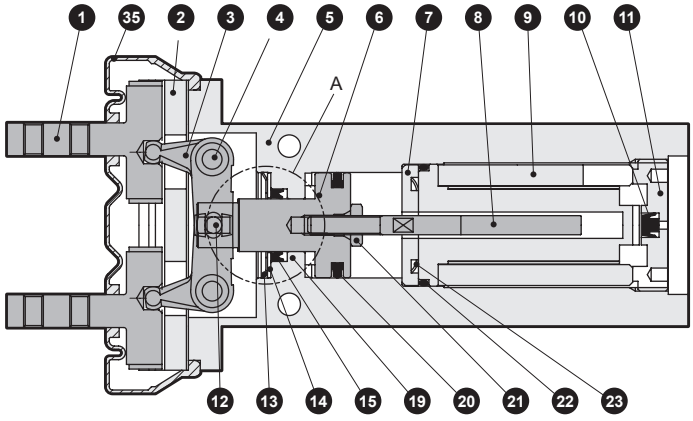
A part ø20, 25

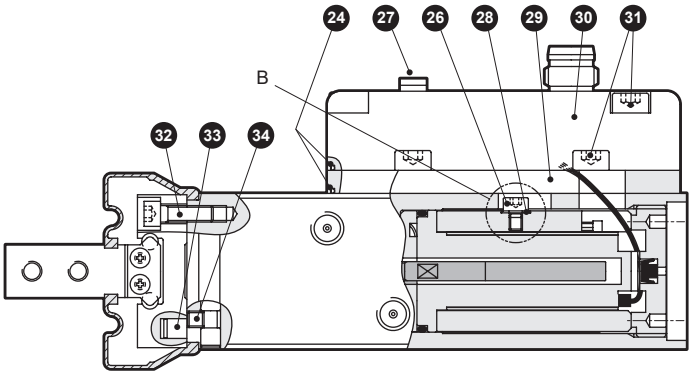


B part ø20, 25



● Amplifier front mounting
ø16 to 25





Cannot be disassembled

Parts list

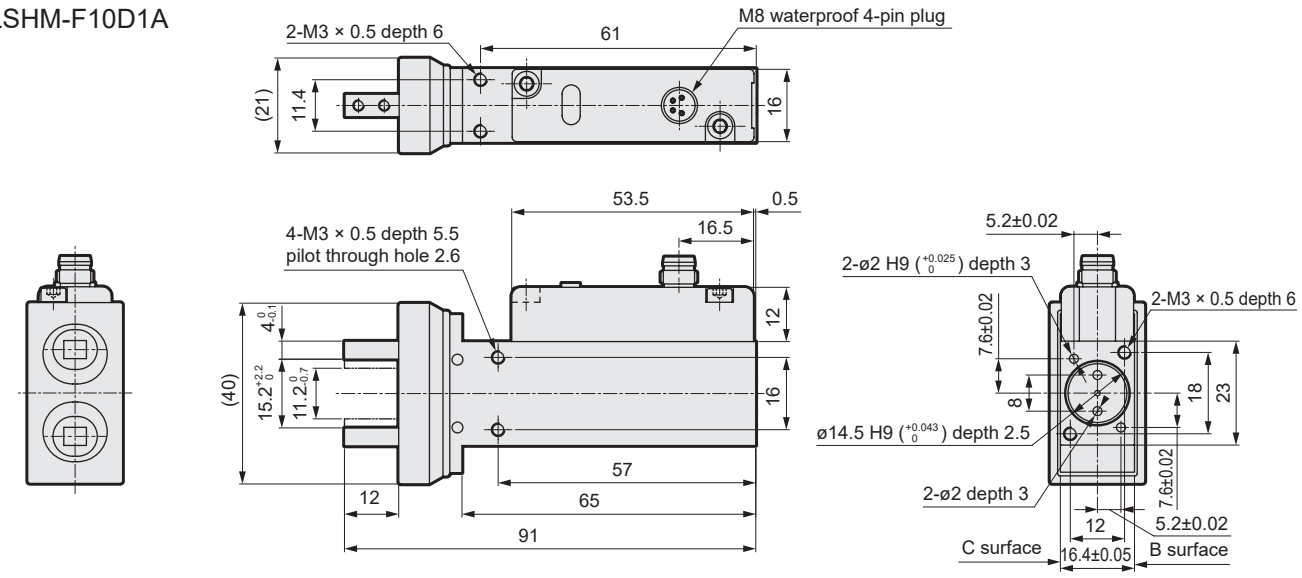
No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Finger	Stainless steel		19	Cushion rubber	Urethane rubber	
2	Linear guide	Stainless steel		20	Piston packing	Nitrile rubber	
3	Lever	Stainless steel		21	Nut	Stainless steel	
4	Fulcrum axis	Steel		22	O-ring	Nitrile rubber	
5	Body	Aluminum alloy		23	Wave washer	Stainless steel	
6	Piston rod	Stainless steel		24	Gasket	Nitrile rubber	
7	Washer retainer	Aluminum alloy		25	Hexagon socket set screw	Stainless steel	ø10
8	Core shaft	Steel		26	Hexagon socket head cap screw	Stainless steel	ø16 to 25
9	Sensor body	-		27	Plug	Nitrile rubber	
10	Check valve	Nitrile rubber		28	Flat washer	Stainless steel	ø16
11	Head cover	Aluminum alloy		29	Amplifier adapter	Aluminum alloy	
12	Fulcrum axis	Steel		30	Amplifier	-	
13	CR ring	Stainless steel		31	Hexagon socket head cap screw	Stainless steel	
14	Cap	Stainless steel		32	Hexagon socket head cap screw	Stainless steel	
15	Rod packing	Nitrile rubber		33	Pin	Steel	
16	O-ring	Nitrile rubber		34	Hexagon socket set screw	Stainless steel	
17	Rod metal	Aluminum alloy		35	Rubber cover	Chloroprene rubber	LSHM-G*
18	C-snap ring	Steel				Fluoro rubber	LSHM-F*

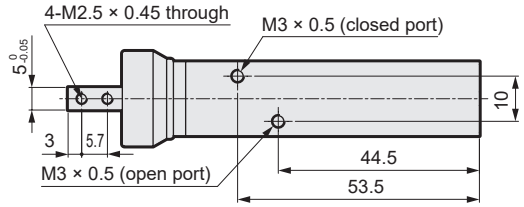
Repair parts list

Bore size (mm)	Material	Kit No.	Repair part No.	Bore size (mm)	Material	Kit No.	Repair part No.
ø10	Chloroprene rubber	LSH-G10K	35	ø20	Chloroprene rubber	LSH-G20K	35
	Fluoro rubber	LSH-F10K			Fluoro rubber	LSH-F20K	
ø16	Chloroprene rubber	LSH-G16K		ø25	Chloroprene rubber	LSH-G25K	
	Fluoro rubber	LSH-F16K			Fluoro rubber	LSH-F25K	

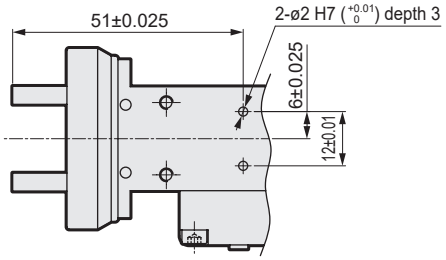
Dimensions (bore size: ø10)

● LSHM-G10D1A
LSHM-F10D1A



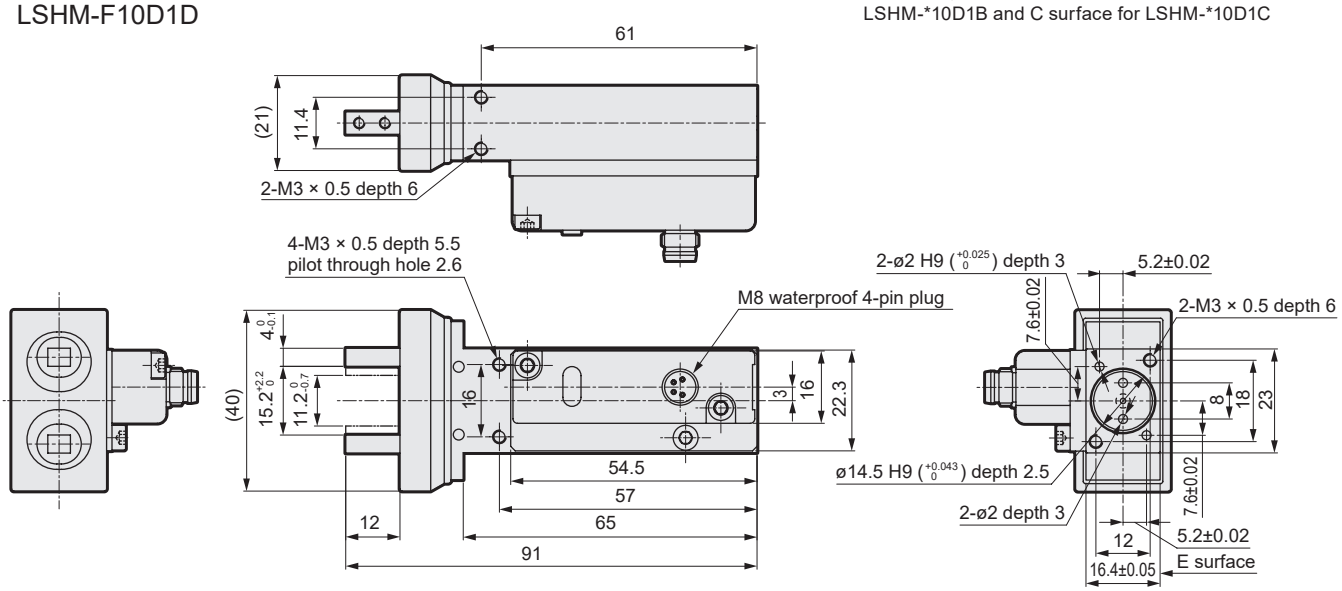


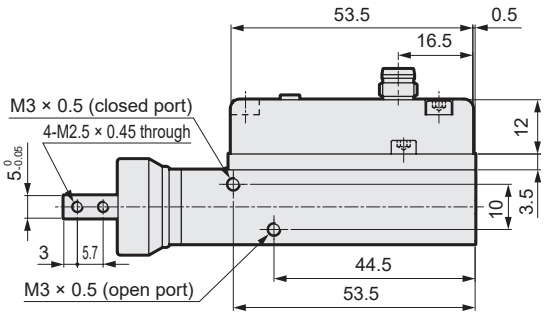
● LSHM-G10D1B / C
LSHM-F10D1B / C



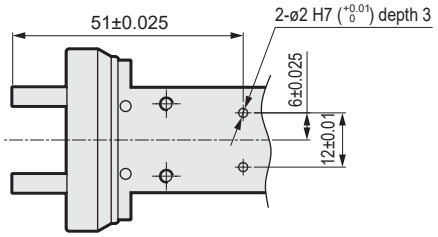
*1: Positioning holes are machined on B surface for LSHM-*10D1B and C surface for LSHM-*10D1C

● LSHM-G10D1D
LSHM-F10D1D



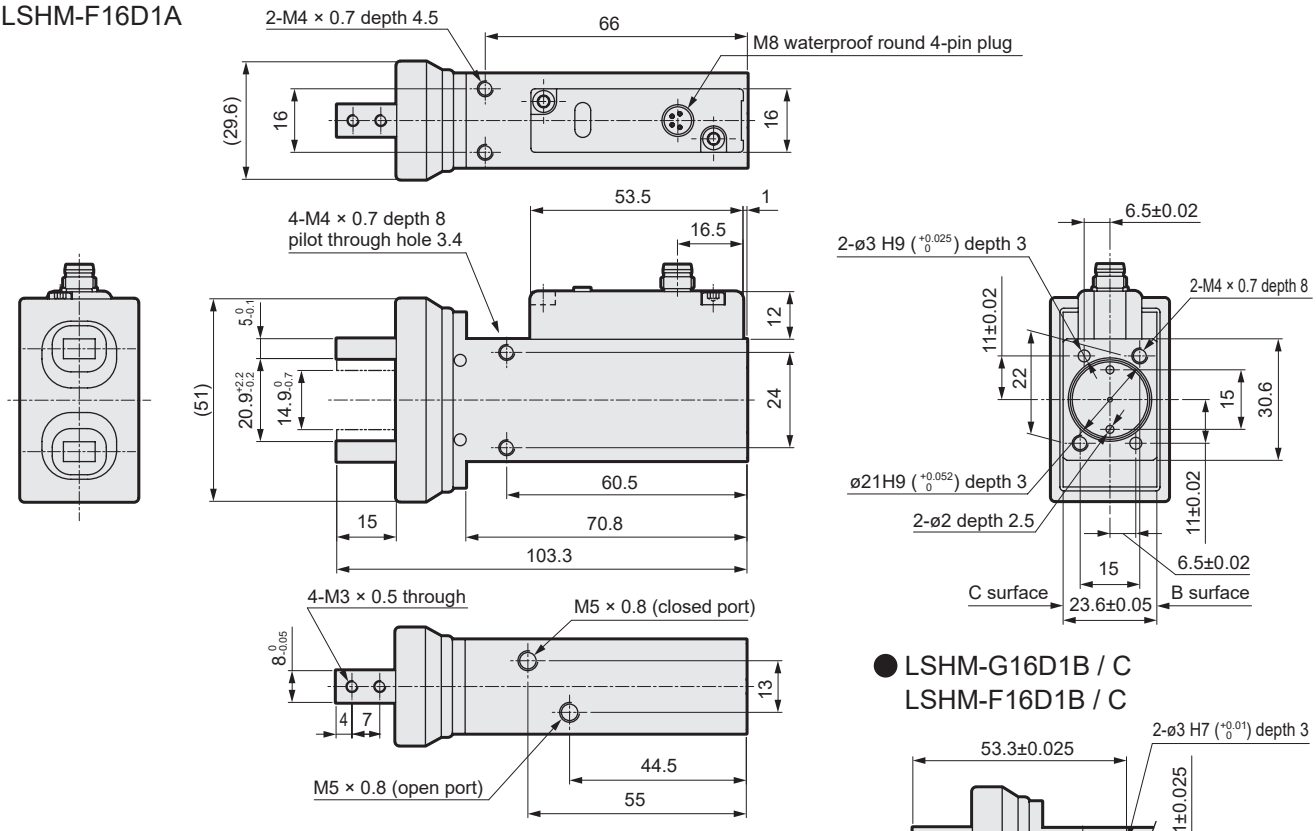


● LSHM-G10D1E
LSHM-F10D1E

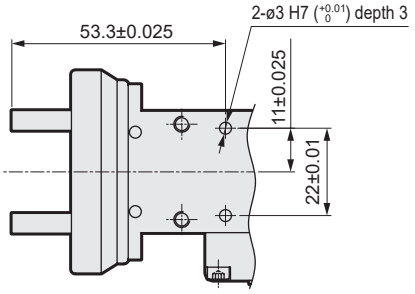


Dimensions (bore size: ø16)

● LSHM-G16D1A
LSHM-F16D1A

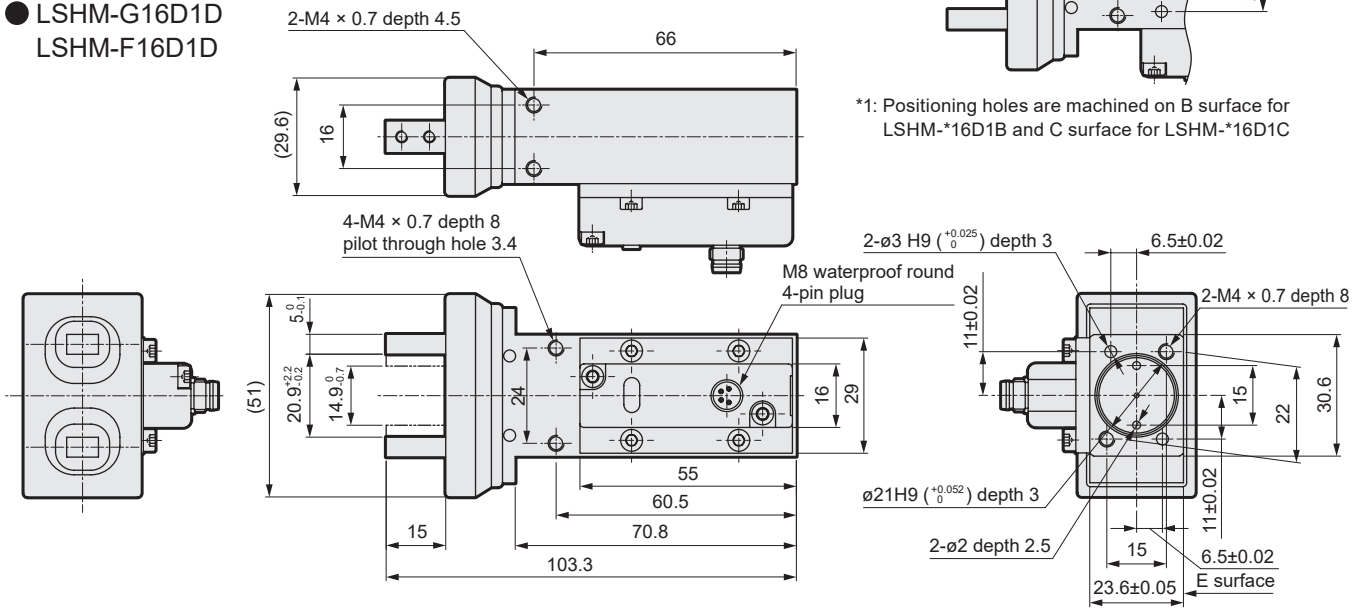


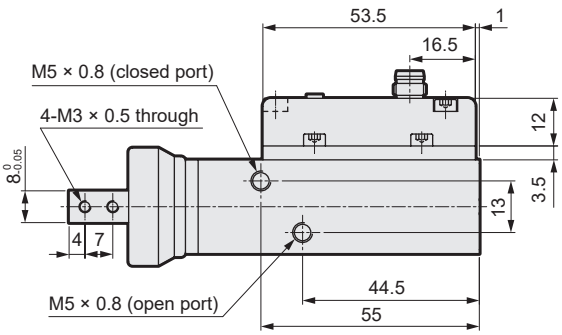
● LSHM-G16D1B / C
LSHM-F16D1B / C



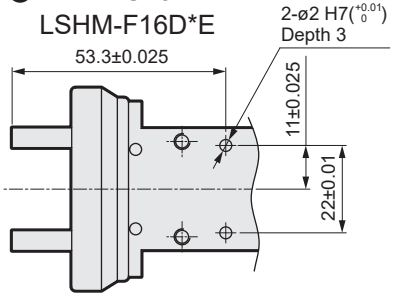
*1: Positioning holes are machined on B surface for LSHM-*16D1B and C surface for LSHM-*16D1C

● LSHM-G16D1D
LSHM-F16D1D



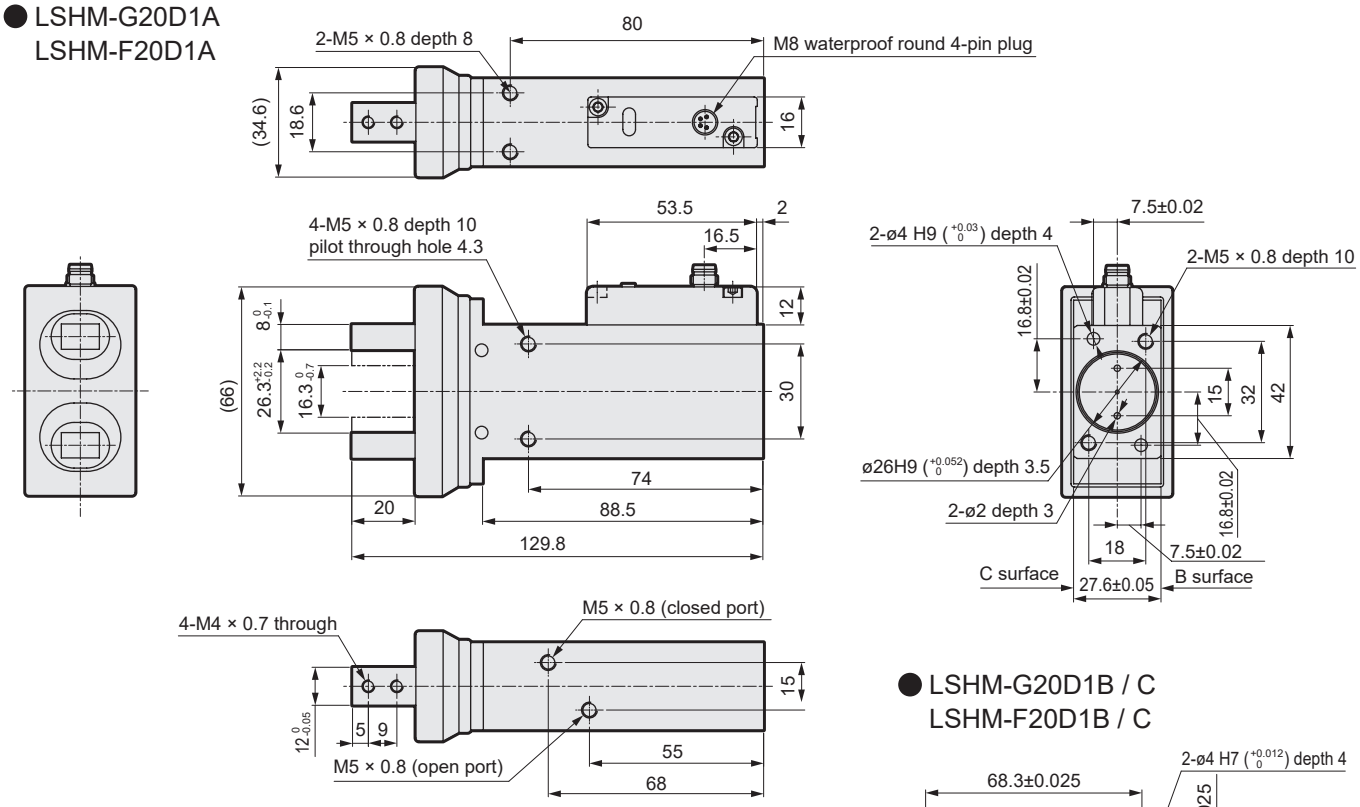


● LSHM-G16D*E
LSHM-F16D*E

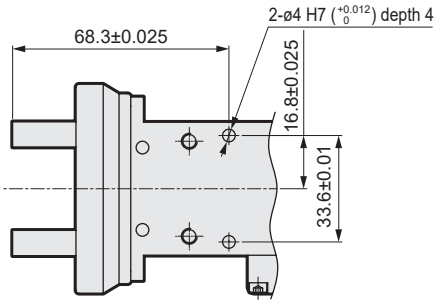


Dimensions (bore size: ø20)

● LSHM-G20D1A
LSHM-F20D1A

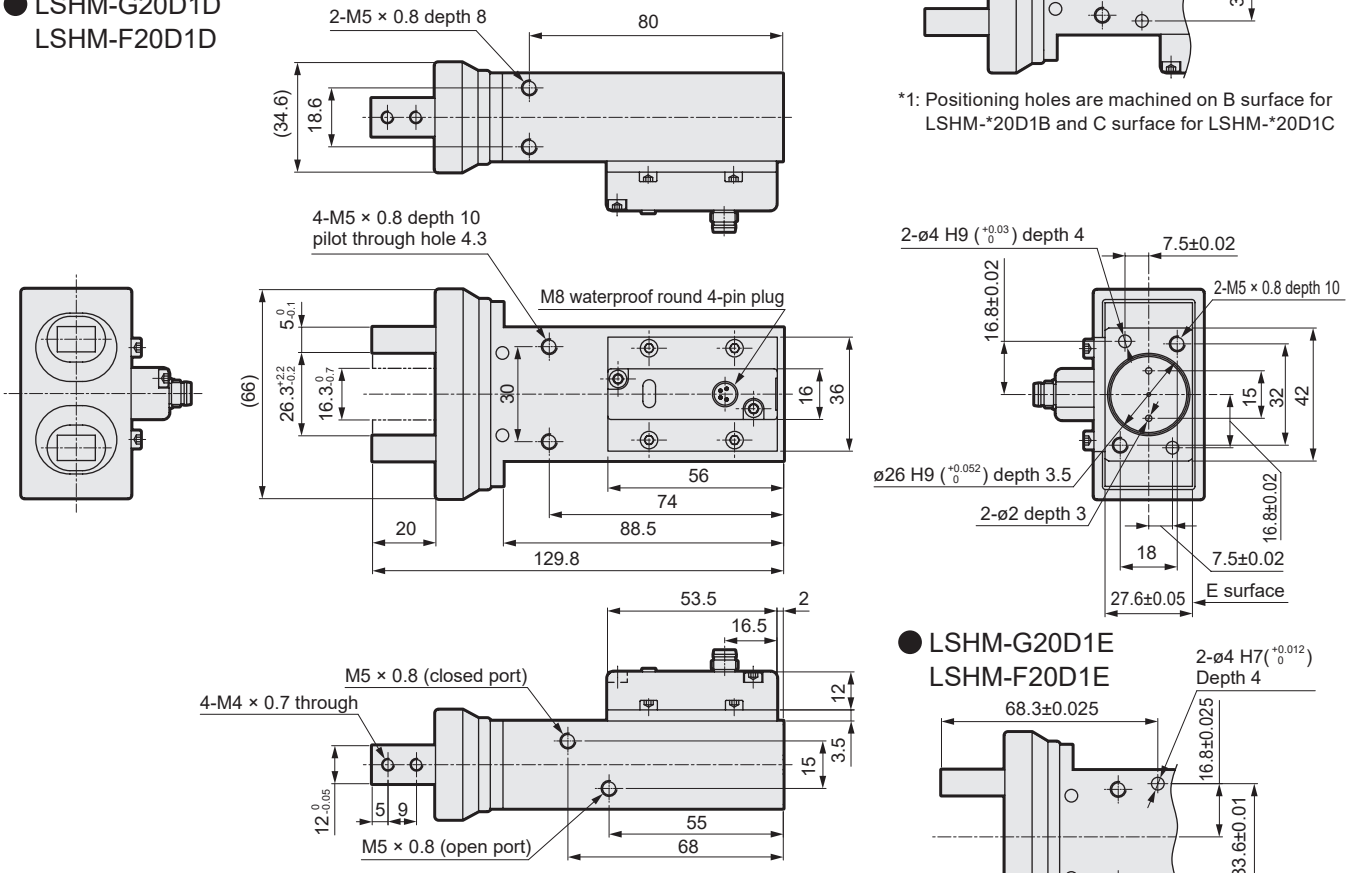


● LSHM-G20D1B / C
LSHM-F20D1B / C

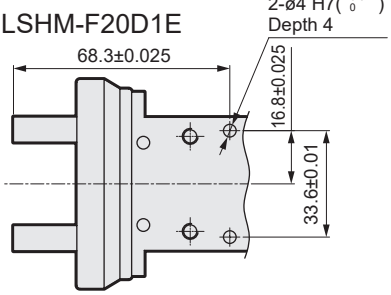


*1: Positioning holes are machined on B surface for LSHM-*20D1B and C surface for LSHM-*20D1C

● LSHM-G20D1D
LSHM-F20D1D

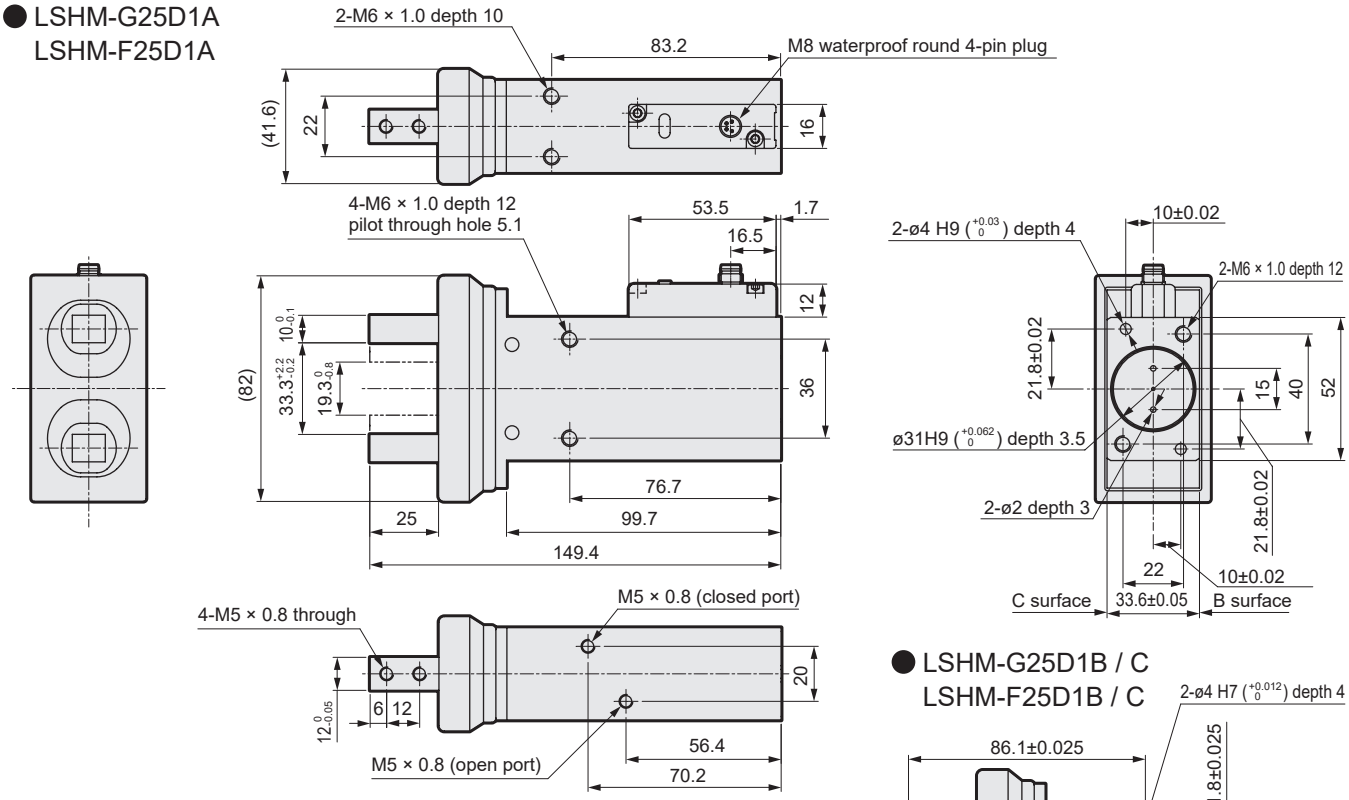


● LSHM-G20D1E
LSHM-F20D1E

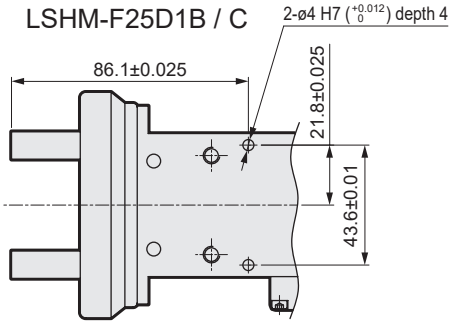


Dimensions (bore size: ø25)

● LSHM-G25D1A
LSHM-F25D1A

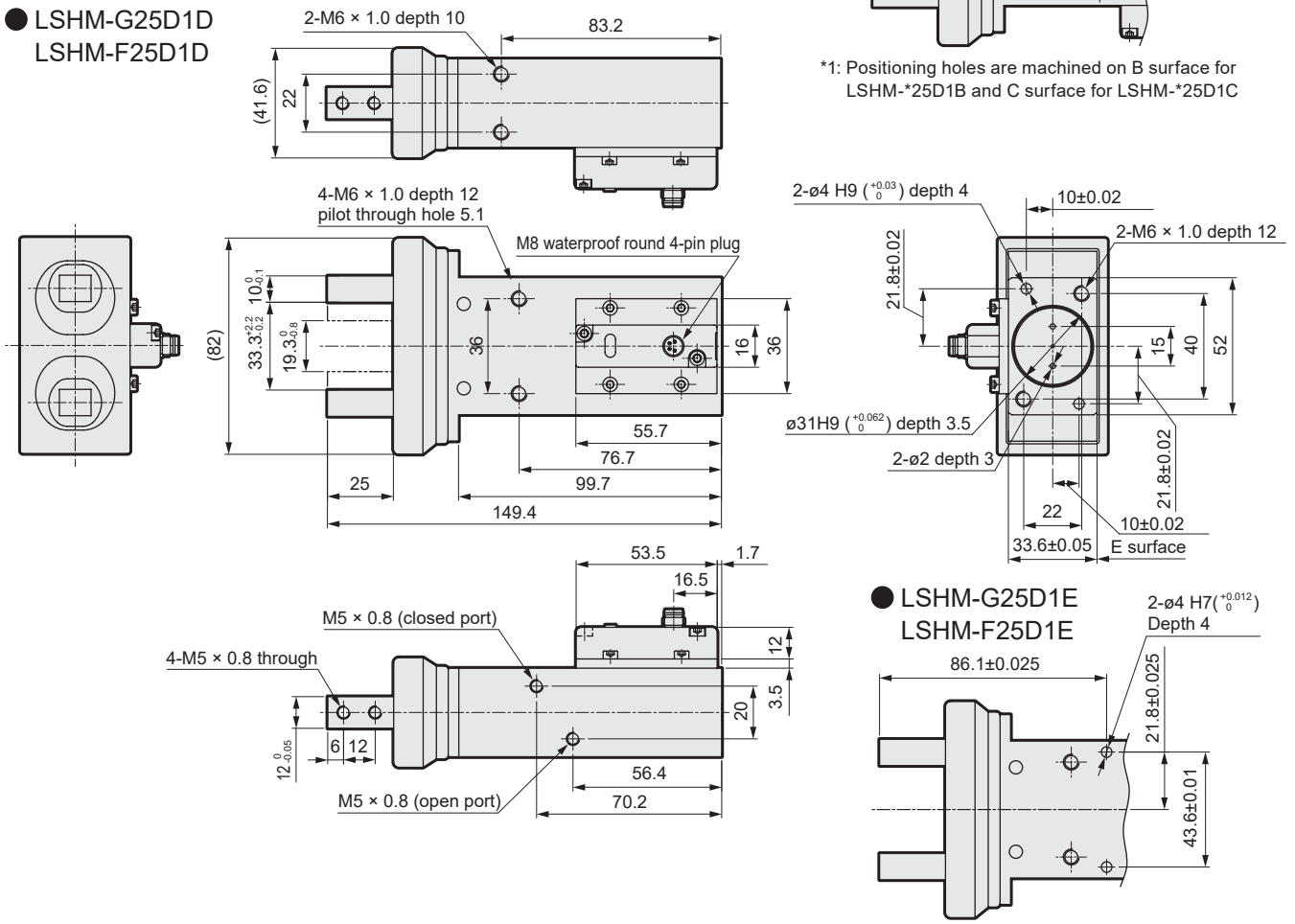


● LSHM-G25D1B / C
LSHM-F25D1B / C



*1: Positioning holes are machined on B surface for LSHM-*25D1B and C surface for LSHM-*25D1C

● LSHM-G25D1D
LSHM-F25D1D



● LSHM-G25D1E
LSHM-F25D1E

Correction adapter

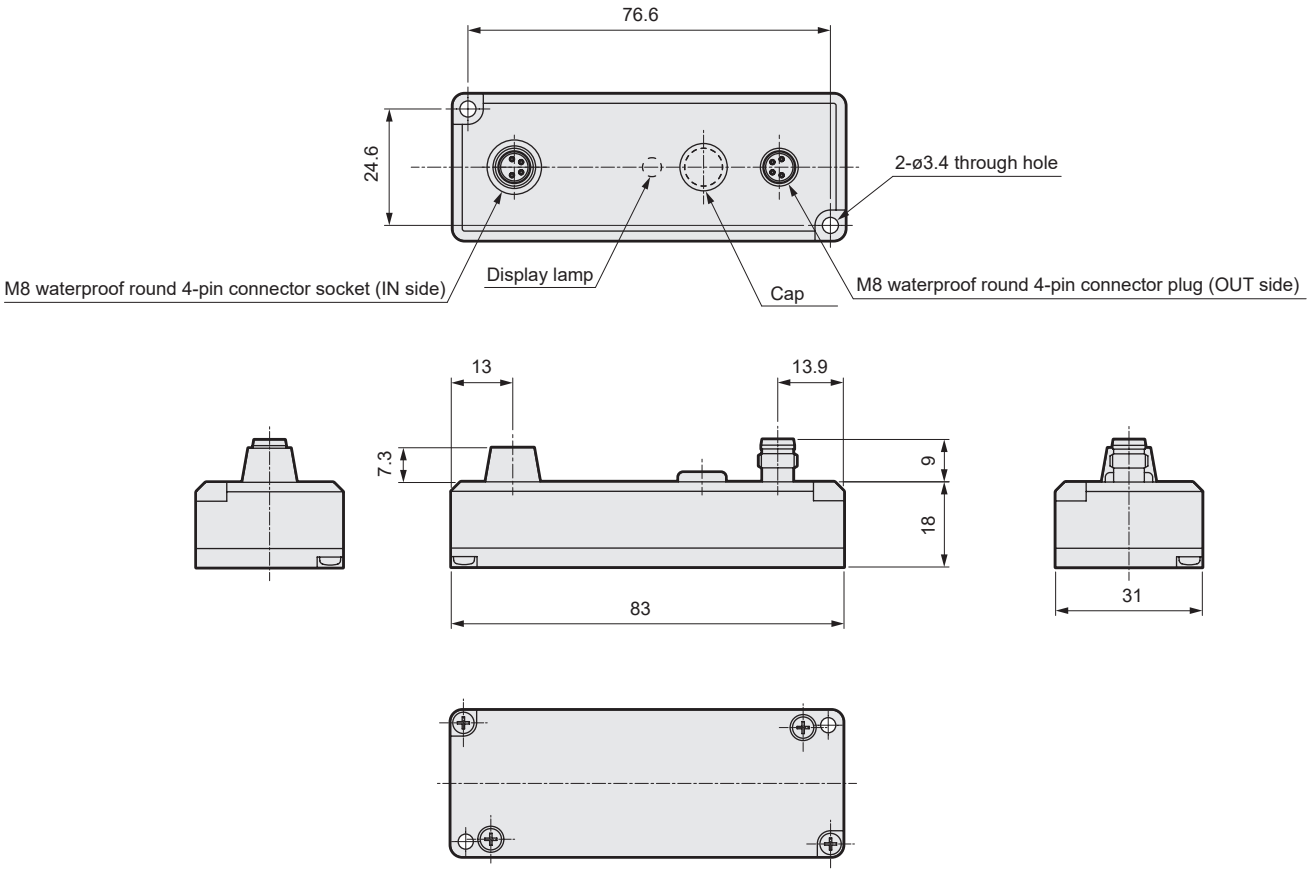
The analog output linearity will be corrected.Please use for applications where high-accuracy linearity is required.

Specifications

Item	Description
Power supply voltage	24 VDC ±10%
Current consumption	35 mA or less
Display lamp	Red LED lit when power applied
Analog input	1 to 5 V (LSHM Series output voltage)
Analog output	1 to 5 V, connection load 50 kΩ or more
Analog output linearity	±0.5%F.S. or less (ambient temperature 25°C, LSHM Series connection, CKD provided measuring method)
Repeatability of analog output	±0.02mm or less (ambient temperature 25°C, no deformation or wear of actuator/jig)
Input connector	M8 waterproof round 4-pin connector socket
Output connector	M8 waterproof round 4-pin connector plug
Shock resistance	294m/s^2
Degree of protection	IEC Standard IP65
Ambient temperature, humidity	10 to 60°C, 85% RH or less
Mounting method	Direct mounting
Weight	40g

* Use the default combination of LSHM and correction adapter.

Dimensions



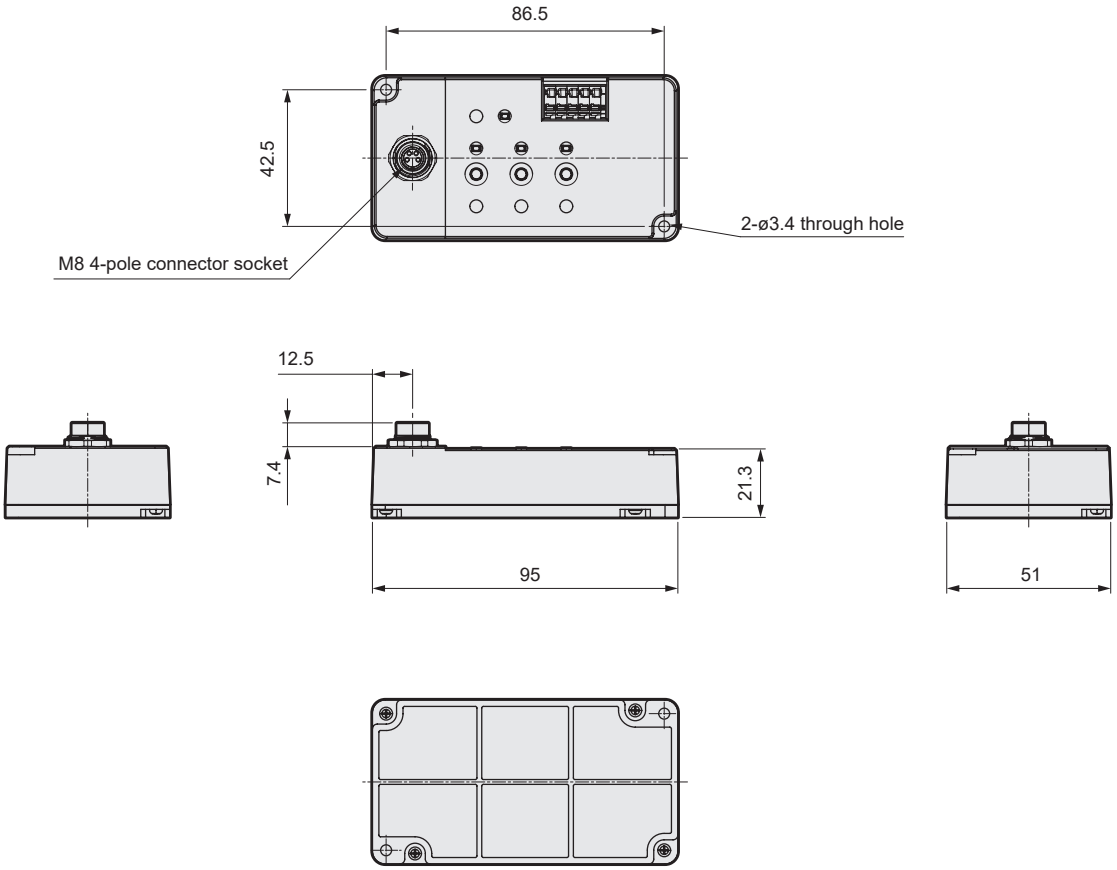
Switch output adapter

Specifications

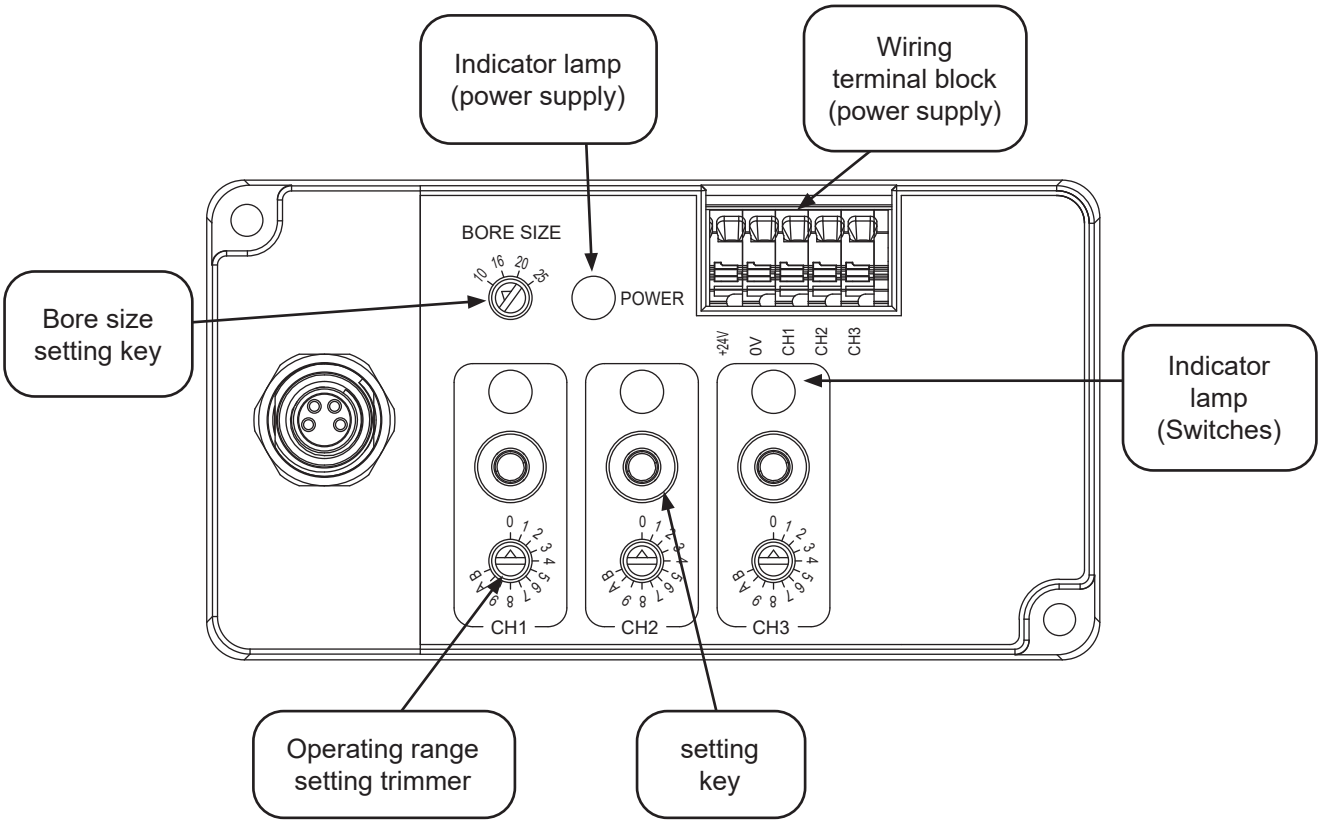
Item	Switches output adaptor (NPN) option code: B	Switches output adaptor (PNP) option code: C
Power supply voltage	24 VDC ±10%	
Current consumption	35 mA or less	
Power indicator lamp	Green LED ON when power applied	
Switch indicator lamp	Red Lit when LED ON	
Switch output point	3	
Switches output (per channel)	NPN: Open collector Max. power supply voltage: 24VDC Max. load current: 50mA Internal voltage drop: 1.2V or less	PNP: Open collector Max. power supply voltage: 24VDC Max. load current: 50mA (*1) Internal voltage drop: 1.5V or less
Operating range	0.2 / 0.5 / 1.0 mm *2	
Analog input	1 to 5 V (LSHM Series output voltage)	
Input connector	M8 connector 4-pin (socket)	
Shock resistance	294m/s^2	
Degree of protection	IEC Standards IP40	
Ambient temperature, humidity	10 to 60°C, 85% RH or less	
Mounting method	Direct mounting	
Insulation resistance	500 MΩ and over with 20 VDC megger	
Withstand voltage	No failure after 1 minute of 1,000 VAC application	
Vibration resistance	10Hz-55Hz compound amplitude 1.5mm, X, Y, Z, 2 hours each in two directions	
Weight	65g	

*1: The total of all channels should be 100mA or less.
*2: There is a hysteresis of 0.04 mm on one side.

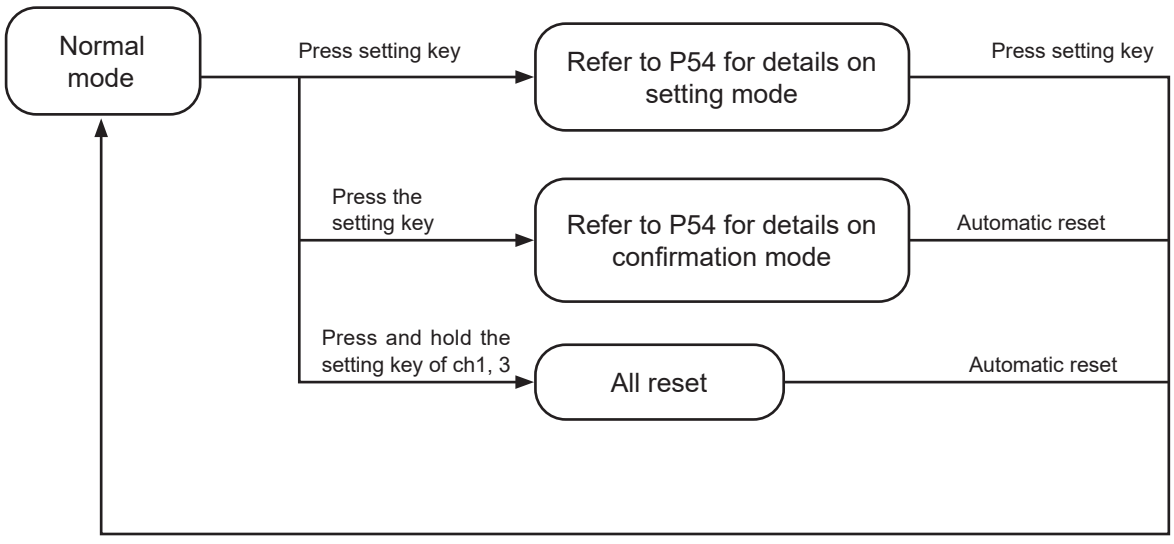
Dimensions



Operating section and parts



Setting



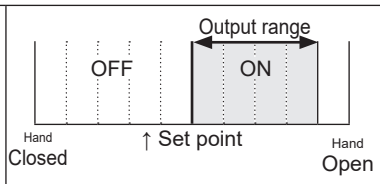
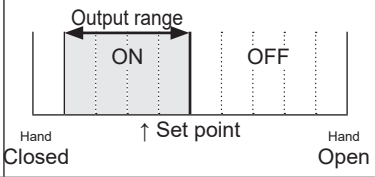
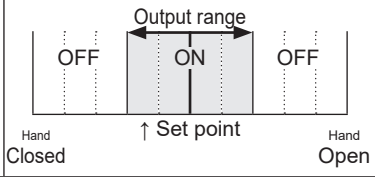
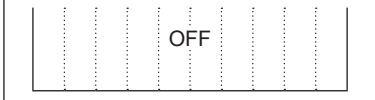
Setting mode

For the first time, each Switches channel must be configured.

[Setting method] (Example) When setting ch1	Status of the indicator lamp (ch1)
(1) ch1: Hold down the setting key for 3 seconds or longer to shift to the setting mode.	Blinking state (setting)
(2) Move the LSHM to the operating position.	Blinking state (setting)
(3) From the pattern table below, select the pattern that you want to output and shift the operation setting trimmer to the symbol position.	Blinking state (setting)
(4) Ch1: Hold down the setting key for 3 seconds or longer to complete the setting. Before deciding (by holding down), make sure that the bore size key is correct. Automatically enters normal mode.	Setting completed when ON

When changing the settings and output patterns of other channels, perform the same operation for each channel.

Pattern table

Output judgment pattern		Output range				
		0.2 mm	0.5 mm	1.0 mm	Normally ON	Reset
(1)		1	4	7	A	-
(2)		2	5	8	B	-
(3)		3	6	9	-	-
(4)		-	-	-	-	0

Confirmation mode

The setting Status of each ch can be confirmed.

(1) Press any setting key during normal mode.

(2) Automatically enters confirmation mode.
The indicator lamp turns ON for ch already set.
If not set, blinks when pattern 0 or when the current state and internal bore size keys do not match.

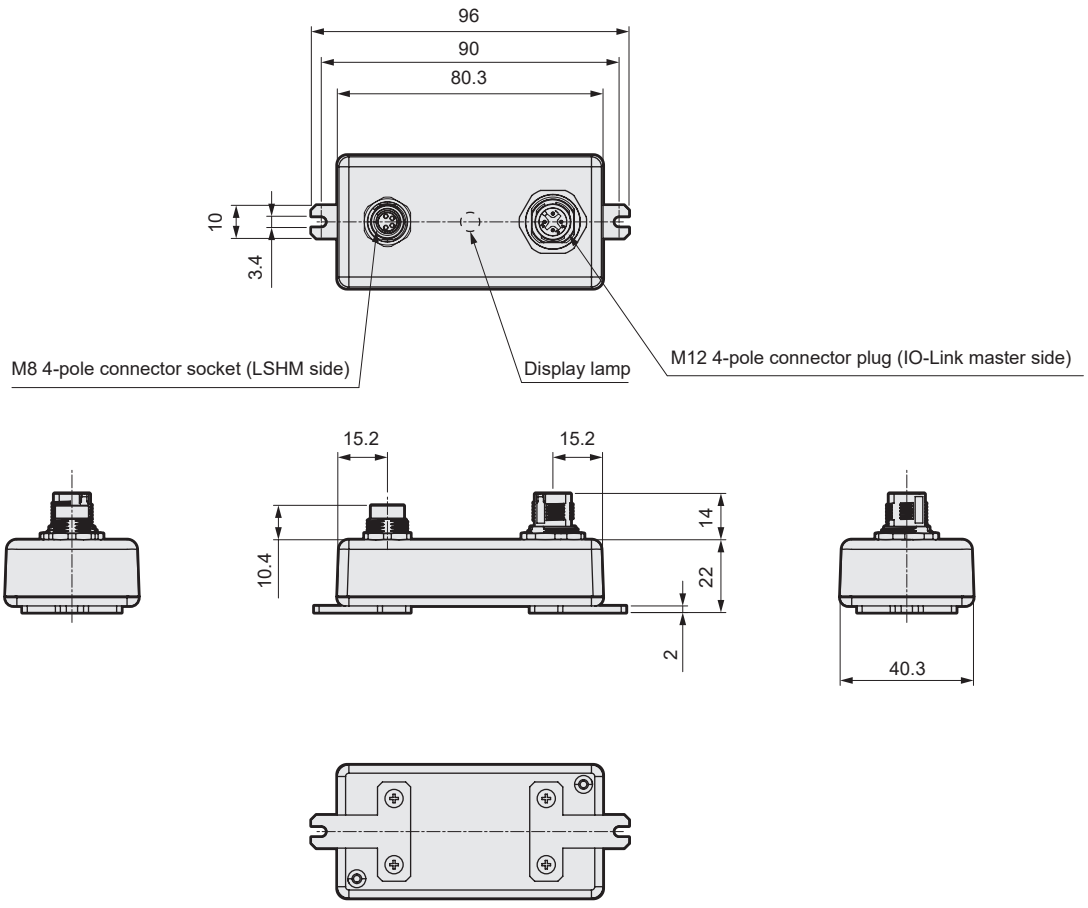
(3) In 3 seconds, the normal mode is automatically returned.

IO-Link adapter

Specifications

Item	Description
Power supply voltage	24 VDC ±10%
Current consumption	35 mA or less
Display lamp	Green LED ON when power applied
Analog input	1 to 5 V (LSHM Series output voltage)
Input connector	M8 connector 4-pin (socket)
Output connector	M12 connector 4-pin (plug)
non-linearity	±0.5%F.S. or less (ambient temperature 25°C, LSHM Series connection, CKD provided measuring method)
Insulation resistance	500 MΩ and over with 20 VDC megger
Withstand voltage	No failure after 1 minute of 1,000 VAC application
Shock resistance	294m/s^2
Degree of protection	IEC Standards IP40
Ambient temperature, humidity	10 to 60°C, 85% RH or less
Mounting method	Direct mounting
Vibration resistance	10Hz-55Hz compound amplitude 1.5mm, X, Y, Z, 2 hours each in two directions
Weight	70g

Dimensions



IO-Link communication specifications

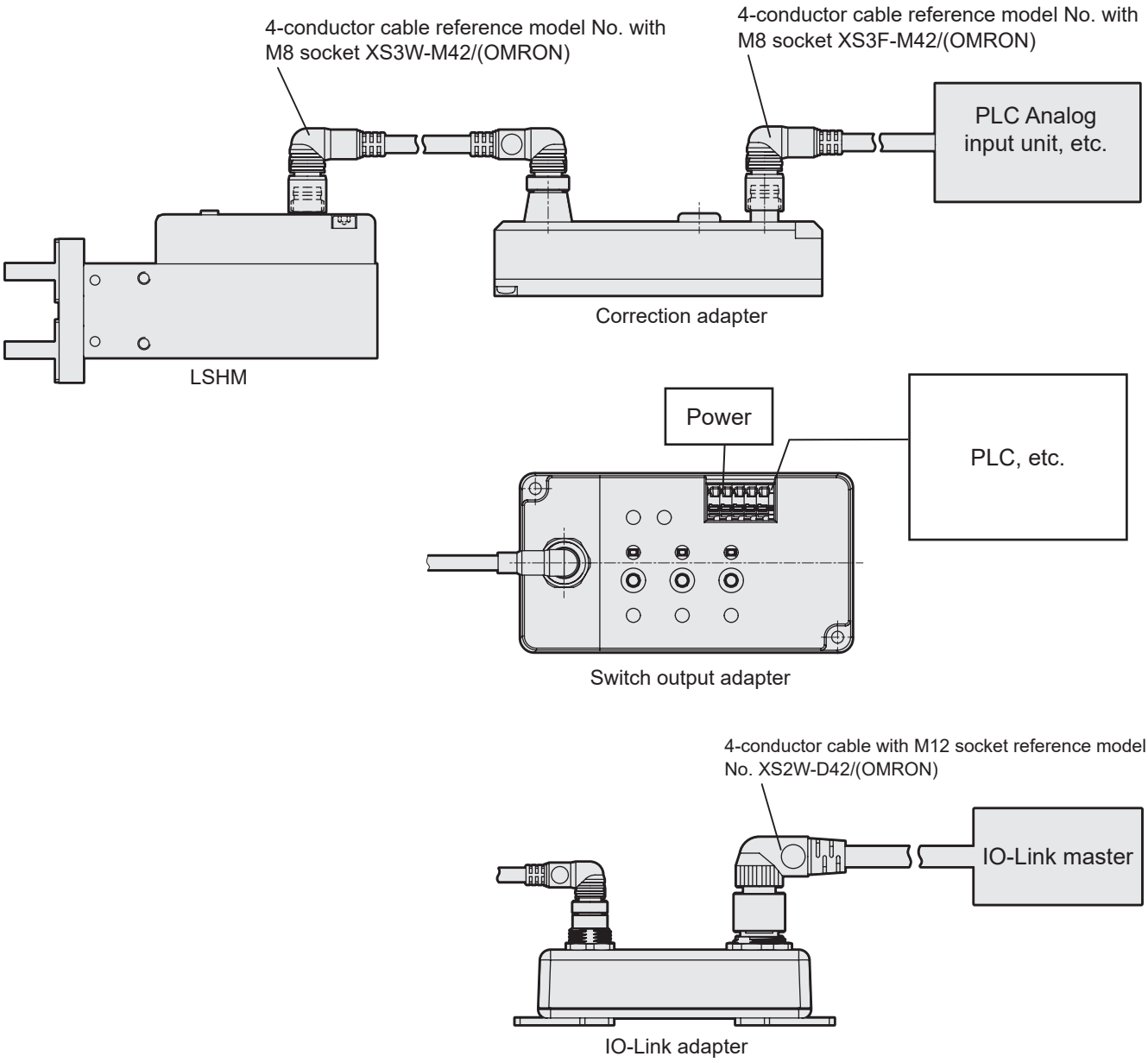
Item	Details
Communication protocol	IO-Link
Communication protocol version	V1.1
Transmission bit rate	COM3(230.4kbps)
Port	Class A
Process data length (input)	4 byte
Process data length (output)	0 byte
Minimum cycle time	1ms
Data storage	1kbyte
SIO mode support	No

Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
	MSB															LSB
Data name	Output voltage															
Data range	2 byte															
Format	UInteger16															

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Data name	Error	WARNING	-	-	Switch output				Vacant							
					4	3	2	1								
Data range	True/False															
Format	Boolean															

* IODD file can be downloaded from the CKD website.

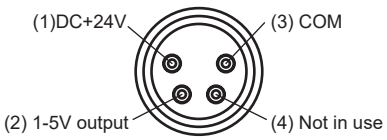
Each adapter system configuration



Plug contact array diagram

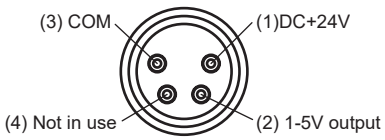
Each adaptor (IN side)

M8 socket pin array

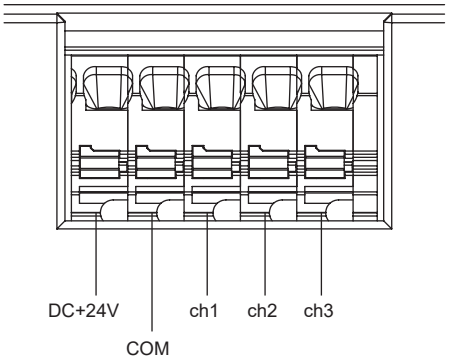


Correction adapter (OUT side)

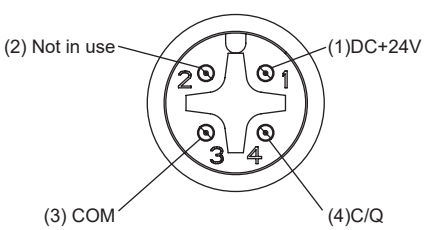
M8 plug (OUT side) pin array



Switches output adaptor (terminal block)



IO-Link adaptor (OUT side)

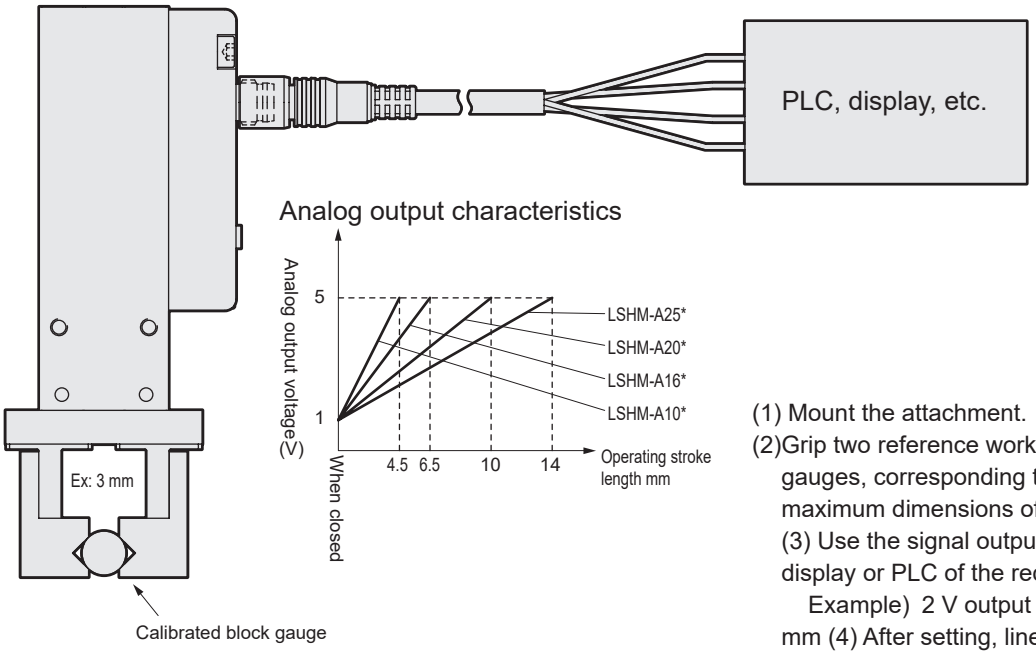


MEMO

LSHM Series usage guide

Workpiece measurement using the entire operating stroke length range

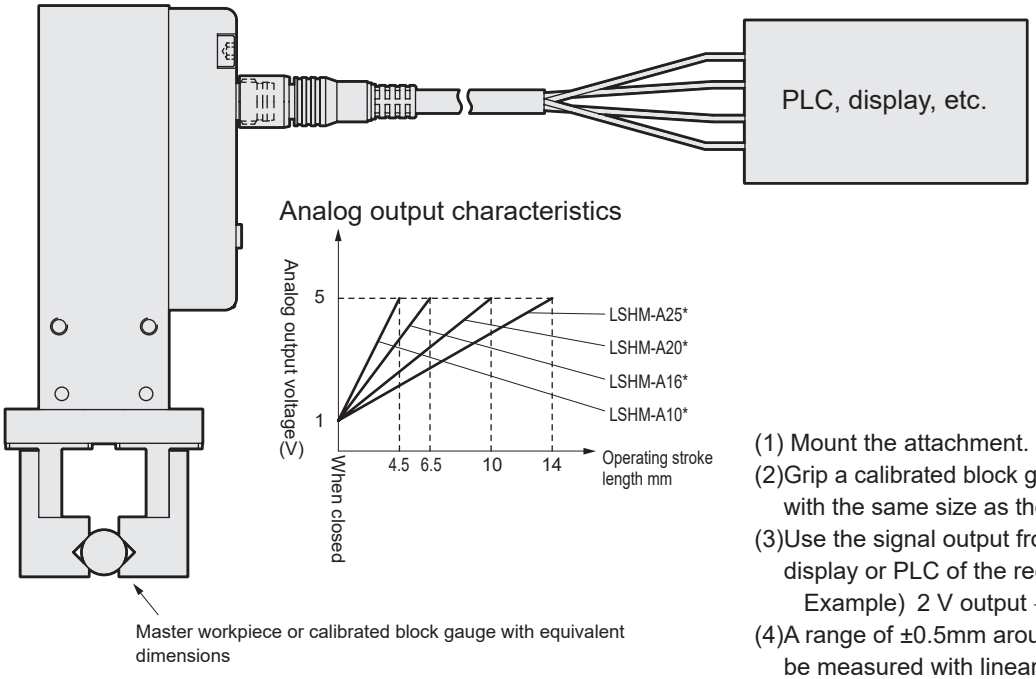
Example) Judgment of workpiece type in multi-model production equipment, etc.



(1) Mount the attachment.
(2)Grip two reference workpieces such as block gauges, corresponding to the minimum and maximum dimensions of the workpiece to be used.
(3) Use the signal output from the sensor to set the display or PLC of the receiving side.
Example) 2 V output → 3 mm, 4 V output → 8 mm (4) After setting, linearity of ±3%F.S.
(±0.5% F.S. with correction adapter option) over the entire stroke

Higher-precision measurement through limiting the measurement range

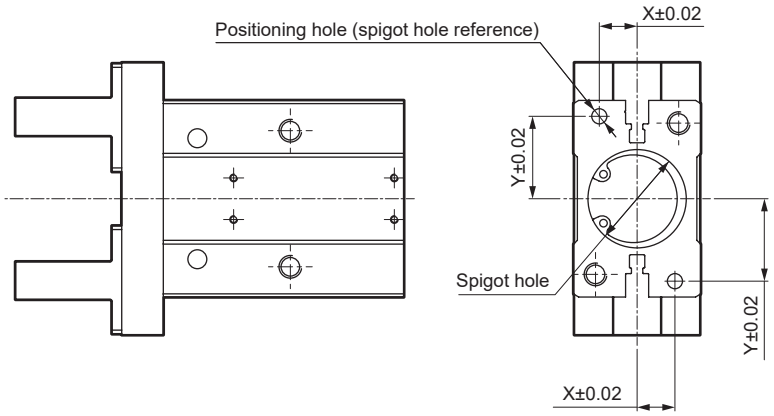
Example) Confirmation that the workpiece is dimensioned within the tolerance range, confirmation of wear and deformation of attachment and jig, etc.



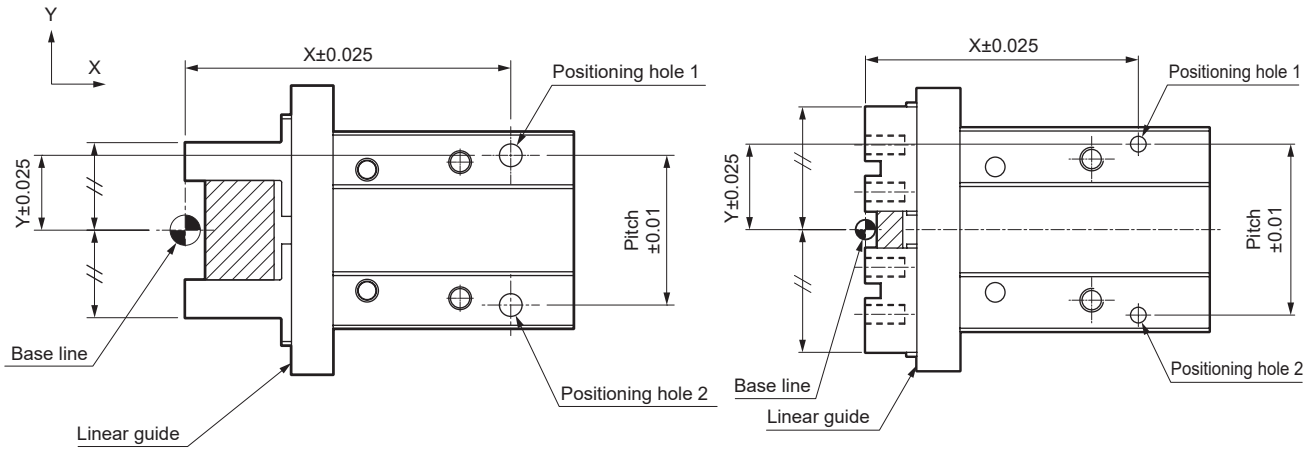
(1) Mount the attachment.
(2)Grip a calibrated block gauge or master workpiece with the same size as the workpiece to be measured.
(3)Use the signal output from the sensor to set the display or PLC of the receiving side.
Example) 2 V output → 3 mm
(4)A range of ±0.5mm around the set dimensions can be measured with linearity of ±0.5%F.S. (reference value when without correction adapter).

Positional reference of positioning hole

● Positioning hole on body end face

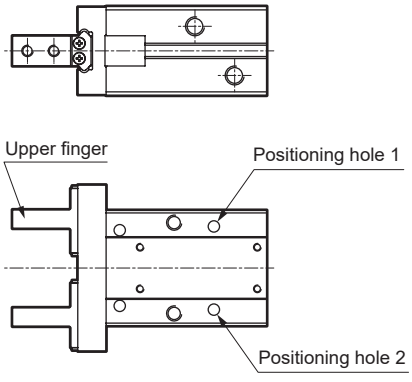


● Grip center reference, high precision positioning hole
Positioning can be performed with reference to the gripping center

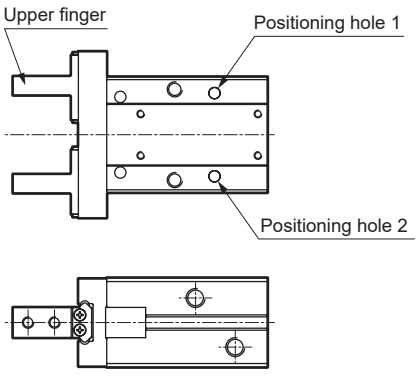


Base line of positioning hole
With the workpiece gripped at custom stroke length, the finger facing left and the linear direction of the linear guide as the Y axis,
X axis direction reference: Upper finger tip
Y axis direction reference: Center of outer surface of finger

Ex) When standard finger faces left and piping is on top
LSH*-□□□□R



Ex) When standard finger faces left and piping is underneath
LSH*-□□□□L



LSH-HP selection guide

STEP 1 Select a suitable model by required gripping power

(1) Calculation of required gripping power

Gripping power F_W satisfying the following equation is required to transport the workpiece (weight W_L).

$$F_W > \frac{W_L \times g \times K}{n}$$

F_W : Required gripping power [N]
n : Number of attachments = 2
W_L : Weight of workpiece [kg]
g : Gravity acceleration 9.8 [m/s^2]
K : Transport coefficient
5 [holding only]
10 [normal transport]
20 [suddenly accelerated transport]

Transport coefficient K

Calculation example: When decelerating and stopping in 0.1 second from transport speed of V = 0.75 m/s with friction coefficient μ of workpiece and finger as 0.1, see below.

Obtain the transport coefficient K from the force applied to the workpiece

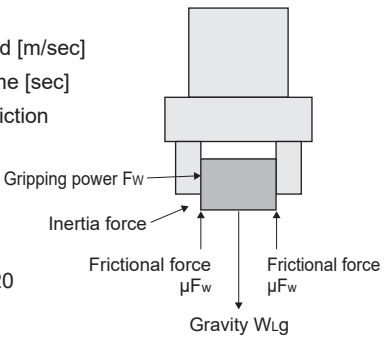
V: Transport speed [m/sec]
t: Deceleration time [sec]
μ: Coefficient of friction

·Inertial force = W_L (V/t)

·Gravity = W_L g

·Required gripping power $F_W > \frac{W_L(V/t)+W_Lg}{n\mu} = \frac{W_L(V/t+g)}{n\mu} = \frac{17.3W_L}{2\times0.1} = 86.5W_L$

∴ Here, the transport coefficient K is calculated from the above equation: $\frac{V/t+g}{\mu g} = \frac{0.75/0.1+9.8}{0.1\times9.8} \approx 20$



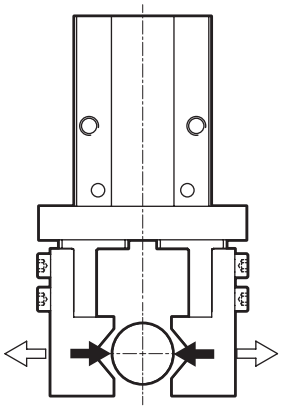
Note) Allowance is required for transport coefficient K due to impacts during transportation, etc. Even when the coefficient of friction μ is higher than μ = 0.1, set transport coefficient K from 10 to 20 or more for safety.

(2) Model selection by required gripping power

The gripping power changes according to "grip direction", "attachment length" and "supply pressure". Confirm on the gripping power graph that sufficient force can be obtained under the usage conditions.

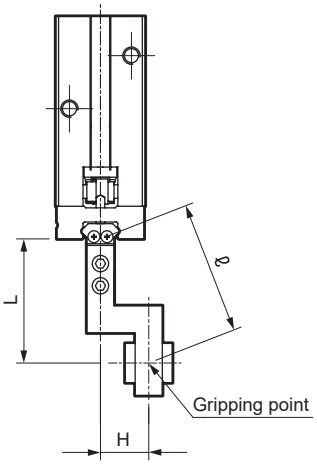
Gripping power graph page	
LSH*-A**D	Page 63
LSH*-A**S/C	Page 64
LSH*-G/F**D	Page 65
LSH*-G/F**S/C	Page 66

Grip direction



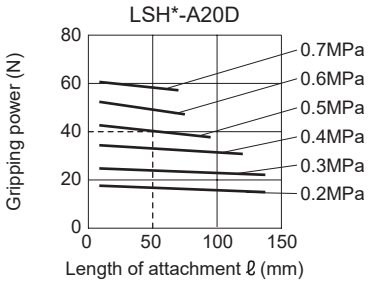
● Open direction (⇦)
● Closed direction (➡)

Attachment length ℓ



Understanding the gripping power graph

(For LSH-A20D closing direction)

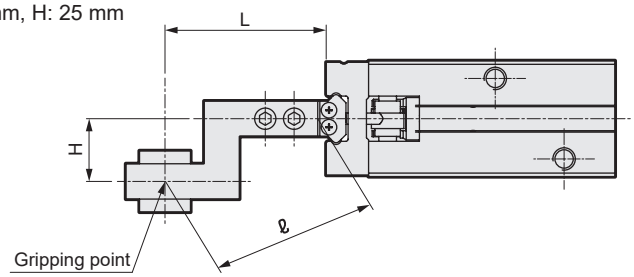


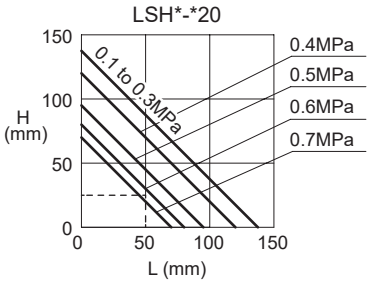
For example, when supply pressure is 0.5 MPa and attachment length is 50 mm, the gripping power is 40 N.

STEP 2 Confirmation of attachment shape

Use the attachment within the ranges shown on page 63.

Example) L: 50 mm, H: 25 mm





When LSH-A20D is selected, the intersection of L: 50 mm and H: 25 mm will be inside the supply pressure line of 0.5 MPa, so it can be used.

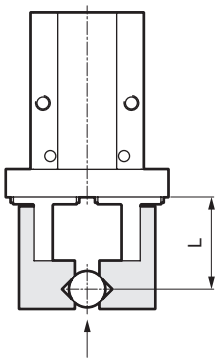
● Use attachments as short and lightweight as possible.
If the attachment is long and heavy, inertia increases when opening and closing.
This may cause play in the finger, and adversely affect durability.

● Minimizing the attachment shape as much as possible within the performance data enables the product to be used for a longer time.
Additionally, if ℓ is too long, gripping failures due to unexpected vibration or falloffs during transfer may result.
Set “cylinder diameter x 1.3/working pressure” as the target. If the length (ℓ) is longer than that, set a higher transfer coefficient in STEP-1 (target: working pressure of 20 or greater).

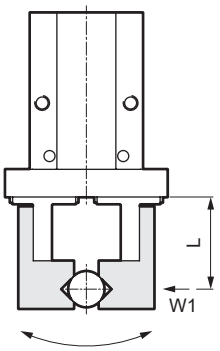
● The weight of the attachment affects durability, so check that the weight is less than the following value.
W < 1/4H (1 pc.) W: Weight of attachment
H: Product weight of Hand

STEP 3 Confirmation of external forces applied to finger

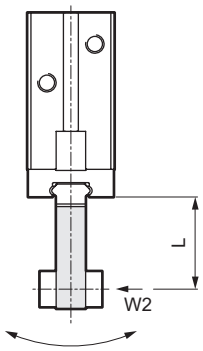
When an external force is applied to the fingers such as through the conveying or inserting of work, please use while keeping it within [Table 1].
*Please consider the impact at the end when using it while conveying.



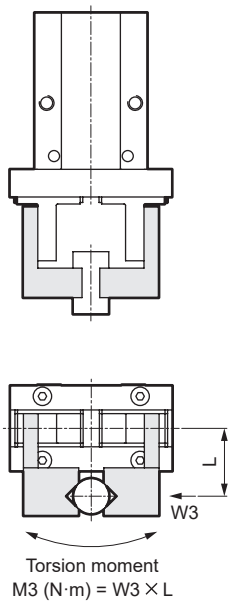
Vertical load
W (N)



Bending moment
M1 (N·m) = W1 × L



Radial moment
M2 (N·m) = W2 × L



Torsion moment
M3 (N·m) = W3 × L

[Table 1] Allowable load value

Bore size	Vertical load Wmax (N)	Bending moment M1max (N·m)	Radial moment M2max (N·m)	Torsion moment M3max (N·m)
ø6	15	0.06	0.06 (0.12)	0.06
ø10	75	0.39	0.39 (0.69)	0.39
ø16	147	1.32	1.32 (2.2)	1.32
ø20	265	2.1	2.1 (4.0)	2.1
ø25	343	3.0	3.0 (6.0)	3.0
ø32	490	4.5	4.5 (9.0)	4.5

L: Distance to the point where load is applied

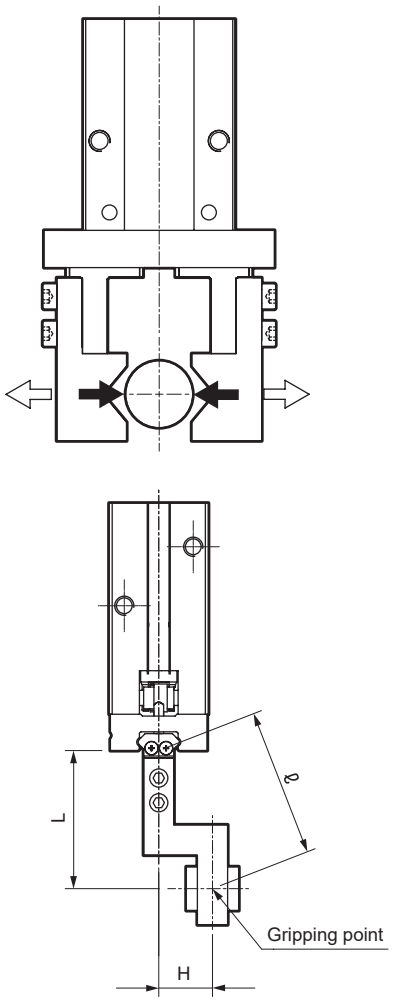
If multiple external forces are applied, combined external forces (following formula) must be smaller than 1.
WT = W / W max + M1 / M1 max + M2 / M2 max + M3 / M3 max < 1
The product can also be used with lateral bending moment lower than ( ). However, make sure to use the product with the length of the L/H dimensions two-thirds of that specified on page 63.
Calculation example (1): When conveying a workpiece
Model No.: LSH-A20D, when gripping a workpiece (weight m = 0.06 kg, centroid distance L = 30 mm) and conveying it to the attachment (weight m_k: 0.8 kg, centroid distance L_k = 60 mm)
(when the impact factor that occurs with g: gravitational acceleration = 9.8 m/s^2, α: nd = 3)
$M_1 = \alpha \times W_1 \times L = \alpha \times (m_k \times g \times L_k \times 2 + m \times g \times L)$
$= 3 \times (0.06 \times 9.8 \times 30 \times 10^{-3} \times 2 + 0.8 \times 9.8 \times 60 \times 10^{-3}) \approx 1.5$ N·m, and M1max = 2,1 N·m or below, and therefore, can be used.

Calculation example (2): When inserting a workpiece
Model No.: LSH-A20D, When load W_1: 40 N is applied to L = 40 mm
$M_1 = W_1 \times L = 40 \times 40 \times 10^{-3} = 1.6$ N·m, and M1max = 2.1 N·m or below, and therefore, can be used.

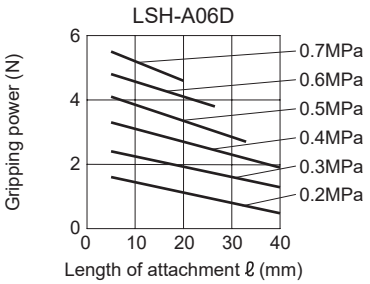
Gripping power performance data LSH-A**D / LSHL-A**D / LSHM-A**D (double acting)

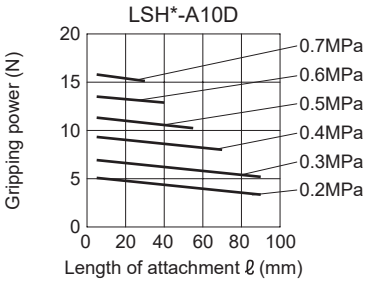
· The gripping power indicates the thrust (for one finger) in the direction of the arrow shown in the figure.
· The gripping power operating in the opening/closing directions against the length (ℓ) of the attachment when the supply pressure is 0.7 MPa or less is shown.

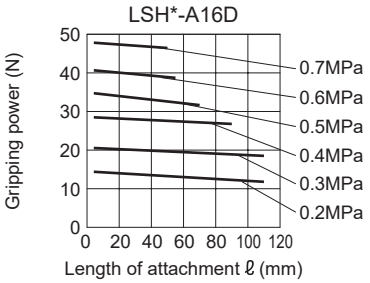
● Open direction (⇦)
● Closed direction (➡)

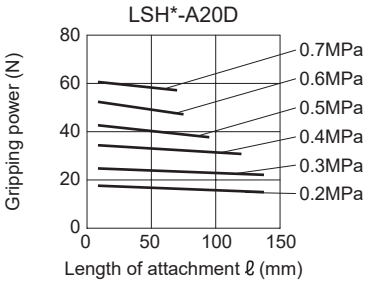


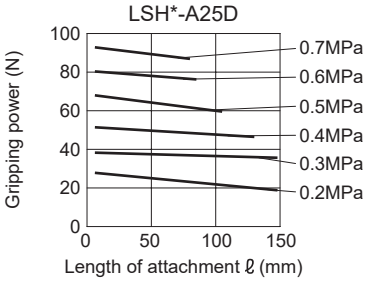
Closed direction

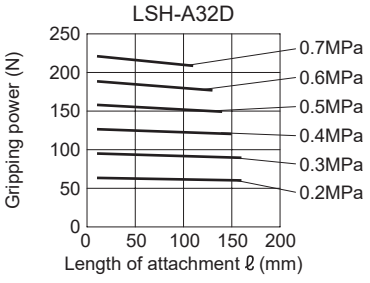




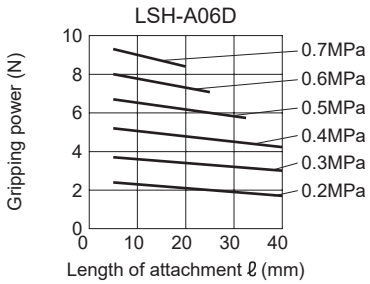


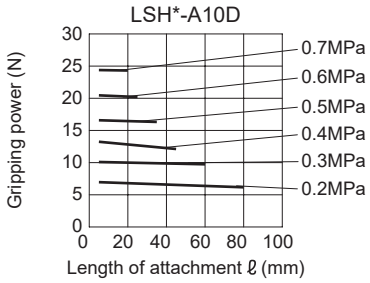


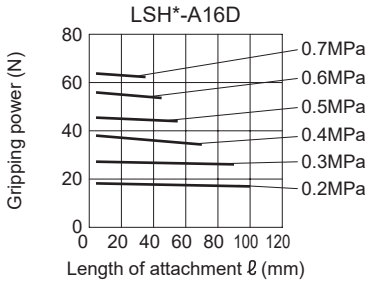


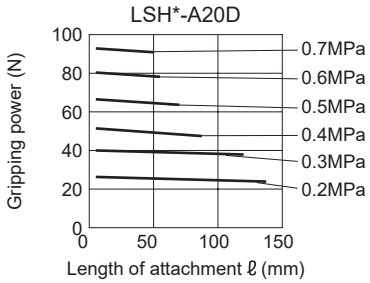


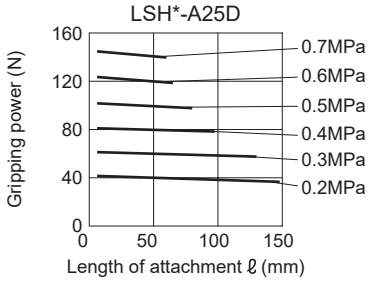
Open direction

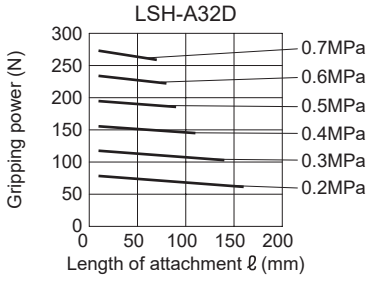








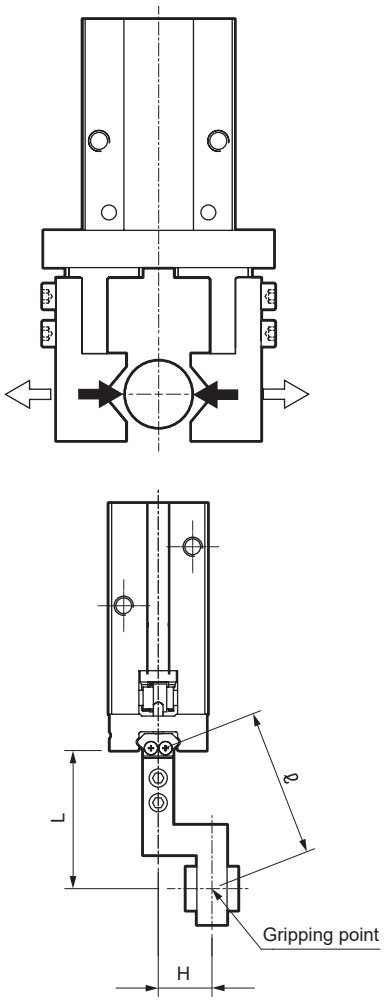




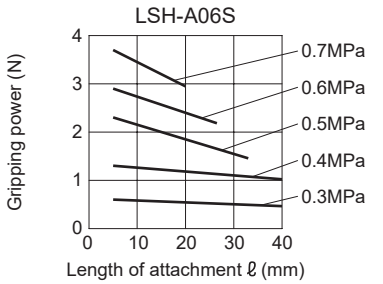
Gripping power performance data LSH-A**S / C (single acting)

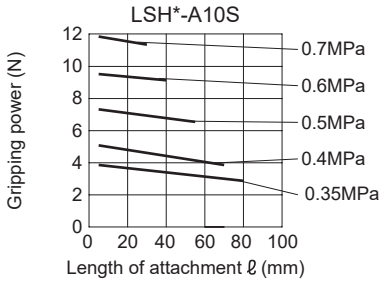
· The gripping power indicates the thrust (for one finger) in the direction of the arrow shown in the figure.
· The gripping power operating in the opening/closing directions against the length (ℓ) of the attachment when the supply pressure is 0.7 MPa or less is shown.

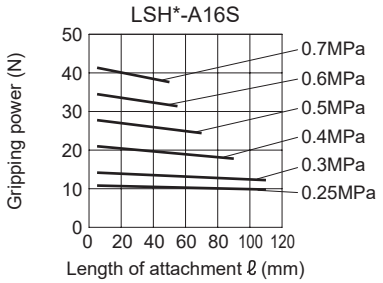
● Open direction (⇦)
● Closed direction (➡)

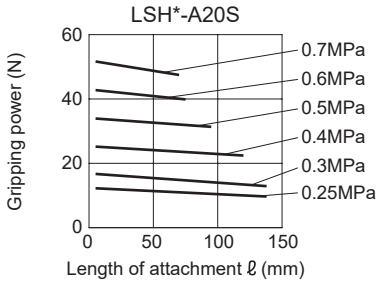


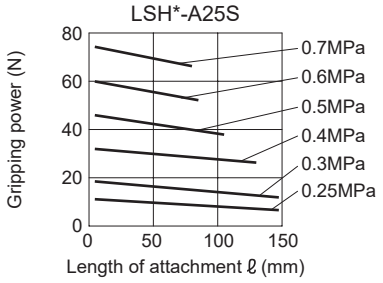
Closed direction

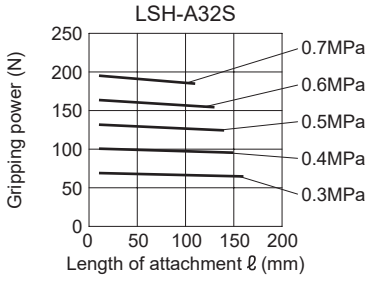




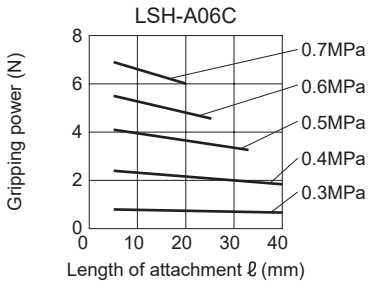


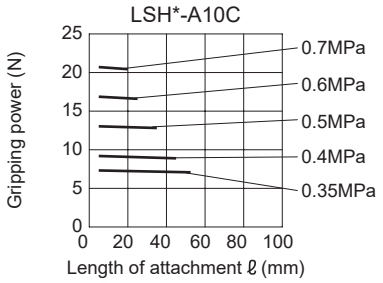


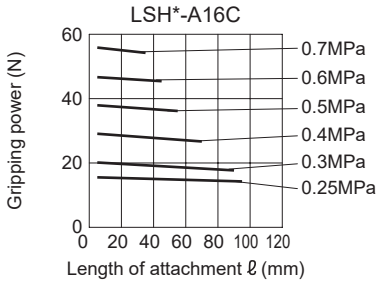


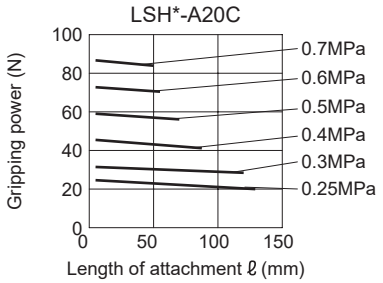


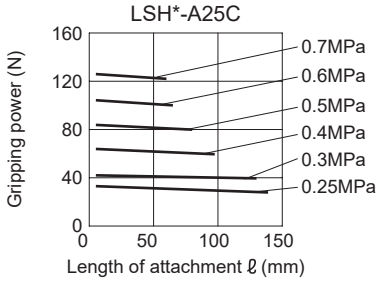
Open direction

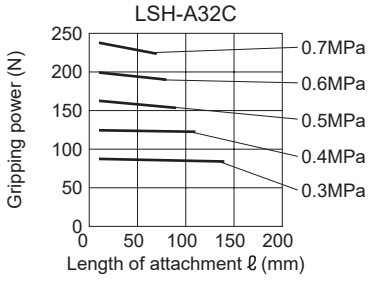










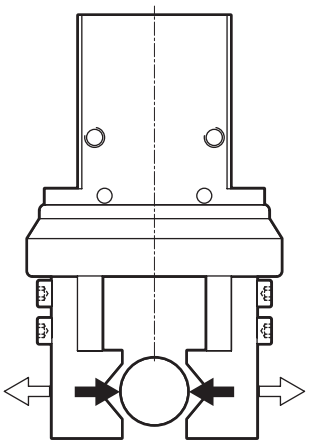


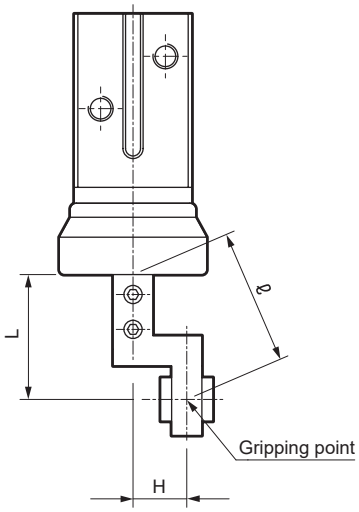
LSH-$^{G}_{F}$ / LSHL-$^{G}_{F}$ / LSHM-$^{G}_{F}$ Series

Gripping power performance data LSH-G / F**D / LSHL-G / F**D / LSHM-G / F**D (double acting)

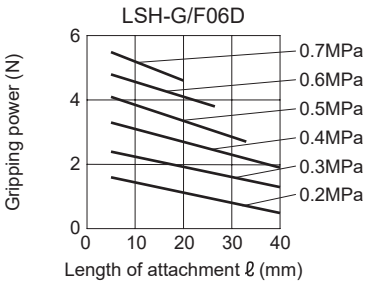
· The gripping power indicates the thrust (for one finger) in the direction of the arrow shown in the figure.
· The gripping power operating in the opening/closing directions against the length (ℓ) of the attachment when the supply pressure is 0.7 MPa or less is shown.

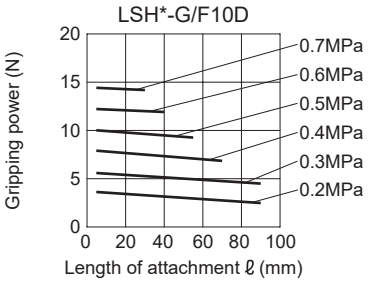
● Open direction (⇦)
● Closed direction (➡)

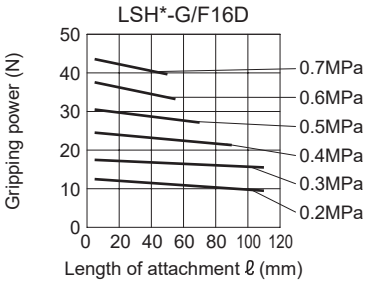


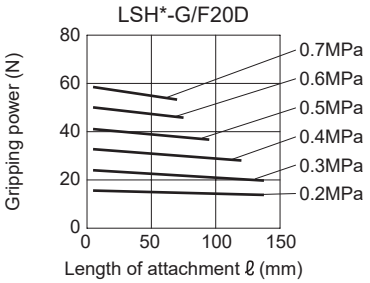


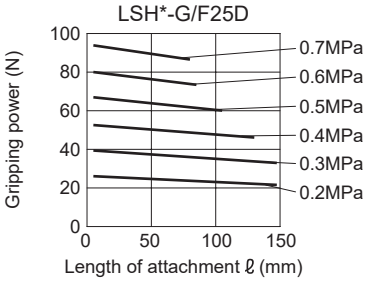
Closed direction

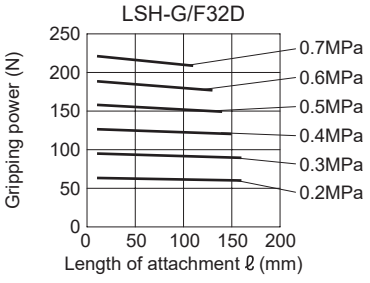




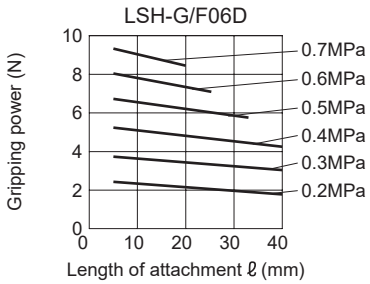


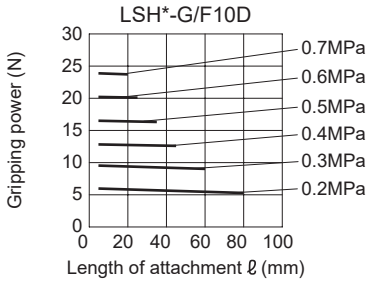


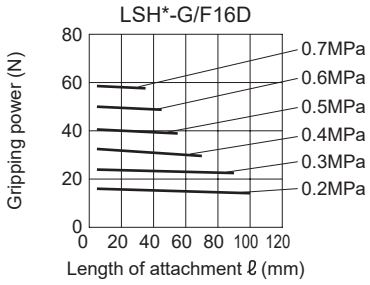


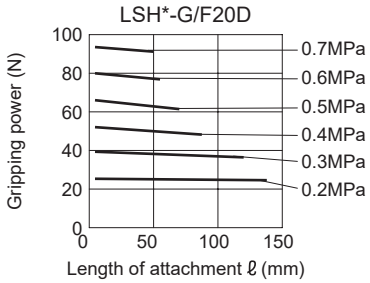


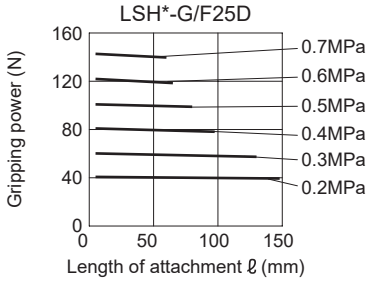
Open direction

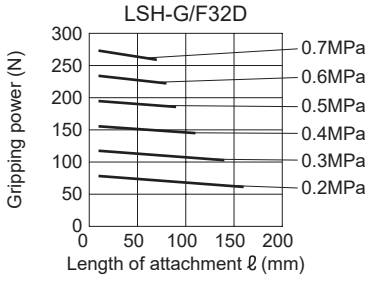








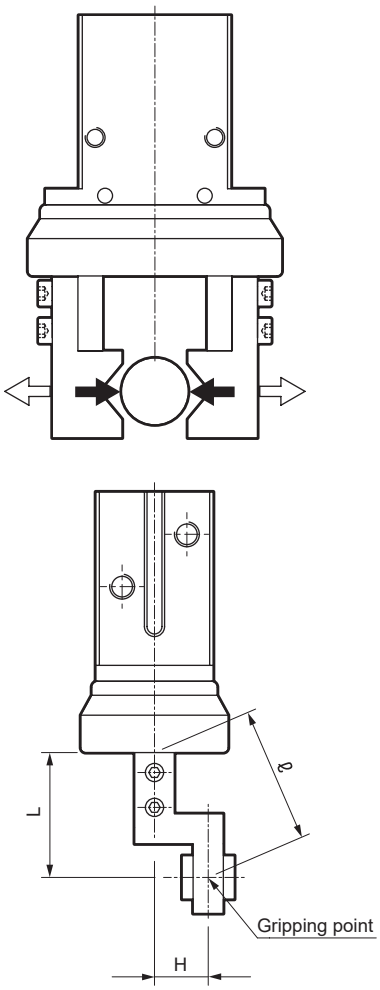




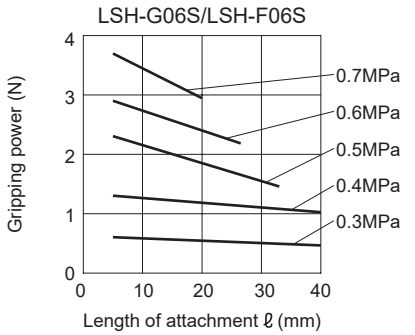
Gripping power performance data LSH-G / F**S / C (single acting)

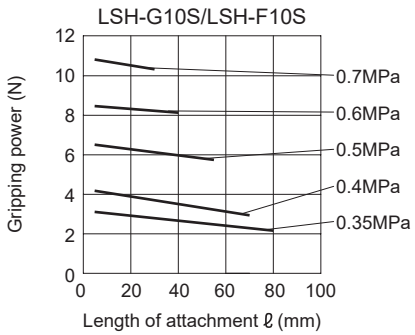
· The gripping power indicates the thrust (for one finger) in the direction of the arrow shown in the figure.
· The gripping power operating in the opening/closing directions against the length (ℓ) of the attachment when the supply pressure is 0.7 MPa or less is shown.

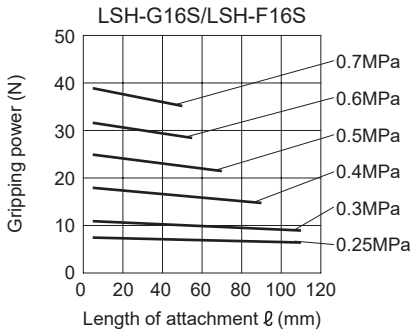
● Open direction (⇦)
● Closed direction (➡)

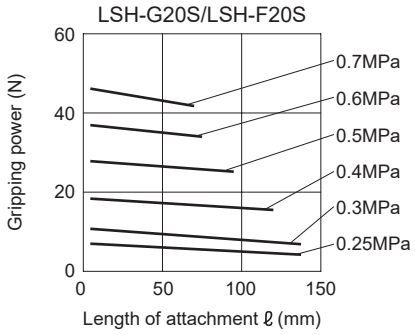


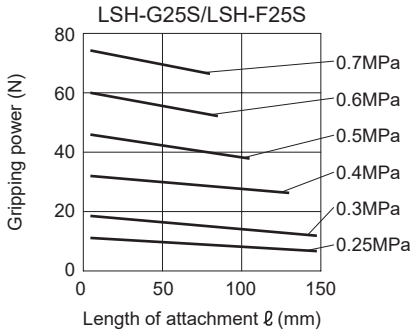
Closed direction



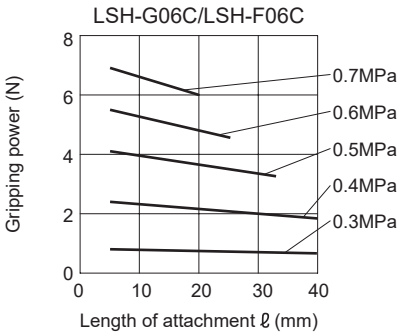


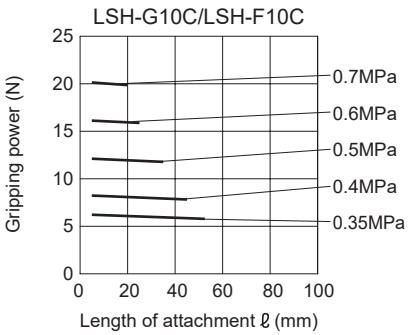


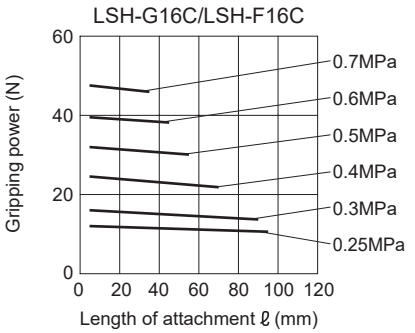


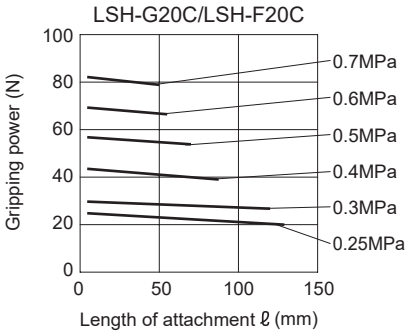


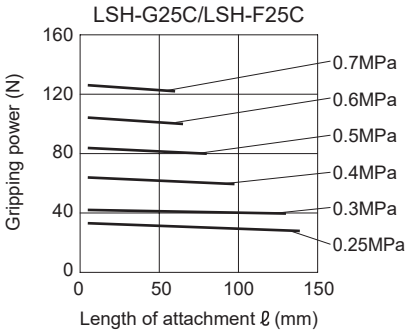
Open direction







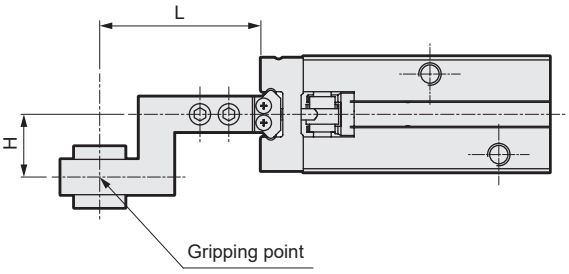




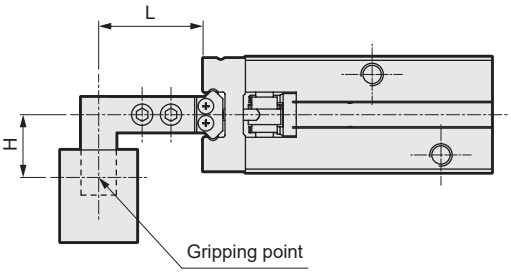
Attachment length

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

Close direction

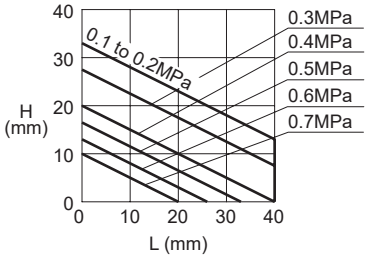


Open direction

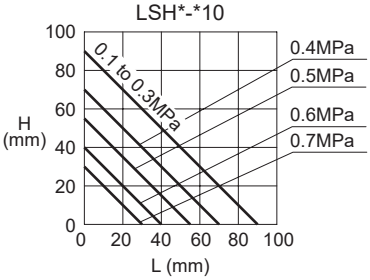


Close direction

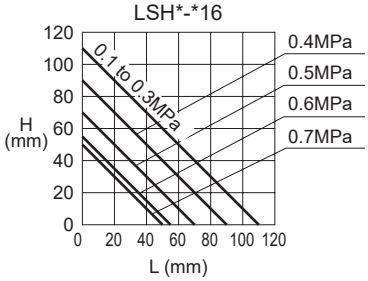
LSH-*06



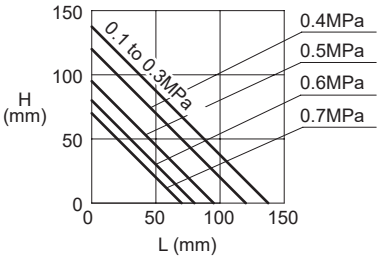
LSH*-*10



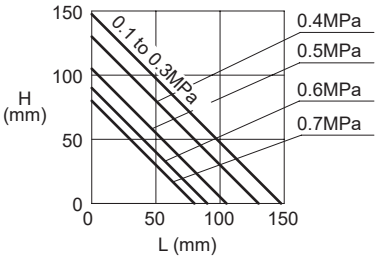
LSH*-*16



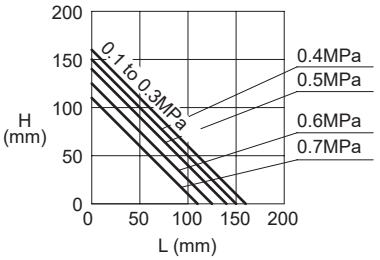
LSH*-*20



LSH*-*25

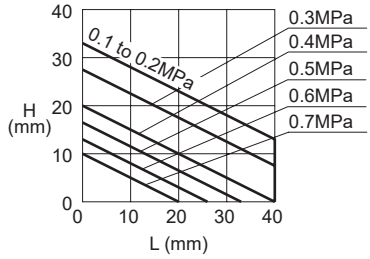


LSH-*32

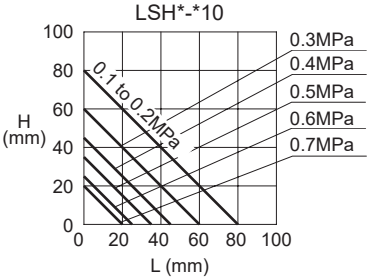


Open direction

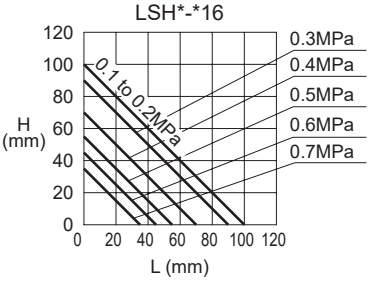
LSH-*06



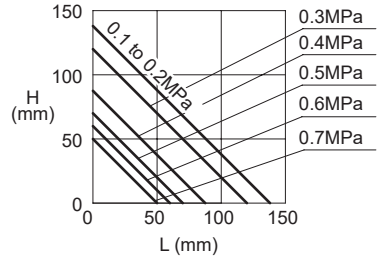
LSH*-*10



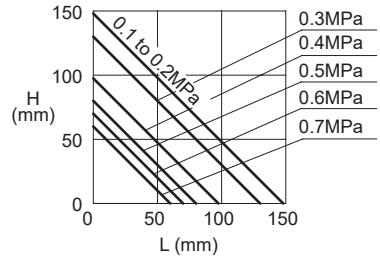
LSH*-*16



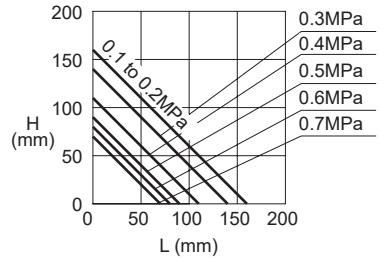
LSH*-*20



LSH*-*25



LSH-*32



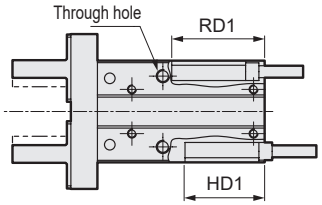
MEMO

Cylinder switch precautions

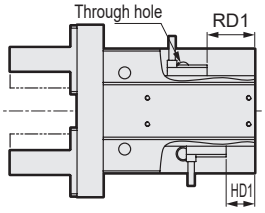
●Switch mounting position list

[Side mounting]

ø6 to 20, 32

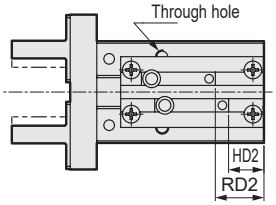


ø25



[Rail mount]

ø6 to 32

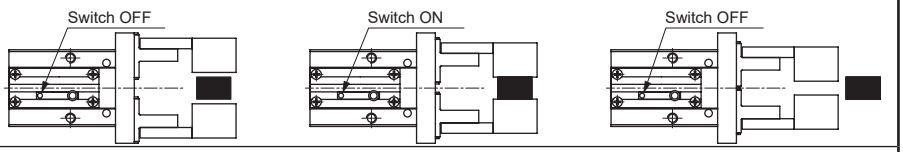
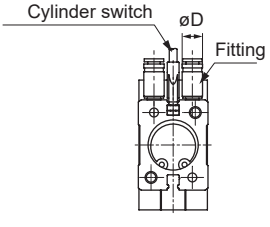


Model No.	Switches Model No.	Side mounting		Rail mounting	
		RD1	HD1	RD2	HD2
LSH-A06*	F2/3□	20.5	18	-	-
	F2/3S	-	-	9.5 (-)	7(-)
LSH-A10*	F2/3□	21	18	11 (21)	8 (18)
	F2/3S	22	19	10 (22)	7 (19)
LSH-A16*	F2/3□	21	17	11 (21)	7 (17)
	F2/3S	22	18	10 (22)	6 (18)
LSH-A20*	F2/3□	26	20	16 (26)	10 (20)
	F2/3S	27	21	15 (27)	9 (21)
LSH-A25*	F2/3H□PH	-	-	20 (30)	12 (22)
	F2/3V□PV	20	12	20 (30)	12 (22)
	F2/3S	19	11	19 (31)	11 (23)
LSH-A32D	F2/3□	32.5	20.5	22.5 (32.5)	10.5 (20.5)
	F2/3S	33.5	21.5	21.5 (33.5)	9.5 (21.5)
	T2/3□	-	-	18.5 (36.5)	6.5 (24.5)
LSH-A32S/C	F2/3□	41	29	31 (41)	19 (29)
	F2/3S	42	30	30 (42)	18 (30)
	T2/3□	-	-	27 (45)	15 (33)

*When the lead wire is directed toward the head side, the dimension in parentheses apply.
*"–" indicates it cannot be mounted.

●Precautions

Refer to precautions in the following table for the bore size to be used.

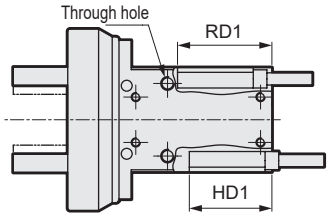
Category	Bore size ø6	ø10	ø16	ø20	ø25	ø32	Precautions
Common items	●	●	●	●	●	●	• RD dimension is the max. sensitivity position at open side end position and HD dimension at closed side end position. The actual mounting position should be adjusted after confirming the operational status of the switches.
	●	●	●	●	●	●	• One switch can be mounted for one switch rail groove.
	●	●	●	●	●	●	• Since the opening and closing stroke is short, only the open or closed state is detected for each switch. Ex: A single switch alone cannot detect what is shown in the following illustration. (1)Open end (no workpiece): Switch OFF (2) Workpiece gripped: Switch ON (3)Closed end (no workpiece): Switch OFF 
	●	●	●	●	●	●	• Be careful not to be caught in the lead wires when opening/closing the finger.
Side mount	●	●	●	●			• When using the L type switch for side mounting on the side of the port, the fittings may interfere with the switch. Use fittings whose outer diameters are below those indicated in the following table. Mount position: port side Switch type: L-shaped type Bore size (mount position) / Fitting O.D. øD: ø6 (RD) ø5 or less; ø6 (HD) ø6.9 or less; ø10 ø7.4 or less; ø16 ø7.9 or less; ø20 ø11 or less 
	●	●	●	●		●	• When using a lead wire straight F3PV switch, the switch and lead wire protrude from the end face of the head side. If this protrusion is a problem, use F2/3V or F2/3S, or mount a rail.
		●	●	●	●	●	• For switch side mounting, the through hole cannot be used.
Rail Mount		●					• For switch rail mounting, the through hole cannot be used.

Cylinder switch precautions

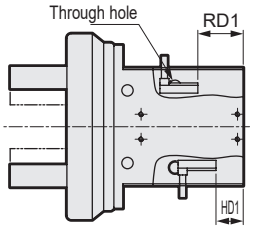
●Switch mounting position list

[Side mounting]

ø6 to 20, 32

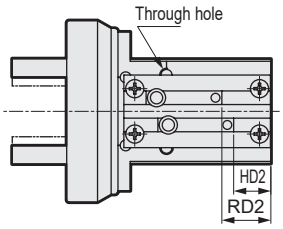


ø25



[Rail mount]

ø6 to 32

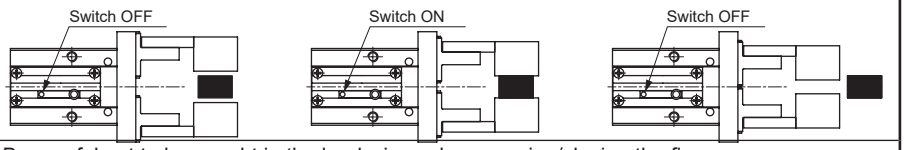
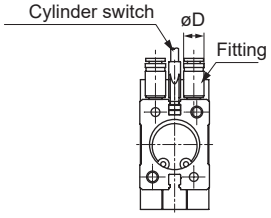


Model No.	Switches Model No.	Side mounting		Rail mounting	
		RD1	HD1	RD2	HD2
LSH-G/F06	F2/3□	20.5	18	-	-
	F2/3S	-	-	9.5 (-)	7(-)
LSH-G/F10	F2/3□	21	18	11 (21)	8 (18)
	F2/3S	22	19	10 (22)	7 (19)
LSH-G/F16	F2/3□	21	17	11 (21)	7(17))
	F2/3S	22	18	10 (22)	6 (18)
LSH-G/F20	F2/3□	26	20	16 (26)	10 (20)
	F2/3S	27	21	15 (27)	9 (21)
LSH-G/F25	F2/3□	-	-	20 (30)	12 (22)
	F2/3V	20	12	20 (30)	12 (22)
	F2/3S	19	11	19 (31)	11 (23)
LSH-G/F32	F2/3□	26	14	16 (26)	4 (14)
	F2/3S	27	15	15 (27)	3 (15)
	T2/3□	-	-	12 (30)	0 (18)

*When the lead wire is directed toward the head side, the dimension in parentheses apply.
*"–" indicates it cannot be mounted.

●Precautions

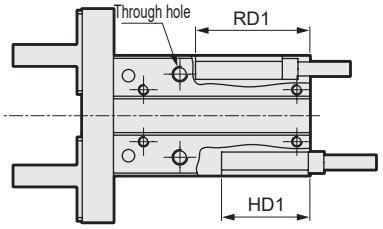
Refer to precautions in the following table for the bore size to be used.

Category	Bore size ø6	ø10	ø16	ø20	ø25	ø32	Precautions
Common items	●	●	●	●	●	●	• RD dimension is the max. sensitivity position at open side end position and HD dimension at closed side end position. The actual mounting position should be adjusted after confirming the operational status of the switches.
	●	●	●	●	●	●	• One switch can be mounted for one switch rail groove.
	●	●	●	●	●	●	• Since the opening and closing stroke is short, only one side of the open or closed state is detected for each switch. Ex: A single switch alone cannot detect what is shown in the following illustration. (1)Open end (no workpiece): Switch OFF (2) Workpiece gripped: Switch ON (3)Closed end (no workpiece): Switch OFF 
	●	●	●	●	●	●	• Be careful not to be caught in the lead wires when opening/closing the finger.
Side mount	●	●	●	●			• When using the L type switch for side mounting on the side of the port, the fittings may interfere with the switch. Use fittings whose outer diameters are below those indicated in the following table. Mount position: port side Switch type: L-shaped type Bore size (mount position) / Fitting O.D. øD ø6 (RD) / ø5 or less ø6 (HD) / ø6.9 or less ø10 / ø7.4 or less ø16 / ø7.9 or less ø20 / ø11 or less 
	●	●	●	●		●	• When using a lead wire straight F3PV switch, the switch and lead wire protrude from the end face of the head side. If this protrusion is a problem, use F2/3V or F2/3S, or mount a rail.
						●	• The switches of the F2/3V protrudes from the head side end. If this protrusion is a problem, use F2/3S or mount a rail.
		●	●	●	●		• For switch side mounting, the through hole cannot be used.
Rail Mount		●					• For switch rail mounting, the through hole cannot be used.

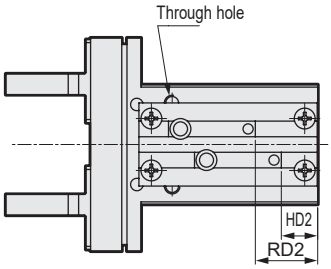
Cylinder switch precautions

●Switch mounting position list

[Side mounting]
ø10 to 25



[Rail mount]
ø10 to 25

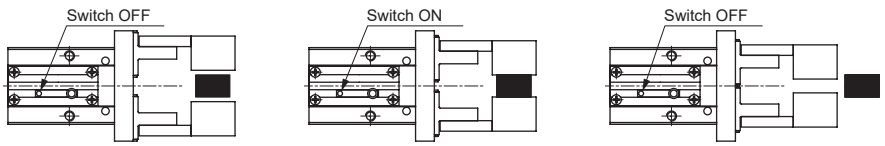
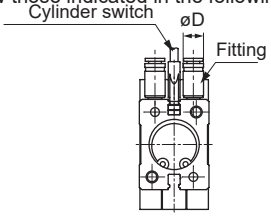


Model No.	Switches Model No.	Side mounting		Rail mounting	
		RD1	HD1	RD2	HD2
LSHL-A10D	F2/3□	22	17	12 (22)	7 (17)
	F2/3S	23	18	11 (23)	6 (18)
LSHL-A16D	F2/3□	24.5	16.5	14.5(24.5)	6.5 (16.5)
	F2/3S	25.5	17.5	13.5 (25.5)	5.5 (17.5)
LSHL-A20D	F2/3□	30	20	20 (30)	10(20))
	F2/3S	31	21	19 (31)	9 (21)
LSHL-A25D	F2/3□	33	21.5	23 (33)	11.5 (21.5)
	F2/3S	34	22.5	22(34)	10.5 (22.5)
LSHL-A10S/C	F2/3□	28	23	18 (28)	13 (23)
	F2/3S	29	24	17 (29)	12 (24)
LSHL-A16S/C	F2/3□	27.5	20	17.5 (27.5)	10 (20)
	F2/3S	28.5	21	16.5 (28.5)	9 (21)
LSHL-A20S/C	F2/3□	33.5	23	23.5 (33.5)	13 (23)
	F2/3S	34.5	24	22.5 (34.5)	12 (24)
LSHL-A25S/C	F2/3□	38.5	27	28.5 (38.5)	17 (27)
	F2/3S	39.5	28	27.5 (39.5)	16 (28)

*When the lead wire is directed toward the head side, the dimension in parentheses apply.

●Precautions

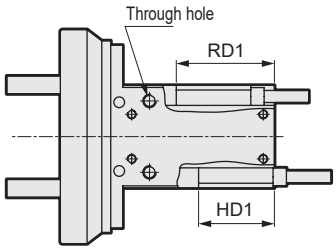
Refer to precautions in the following table for the bore size to be used.

Category	Bore size ø10	ø16	ø20	ø25	Precautions
Common items	●	●	●	●	• RD dimension is the max. sensitivity position at open side end position and HD dimension at closed side end position. The actual mounting position should be adjusted after confirming the operational status of the switches.
	●	●	●	●	• One switch can be mounted for one switch rail groove.
	●	●	●	●	• Since the opening and closing stroke is short, only the open or closed state is detected for each switch. Ex: A single switch alone cannot detect what is shown in the following illustration. (1)Open end (no workpiece): Switch OFF (2) Workpiece gripped: Switch ON (3)Closed end (no workpiece): Switch OFF 
	●	●	●	●	• Be careful not to be caught in the lead wires when opening/closing the finger.
Side mount	●	●	●		• When using the L type switch for side mounting on the side of the port, the fittings may interfere with the switch. Use fittings whose outer diameters are below those indicated in the following table. Mount position: port side Switch type: L-shaped type Bore size / Fitting O.D. øD: ø10 / ø7.4 or less; ø16 / ø7.9 or less; ø20 / ø11 or less 
	●	●	●	●	• For the axial lead wire switches, the switches and lead wire will protrude from the head side end. If this protrusion is a problem, use F2/3V or F2/3S, or mount a rail.
	●	●	●		• For the F3PV switches, the switches will protrude from the head side end. If this protrusion is a problem, use F2/3V or F2/3S, or mount a rail.
	●	●	●	●	• For switch side mounting, the through hole cannot be used.
Rail Mount	●				• For switch rail mounting, the through hole cannot be used.

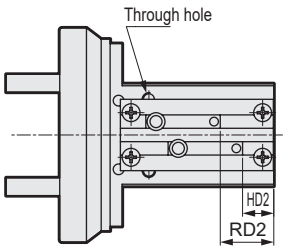
Cylinder switch precautions

●Switch mounting position list

[Side mounting]
ø10 to 20



[Rail mount]
ø10 to 20

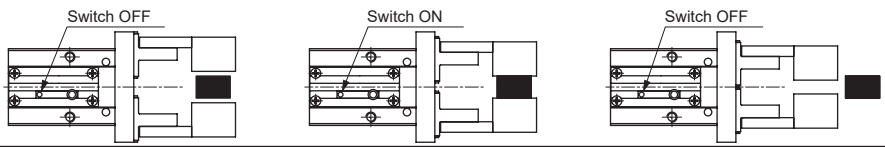
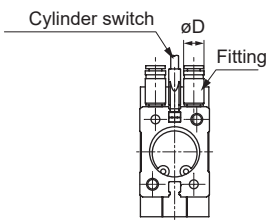


Model No.	Switches Model No.	Side mounting		Rail mounting	
		RD1	HD1	RD2	HD2
LSHL-G/F10	F2/3□	22	17	12 (22)	7 (17)
	F2/3S	23	18	11 (23)	6 (18)
LSHL-G/F16	F2/3□	25	17	15 (25)	7 (17)
	F2/3S	26	18	14 (26)	6 (18)
LSHL-G/F20	F2/3□	35.5	25.5	25.5 (35.5)	15.5 (25.5)
	F2/3S	36.5	26.5	24.5 (36.5)	14.4 (26.5)

*When the lead wire is directed toward the head side, the dimension in parentheses apply.

●Precautions

Refer to precautions in the following table for the bore size to be used.

Category	Bore size ø10	Bore size ø16	Bore size ø20	Precautions
Common items	●	●	●	• RD dimension is the max. sensitivity position at open side end position and HD dimension at closed side end position. The actual mounting position should be adjusted after confirming the operational status of the switches.
	●	●	●	• One switch can be mounted for one switch rail groove.
	●	●	●	• Since the opening and closing stroke is short, only the open or closed state is detected for each switch. Ex: A single switch alone cannot detect what is shown in the following illustration. (1)Open end (no workpiece): Switch OFF (2) Workpiece gripped: Switch ON (3)Closed end (no workpiece): Switch OFF 
	●	●	●	• Be careful not to be caught in the lead wires when opening/closing the finger.
Side mount	●	●	●	• When using the L type switch for side mounting on the side of the port, the fittings may interfere with the switch. Use fittings whose outer diameters are below those indicated in the following table. Mount position: port side Switch type: L-shaped type Bore size / Fitting O.D. øD: ø10 / ø7.4 or less; ø16 / ø7.9 or less; ø20 / ø11 or less 
	●	●	●	• For the axial lead wire switches, the switches and lead wire will protrude from the head side end. If this protrusion is a problem, use F2/3V or F2/3S, or mount a rail.
	●	●		• For the F3PV switches, the switches will protrude from the head side end. If this protrusion is a problem, use F2/3V or F2/3S, or mount a rail.
	●	●	●	• For switch side mounting, the through hole cannot be used.
Rail Mount	●			• For switch rail mounting, the through hole cannot be used.

Safety Precautions

Be sure to 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.

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.)

❶ 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.
❷ 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 (Pneumatics fluid power - General rules and safety requirements for systems and their components)
JFPS2008 (Principles for pneumatic cylinder selection and use)
Including the High Pressure Gas Safety Act, Industrial Safety and Health Act, other safety rules, organization standards and regulations, etc.

4 Do not handle, pipe, or remove devices before confirming safety.

❶ Inspect and service the machine and devices after confirming safety of all systems related to this product.
❷ Note that there may be hot or charged sections even after operation is stopped.
❸ 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.
❹ 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.

Warranty

1 Warranty period

The product specified herein is warranted for one (1) year from the date of delivery to the location specified by the customer.

2 Warranty coverage

If the product specified herein fails for reasons attributable to CKD within the warranty period specified above, CKD will promptly provide a replacement for the faulty product or a part thereof or repair the faulty product at one of CKD's facilities free of charge.
However, following failures are excluded from this warranty:
1) Failure caused by handling or use of the product under conditions and in environments not conforming to those stated in the catalog, the Specifications, or the Instruction Manual.
2) Failure caused by use of the product exceeding its durability (cycles, distance, time, etc.) or caused by consumable parts.
3) Failure not caused by the product.
4) Failure caused by use not intended for the product.
5) Failure caused by modifications/alterations or repairs not carried out by CKD.
6) Failure caused by reasons unforeseen at the level of technology available at the time of delivery.
7) Failure caused by acts of nature and disasters beyond control of CKD.
The warranty stated herein covers only the delivered product itself. Any loss or damage induced by failure of the delivered product is excluded from this warranty.
Note: For details on the durability and consumable parts, contact your nearest CKD sales office.

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

Be sure to read this section before use.
For details on general cylinders and cylinder switches, refer to Pneumatic Cylinders (CB-029SA).

Product-specific precautions: Linear slide hand LSH* Series

Design/selection

1. Common

⚠WARNING

■ If a moving workpiece poses a danger to the human body, or if there is a possibility of human fingers being pinched by the fingers or the attachments, take safety precautions such as by installing a protective cover.

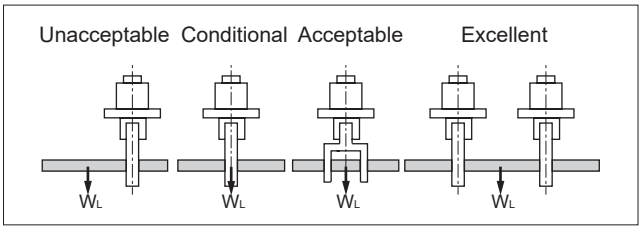
■ If the circuit pressure drops due to a power outage or there is a problem with the air source, gripping force may decrease causing the workpiece to fall. Provide position locking measures, etc., so that personnel are not injured or machines are not damaged.

⚠CAUTION

■ Usage 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 this as much as possible.
Also, do not use the equipment under the following environments.
- Exposed to cutting fluid (because the sliding section is abraded by the abrasive or abrasive powder in the fluid)
- When the atmosphere contains organic solvents, chemicals, acids, alkalis, kerosene, etc.
- Exposed to water

■ When grasping long or large workpieces, it is necessary to grasp the center of gravity to ensure a stable grip, but it is also necessary to stabilize it by increasing the size and using multiple pieces.



■ Select a model with a sufficient gripping force according to the mass of the workpiece.

■ Select a model with a sufficient opening and closing width according to the size of the workpiece.

■ If the attachment is not rigid enough, the fingers may twist due to deflection, which may have a negative impact on operation.

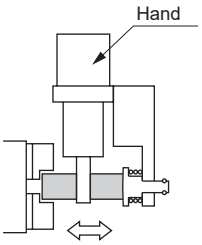
■ Avoid gripping the workpiece with single acting spring force as much as possible. The gripping power may become unstable, leading to operation failure.

■ The rubber cover is a consumable part. Replace if necessary.

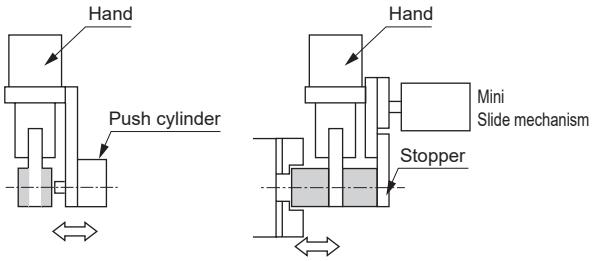
■ When inserting the workpiece directly to the jig using a hand, take the clearance into consideration during design. The hand could be damaged.

Hand

● Press the jig by ejecting



● When using a push cylinder



Note) Since the workpiece slides over the top of the attachments, it may significantly shorten the service life of the chuck. The shape of the attachments should be sufficiently considered.

■ Adjust the gripper opening/closing speed using the speed controller (sold separately).
When used at high speed, backlash may occur sooner. Also, the workpiece may vibrate due to the impact of opening and closing, which may result in chuck errors, workpiece insertion failures, or poor repeatability.

■ If a small-diameter or short-stroke actuator operates at a high frequency, condensation (water droplets) may form inside the piping in certain conditions. Take steps to prevent condensation such as by using a quick exhaust valve.

■ The rubber cover does not ensure reliable air tightness. Due to the structure, there may be a gap between the rubber cover, and the body/fingers. If this raises an issue, please contact us.

■ With the single acting type, the spring force is minimized near the stroke end (open end for NO, closed end for NC). Due to the structure operated by the spring force, it may not return when operated with a short stroke; take care of the attachment shape so that the workpiece can be gripped with a margin in the stroke.

2. LSHM Series

⚠CAUTION

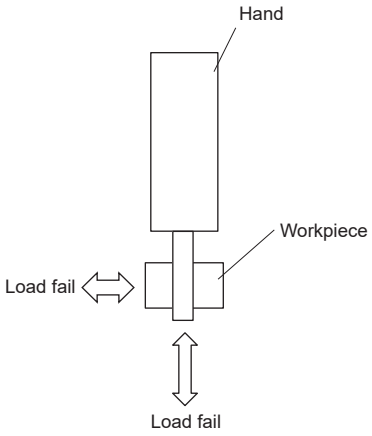
- Use only a DC safety power supply. Do not connect motors, valves, etc., that generate noise to the power supply used in this device.
- While wiring, ensure that inductive noise is not applied to the sensor and amplifier and that power lines such as motors do not use the same piping and wiring (through multi-core cables, etc.). Use caution with the inverter power supply and its wiring section as well.
  (Check that the inverter power frame ground is correctly grounded and noise is released.)
- Note that noise resistance performance may be adversely affected if the length of the cable is 5 m or greater.
- Make sure that the cable is wired so that it is free of local bends and tension. Also make sure that the lead wire is free of repeated bends.
- Make sure that force of 30 N or over is not applied to the M8/M12 connector section.
- This product cannot be used outdoors or in an atmosphere containing corrosive elements.
- The protection structure of the switch output adapter and IO-Link adapter is equivalent to IP40. Do not install in a place with moisture, salt, dust and cuttings.

Mounting, installation and adjustment

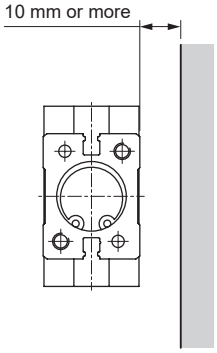
1. Common

⚠CAUTION

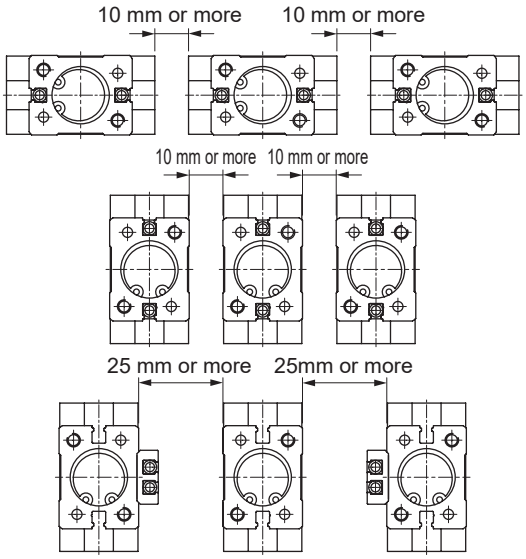
- Be sure not to apply an excessive load to the fingers and attachment when attaching and detaching or conveying workpieces. The linear guide rolling contact surface of the fingers may be scratched or dented, resulting in a malfunction.



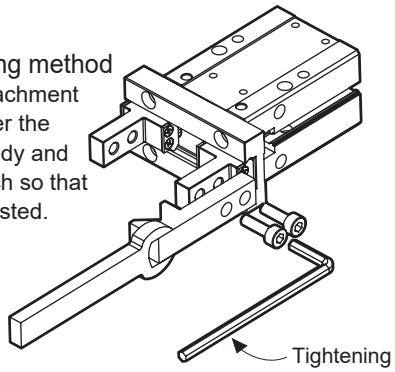
- The cylinder switch may malfunction if there is a magnetic substance such as a metal plate installed adjacently. Check that a distance of 10 mm is provided from the surface of the cylinders.



- 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.
- Attachment mounting method
  When mounting a attachment to the fingers, consider the impact to the hand body and tighten it with a wrench so that the fingers are not twisted.

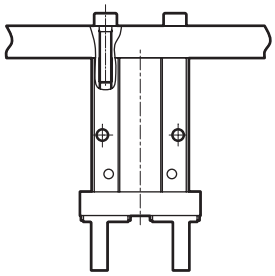


Item	Bolt used	Tightening torque (N·m)
LSH-*06	M2.5 × 0.45	0.32
LSH*-*10	M2.5 × 0.45	0.32
LSH*-*16	M3 × 0.5	0.59
LSH*-*20	M4 × 0.7	1.4
LSH*-*25	M5 × 0.8	2.8
LSH*-*32	M6 × 1.0	4.9

- Do not cause dents or scratches that may damage flatness or perpendicularity on the body mounting surface and finger.

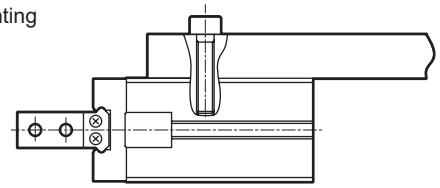
■ Refer to the following section for body mounting.

● Top mounting



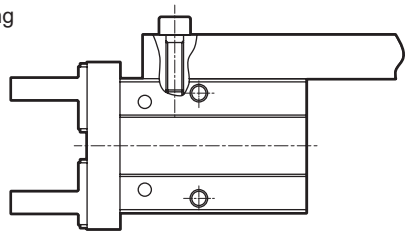
Item	Bolt used	Tightening torque (N·m)	Max. insertion depth L (mm)
LSH-*06	M3×0.5	0.59	4.5
LSH*-*10	M3 × 0.5	0.88	6
LSH*-*16	M4 × 0.7	2.1	8
LSH*-*20	M5 × 0.8	4.3	10
LSH*-*25	M6 × 1.0	7.3	12
LSH-*32	M6 × 1.0	7.3	13

● Front mounting



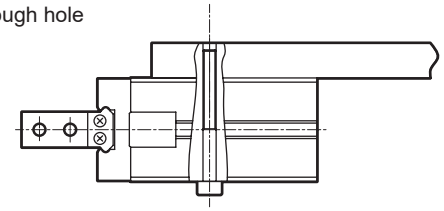
Item	Bolt used	Tightening torque (N·m)	Max. insertion depth L (mm)
LSH-*06	M3 × 0.5	0.88	10
LSH*-*10	M3 × 0.5	0.69	5
LSH*-*16	M4 × 0.7	2.1	8
LSH*-*20	M5 × 0.8	4.3	10
LSH*-*25	M6 × 1.0	7.3	12
LSH-*32	M6 × 1.0	7.3	13

● Side mounting



Item	Bolt used	Tightening torque (N·m)	Max. insertion depth L (mm)
LSH-*10 LSHM-*10	M3 × 0.5	0.88	6
LSHL-*10	M3 × 0.5	0.78	5.5
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
LSH-*32	M6 × 1.0	5.9	10

● Use of through hole



Item	Bolt used	Tightening torque (N·m)
LSH-*06	M2.5 × 0.45	0.32
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
LSH-*32	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 finger. This could lead to malfunction.

■ Regularly grease the sliding section of the finger. Regular replenishment can extend service life further.

Manufacturer	Model No.
THK	AFF grease

2. LSHM Series

⚠CAUTION

■ Rubber plugs are attached to the external zero point adjusting trimmers to maintain water resistance. Fit these plugs in after adjusting.

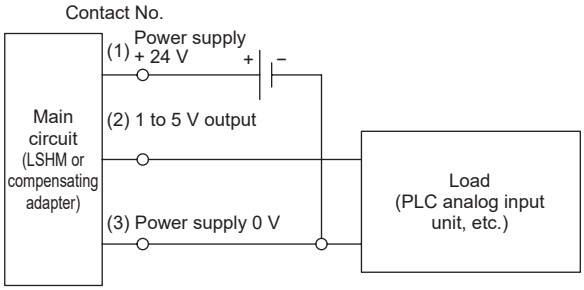
■ Do not remove the compensating adapter cap to maintain water resistance.

■ The M8 screw of the cable should be securely tightened to maintain water resistance.

■ Connecting the cable

1. Turn power OFF before wiring this product.
2. Do not touch the connector fitting surface with wet hands.
   Additionally, thoroughly wipe water off if any when wiring the connector or surrounding areas. Otherwise, defective insulation may result.
3. Ensure that metal pieces or powder do not enter the connector fitting section.
4. Make sure to manually tighten the connector fixing bracket (M8) (recommended tightening torque = 0.2 N·m). If inserted with a tool such as pliers, it could break due to overload.
   If the tightening torque is not sufficient, the product may not only be incapable of maintaining its protective structure, but also be loosened due to vibration.

● Connecting the lead wire



■ Use the default combination of LSHM and the correction adapter and IO-Link adapter.

Use / maintenance

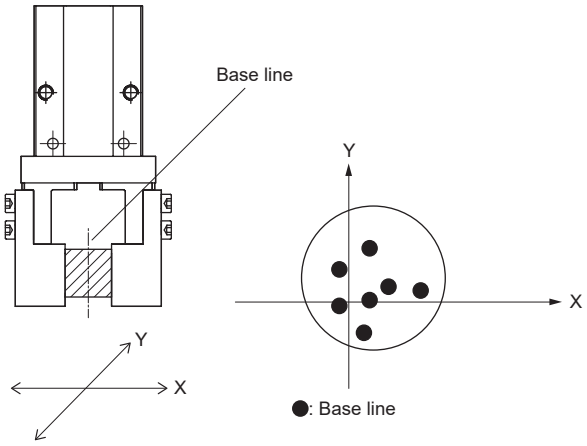
1. Common

⚠CAUTION

■ Repeatability

The repeatability here indicates the displacement of the finger in the case of repeated clamping and unclamping in the same conditions (hand fixed, same attachment used: see below).
Shock during opening and closing may lead to position misalignment of the workpiece and deterioration of repeatability. Note as well that attachment wear or insufficient rigidity may lead to deterioration of accuracy.

Conditions
· Attachment size, shape, weight
· Workpiece grip position of attachment
· Clamp method, length
· Resistance of attachment and workpiece contact section
· Shock-free opening and closing with speed controller
· Fluctuation of gripping power (air pressure), etc.



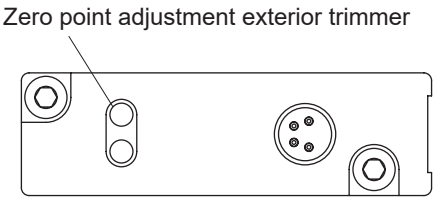
2. LSHM Series

⚠CAUTION

■ Analog output voltage corresponds to the cylinder piston position. The value may fluctuate because of jig deformation and wear, etc., due to use over time. (For the hand, fluctuation is caused by finger opening and closing direction backlash and attachment deformation and wear.)
If the analog output voltage fluctuates, perform fine adjustment using the zero point adjustment exterior trimmer.

Operating procedure
Remove the attachment or the like, close the fingers, remove the rubber stopper of the zero point adjustment exterior trimmer and rotate the trimmer for fine adjustment so that the output voltage is 1 V.
Be sure to reinstall the rubber plug correctly after operation. At this time, make sure water or foreign matter does not enter.

* For models with correction adapter option, keep the correction adapter connected.



■ Repeatability of analog output

The repeatability here indicates the displacement of the analog output converted to length 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 grip position of attachment
· Clamp method, length
· Resistance of attachment and workpiece contact section
· Fluctuation of gripping power (air pressure)

Related products

Auto hand changer CHC Series

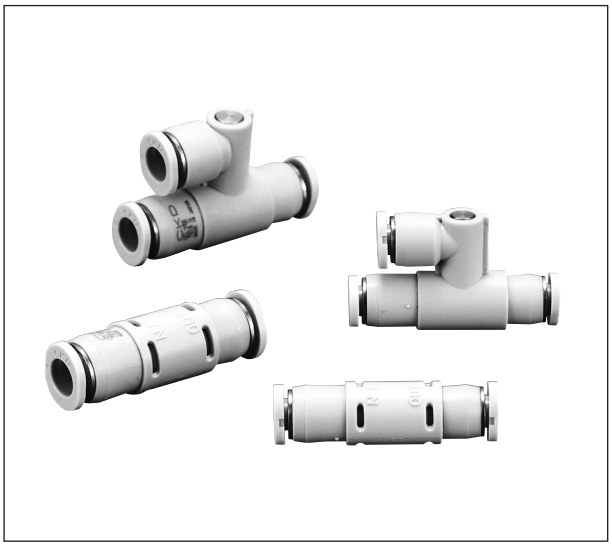
Catalog No. CB-030SA

- High connection strength between body and adapter, ensuring high rigidity
- Position locking mechanism is equipped to prevent falling tools even when the drive source is shut off.
- A wide range of options including D sub-connector are available

Quick exhaust valve QEL Series

Catalog No. CB-024SA

- Compact / space saving inline
  Ozone-proof materials for degradation prevention are used as standard for the valve body
- Reducer that can be connected to piping (made-to-order product)
  Quick exhaust can be performed near the actuator
  Helps reduce adiabatic expansion

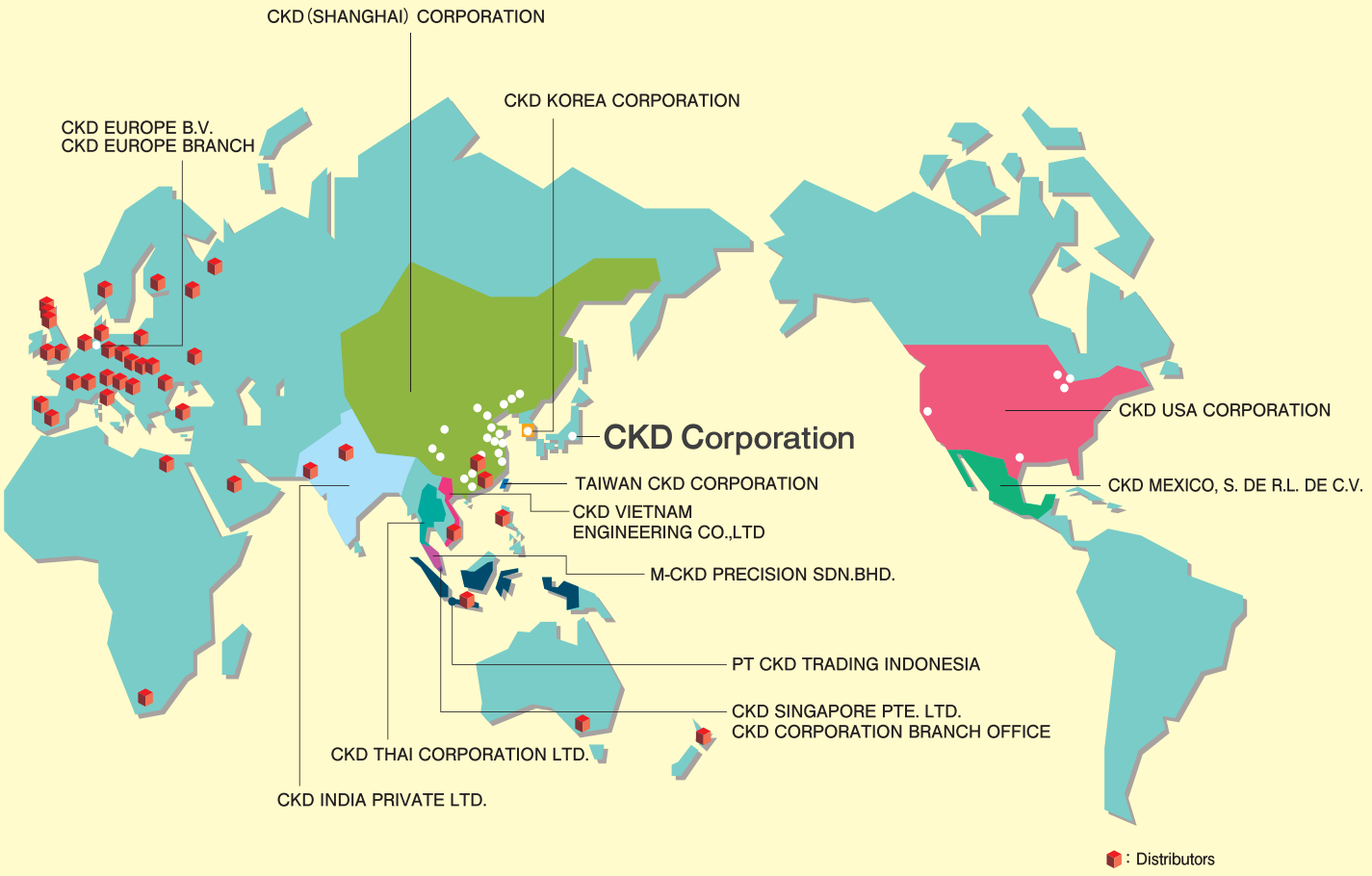


HP Series General Catalog

Catalog No.CC-1421A

- For high Frequency use (HP1)
  Optimized sliding technology for longer service life with the same dimensions as conventional products (more than 2-fold compared to conventional products)
- For dusty environments (G-HP1)
  Rubber scraper and lube keeping structure improves durability in dusty environments (2x or more compared to conventional models)

WORLD-NETWORK



CKD Corporation

Website https://www.ckd.co.jp/

2-250 Ouji, Komaki City, Aichi 485-8551, Japan
PHONE +81-568-74-1338 FAX +81-568-77-3461

ASIA

喜開理(上海)機器有限公司
CKD(SHANGHAI)CORPORATION

●営業部 / 上海浦西事務所(SALES HEADQUARTERS / SHANGHAI PUXI OFFICE)
Room 601, 6th Floor, Yuanzhongkeyan Building, No. 1905 Hongmei Road, Xinhui District, Shanghai 200233, China
PHONE +86-21-61911888 FAX +86-21-60905356

- 上海浦東事務所(SHANGHAI PUDONG OFFICE)
- 寧波事務所(NINGBO OFFICE)
- 杭州事務所(HANGZHOU OFFICE)
- 無錫事務所(WUXI OFFICE)
- 昆山事務所(KUNSHAN OFFICE)
- 蘇州事務所(SUZHOU OFFICE)
- 南京事務所(NANJING OFFICE)
- 合肥事務所(HEFEI OFFICE)
- 成都事務所(CHENGDU OFFICE)
- 武漢事務所(WUHAN OFFICE)
- 鄭州事務所(ZHENGZHOU OFFICE)
- 長沙事務所(CHANGSHA OFFICE)
- 重慶事務所(CHONGQING OFFICE)
- 西安事務所(XIAN OFFICE)
- 広州事務所(GUANGZHOU OFFICE)
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- 深圳西事務所(WEST SHENZHEN OFFICE)
- 深圳東事務所(EAST SHENZHEN OFFICE)
- 東莞事務所(DONGGUAN OFFICE)
- 厦門事務所(XIAMEN OFFICE)
- 福州事務所(FUZHOU OFFICE)
- 瀋陽事務所(SHENYANG OFFICE)
- 大連事務所(DALIAN OFFICE)
- 長春事務所(CHANGCHUN OFFICE)
- 北京事務所(BEIJING OFFICE)
- 天津事務所(TIANJIN OFFICE)
- 青島事務所(QINGDAO OFFICE)
- 潍坊事務所(WEIFANG OFFICE)
- 済南事務所(JINAN OFFICE)
- 烟台事務所(YANTAI OFFICE)

CKD INDIA PRIVATE LTD.

●HEADQUARTERS
Unit No. 607, 6th Floor, Welldone Tech Park, Sector 48, Sohna Road, Gurgaon-122018, Haryana, India
PHONE +91-124-418-8212 FAX +91-(0)124-418-8216

- BANGALORE OFFICE
- PUNE OFFICE

PT CKD TRADING INDONESIA

●HEAD OFFICE
Menara Bidakara 2, 18th Floor, Jl. Jend. Gatot Subroto Kav. 71-73, Pancoran, Jakarta 12870, Indonesia
PHONE +62-21-2938-6601 FAX +62-21-2906-9470

- MEDAN OFFICE
- BEKASI OFFICE
- KARAWANG OFFICE
- SEMARANG OFFICE
- SURABAYA OFFICE

CKD KOREA CORPORATION

●HEADQUARTERS
(3rd Floor), 44, Sinsu-ro, Mapo-gu, Seoul 04088, Korea
PHONE +82-2-783-5201～5203 FAX +82-2-783-5204

- 水原営業所(SUWON OFFICE)
- 天安営業所(CHEONAN OFFICE)
- 蔚山営業所(ULSAN OFFICE)

M-CKD PRECISION SDN.BHD.

●HEAD OFFICE
Lot No.6,Jalan Modal 23/2, Seksyen 23, Kawasan MIEL, Fasa 8, 40300 Shah Alam,Selangor Darul Ehsan, Malaysia
PHONE +60-3-5541-1468 FAX +60-3-5541-1533

- JOHOR BAHRU BRANCH OFFICE
- PENANG BRANCH OFFICE

CKD SINGAPORE PTE. LTD.

No.33 Tannery Lane #04-01 Hoesteel Industrial Building, Singapore 347789, Singapore
PHONE +65-67442623 FAX +65-67442486

CKD CORPORATION BRANCH OFFICE

No.33 Tannery Lane #04-01 Hoesteel Industrial Building, Singapore 347789, Singapore
PHONE +65-67447260 FAX +65-68421022

CKD THAI CORPORATION LTD.

●HEADQUARTERS
19th Floor, Smooth Life Tower, 44 North Sathorn Road, Silom, Bangrak, Bangkok 10500, Thailand
PHONE +66-2-267-6300 FAX +66-2-267-6304-5

- NAVANAKORN OFFICE
- EASTERN SEABOARD OFFICE
- LAMPHUN OFFICE
- KORAT OFFICE
- AMATANAKORN OFFICE
- PRACHINBURI OFFICE
- SARABURI OFFICE

台湾喜開理股份有限公司
TAIWAN CKD CORPORATION

●HEADQUARTERS
16F-3, No. 7, Sec. 3, New Taipei Blvd., Xinzhuang Dist., New Taipei City 242, Taiwan
PHONE +886-2-8522-8198 FAX +886-2-8522-8128

- 新竹営業所(HSINCHU OFFICE)
- 台中営業所(TAICHUNG OFFICE)
- 台南営業所(TAINAN OFFICE)
- 高雄営業所(KAOHSIUNG OFFICE)

CKD VIETNAM ENGINEERING CO.,LTD.

●HEADQUARTERS
18th Floor, CMC Tower, Duy Tan Street, Cau Giay District, Hanoi, Vietnam
PHONE +84-24-3795-7631 FAX +84-24-3795-7637

- HO CHI MINH OFFICE

EUROPE

CKD EUROPE B.V.

●HEADQUARTERS
Beechavenue 125A, 1119 RB Schiphol-Rijk, the Netherlands
PHONE +31-23-554-1490

- CKD EUROPE GERMANY OFFICE
- CKD EUROPE UK
- CKD EUROPE CZECH O.Z.

CKD CORPORATION EUROPE BRANCH

Beechavenue 125A, 1119 RB Schiphol-Rijk, the Netherlands
PHONE +31-23-554-1490

NORTH AMERICA & LATIN AMERICA

CKD MEXICO, S. DE R.L. DE C.V.

Cerrada la Noria No. 200 Int. A-01, Querétaro Park II, Parque Industrial Querétaro, Santa Rosa Jáuregui, Querétaro, C.P. 76220, México
PHONE +52-442-161-0624

CKD USA CORPORATION

●HEADQUARTERS
1605 Penny Lane, Schaumburg, IL 60173, USA
PHONE +1-847-648-4400 FAX +1-847-565-4923

- LEXINGTON OFFICE
- SAN ANTONIO OFFICE
- SAN JOSE OFFICE/ TECHNICAL CENTER
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