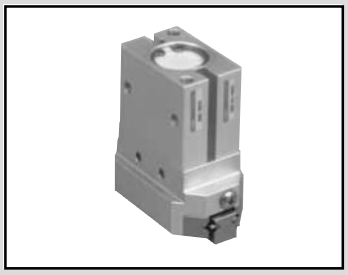


Centering hand

BHE Series

● Operating stroke length: 7, 10, 14, 16, 22 mm

Double acting

RoHS CAD

Specifications

Descriptions	BHE-01CS	BHE-03CS	BHE-04CS	BHE-05CS	BHE-06CS
Bore size mm	φ12	φ16	φ20	φ25	φ32
Working fluid	Compressed air				
Max. working pressure MPa	0.7 (≈100 psi, 7 bar)				
Min. working pressure MPa	0.2 (≈29 psi, 2 bar)				
Ambient temperature °C	5 (41°F) to 60 (140°F)				
Port size	M3		M5		
Operating stroke length mm	7	10	14	16	22
Rod diameter mm	φ6	φ8	φ10	φ12	φ16
Repeatability mm	±0.01				
Centering precision mm	±0.05				
Weight kg	0.108	0.154	0.260	0.438	1.040
Lubrication	Not required (use turbine oil class 1 ISO VG32 if necessary for lubrication)				

Switch specifications

Descriptions	Proximity 2-wire	Proximity 3-wire
	T2H/V	T3H/V
Applications	Dedicated for programmable controller	For programmable controller, relay
Output method	—	NPN output
Power supply voltage	—	10 to 28 VDC
Load voltage/current	10 to 30 VDC, 5 to 20 mA (*1)	30 VDC or less, 100 mA or less
Indicator lamp	LED (Lit when ON)	
Leakage current	1 mA or less	10 μA or less
Weight	1 m:18 g 3 m:49 g 5 m:80 g	

*1 : The above max. load current is 20 mA at 25°C. The current is lower than 20 mA if the operating ambient temperature around the switch is higher than 25°C. (5 to 10 mA at 60°C)

*2 : Refer to Ending Page 1 for other switch specifications.

* The BHE-LN Series with length measuring function (length measuring sensor) is also available. Refer to page 1431 for details.

How to order

Without switch (built-in magnet for switch)

BHE - 03CS - D

With switch (built-in magnet for switch)

BHE - 03CS - D - T2H - R

Ⓐ Size

Ⓑ Option

Ⓒ Switch model No.

Ⓓ Switch quantity

Code	Content
Ⓐ Size	
01CS	
03CS	
04CS	
05CS	
06CS	
Ⓑ Option	
Blank	Standard
D	Open stroke adjustment mechanism
E	Close stroke adjustment mechanism
DE	Open and close stroke adjustment mechanism

Ⓒ Switch model No.

Axial lead wire	Radial lead wire	Contact	Voltage AC	Voltage DC	Display	Lead wire
T2H*	T2V*	Proximity		●	1-color display	2-wire
T3H*	T3V*	Proximity		●	1-color display	3-wire

* Lead wire length	
Blank	1 m (standard)
3	3 m (option)
5	5 m (option)

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

[Example of model No.]

BHE-03CS-D-T2H-R

Ⓐ Size : 03CS
Ⓑ Option : Open stroke adjustment mechanism
Ⓒ Switch model No.: Proximity T2H switch, lead wire 1 m
Ⓓ Switch quantity : 1 on open side

How to order switch

SW - T2H

Switch model No.
(Item Ⓒabove)

Specifications for rechargeable battery

(Catalog No. CC-1226A)

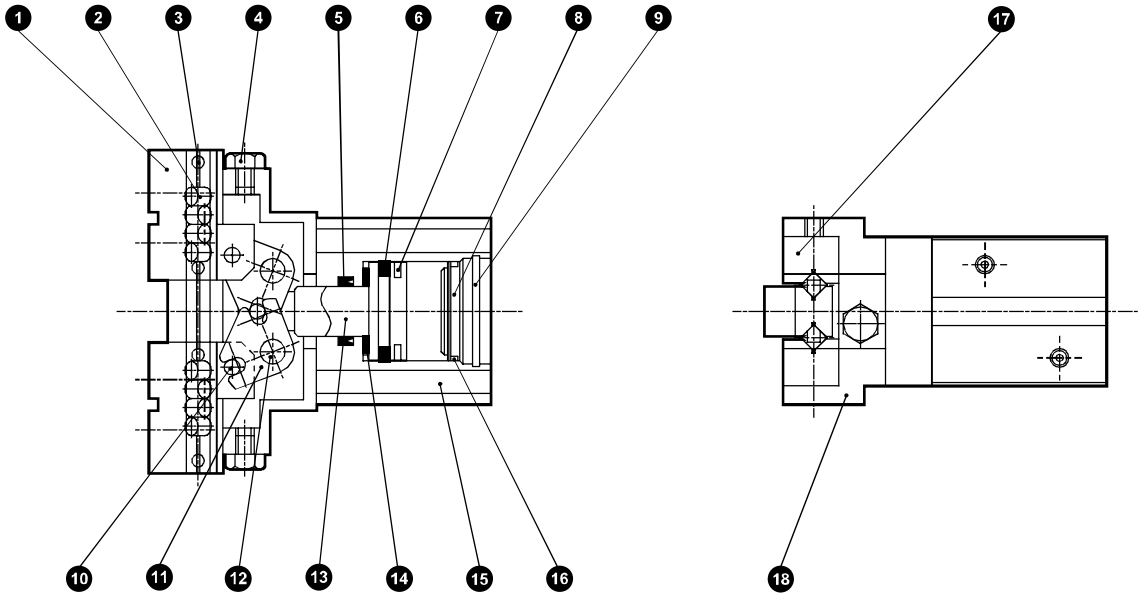
BHE - … - P4*

● Design compatible with rechargeable battery manufacturing process.

* Contact CKD for details.

Internal structure and parts list

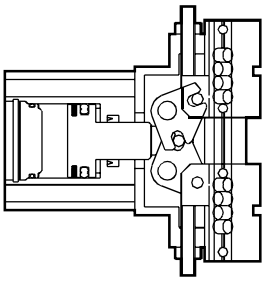
● BHE-01CS to 06CS



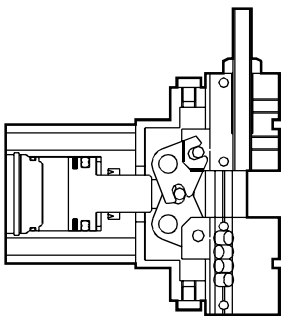
Cannot be disassembled

No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Master key	Stainless steel		10	Operation shaft	High carbon chrome bearing steel	
2	Cross roller	High carbon chrome bearing steel		11	Arm	Stainless steel	
3	Spring pin	Stainless steel		12	Fulcrum axis	High carbon chrome bearing steel	
4	Plug	Copper alloy		13	Piston	Stainless steel	
5	Rod packing	Nitrile rubber		14	Cushion	Urethane rubber	
6	Piston packing	Nitrile rubber		15	Cylinder	Aluminum alloy	
7	Magnet			16	Cylinder gasket	Nitrile rubber	
8	Cylinder guard	Resin		17	Bearing guide	Stainless steel	
9	Snap ring	Stainless steel		18	Body	Aluminum alloy	

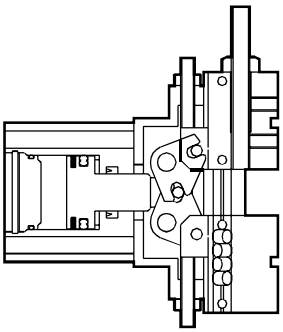
Option internal structure



Open stroke adjustment mechanism
(Option: D)



Close stroke adjustment mechanism
(Option: E)



Open and close stroke adjustment mechanism
(Option: DE)

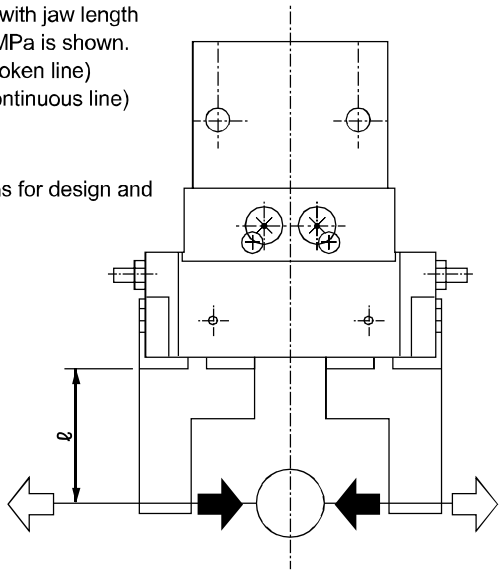
Gripping power performance data

The gripping power in the opening/closing directions with jaw length L of hand with a supply pressure of 0.3, 0.5 and 0.7 MPa is shown.

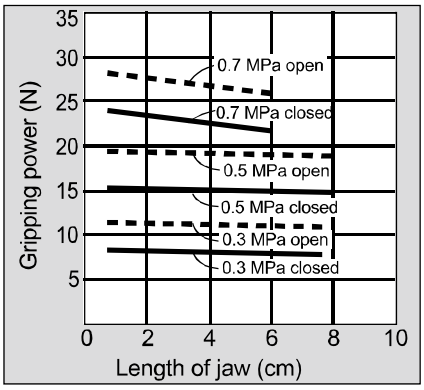
·Open direction (⇦) - - - - - - (shown with broken line)

·Closed direction (➡) ——— (shown with continuous line)

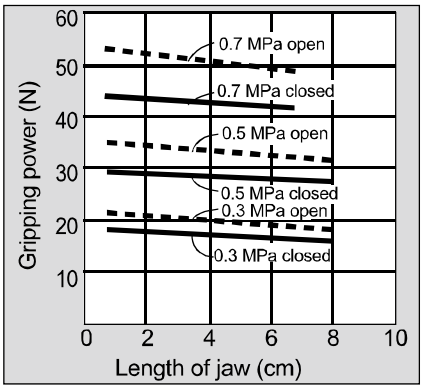
(Note) When making a selection, read the precautions for design and selection on page 1636.



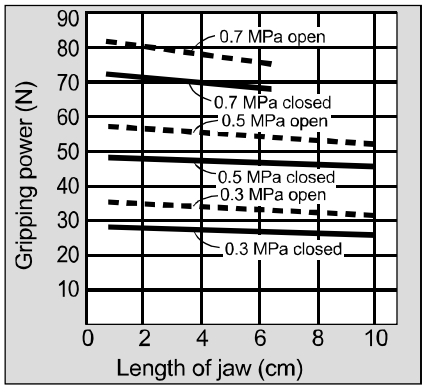
● BHE-01CS



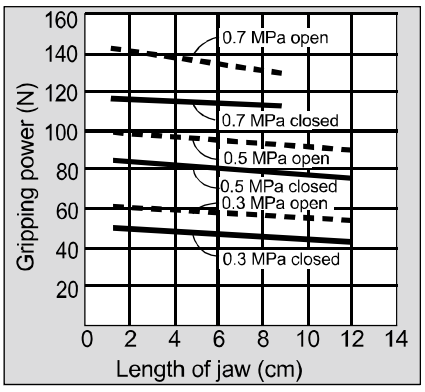
● BHE-03CS



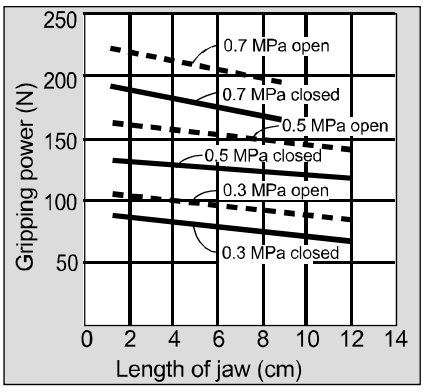
● BHE-04CS



● BHE-05CS

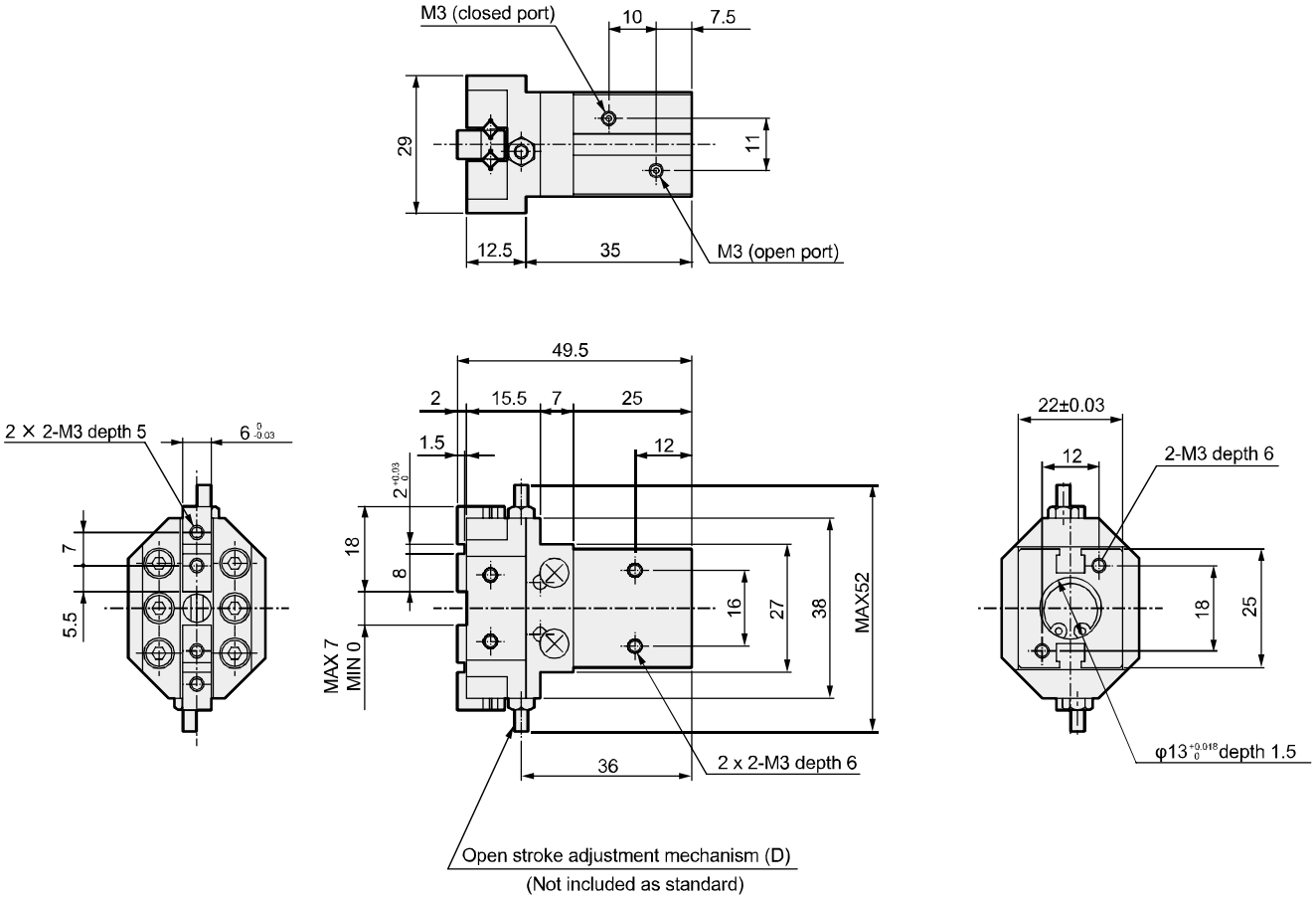


● BHE-06CS

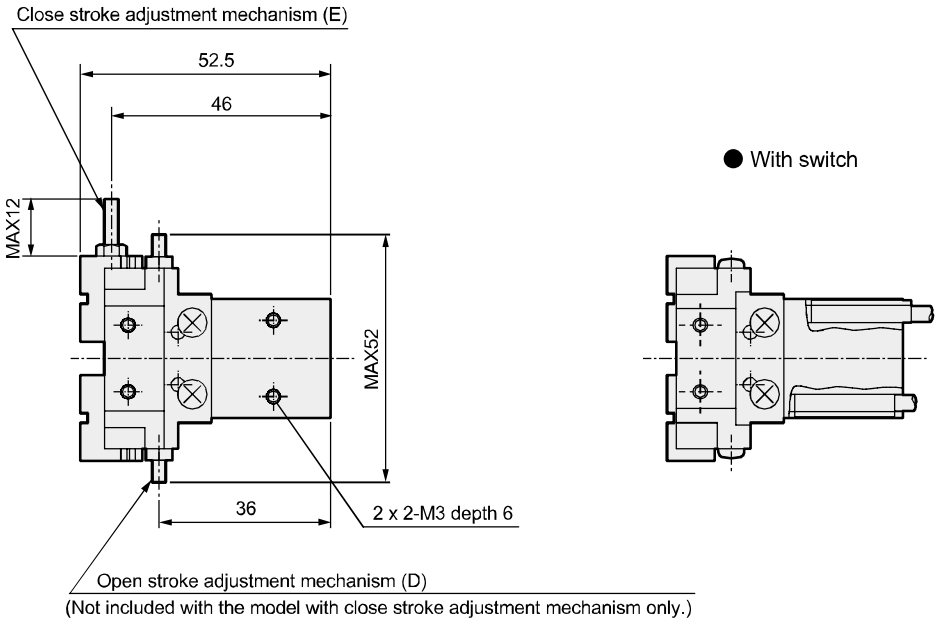


Dimensions CAD

● BHE-01CS (Standard)
● BHE-01CS-D (Open stroke adjustment mechanism)

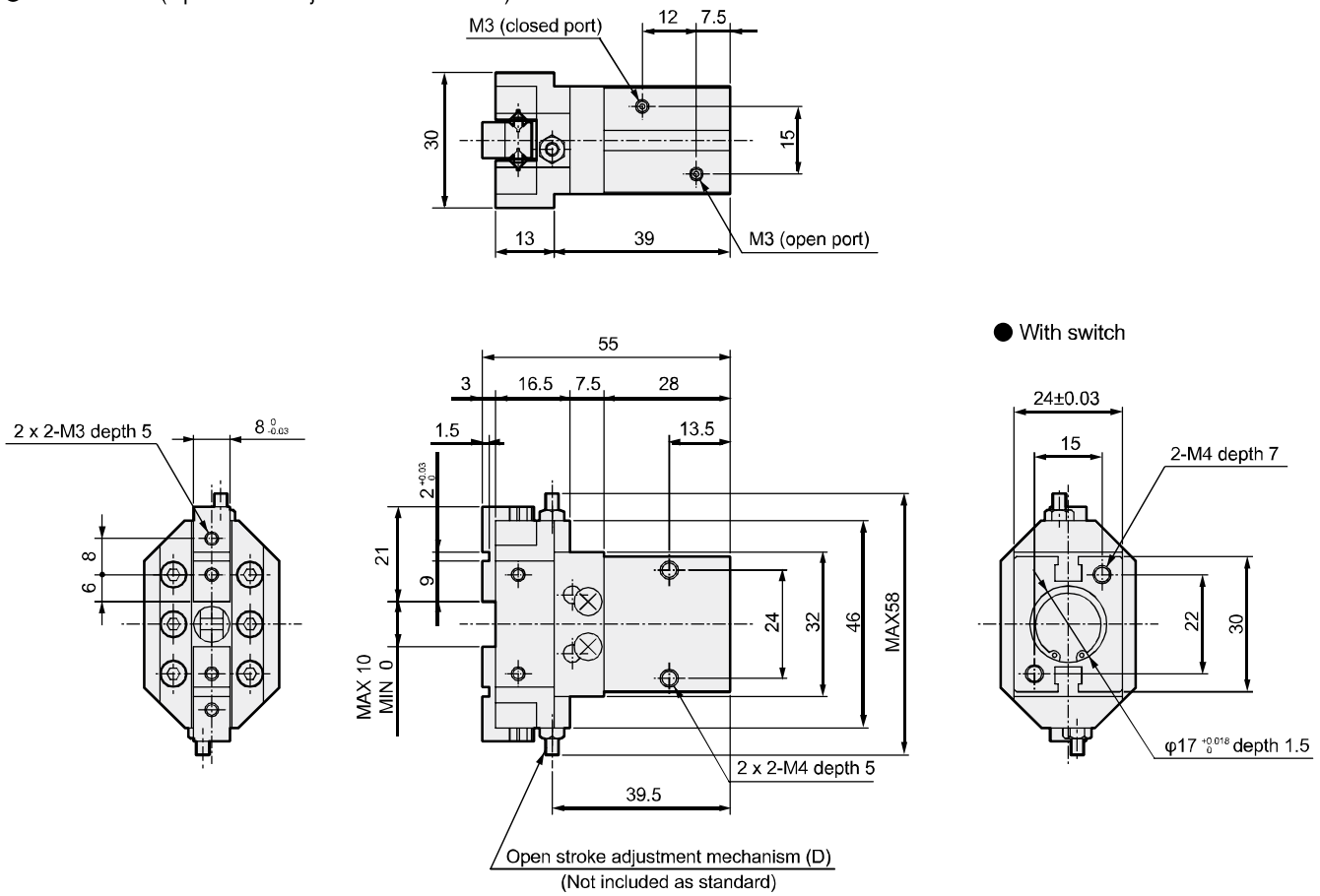


● BHE-01CS-E (Close stroke adjustment mechanism)
● BHE-01CS-DE (Open and close stroke adjustment mechanism)

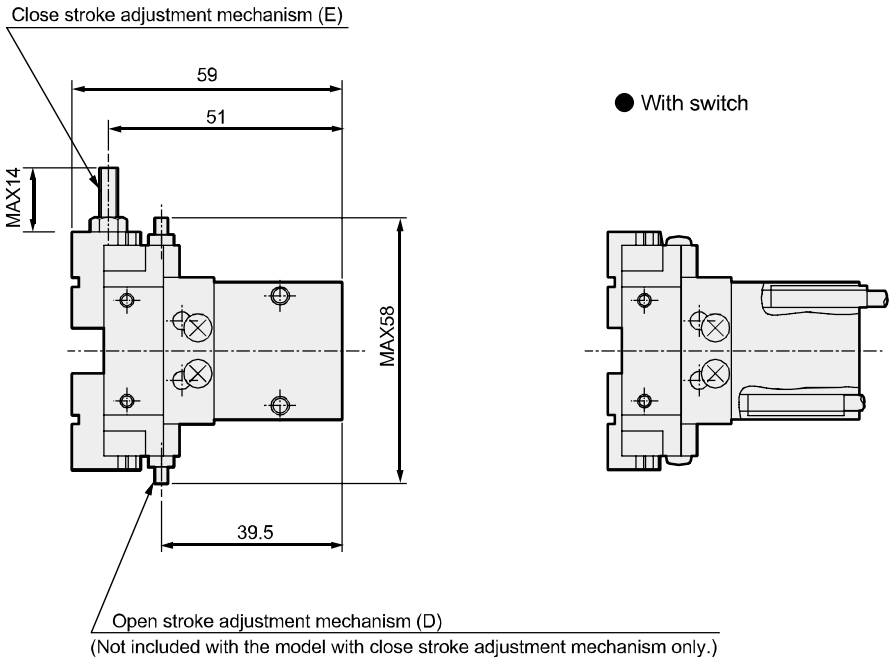


Dimensions

● BHE-03CS (Standard)
● BHE-03CS-D (Open stroke adjustment mechanism)

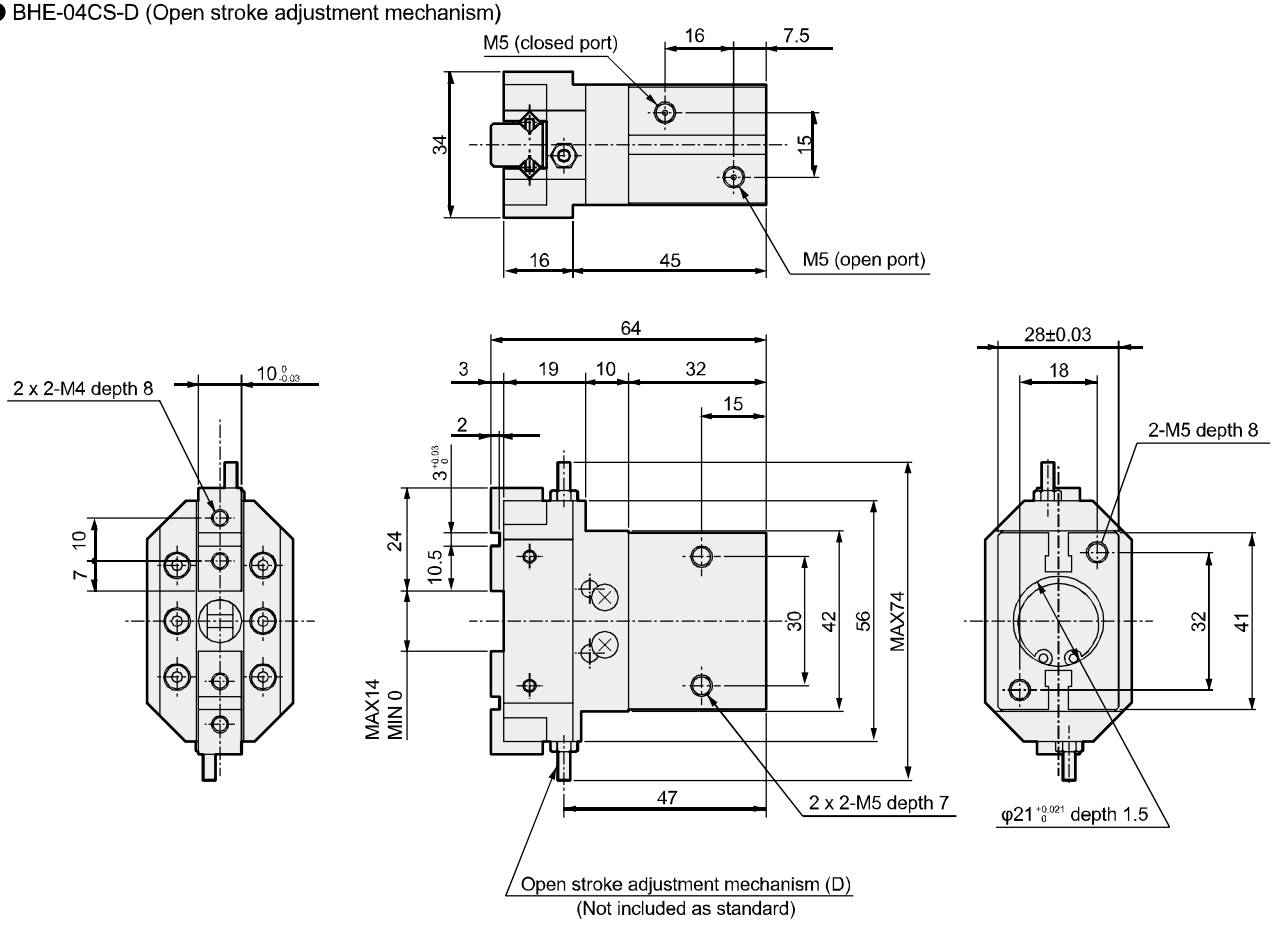


● BHE-03CS-E (Close stroke adjustment mechanism)
● BHE-03CS-DE (Open and close stroke adjustment mechanism)

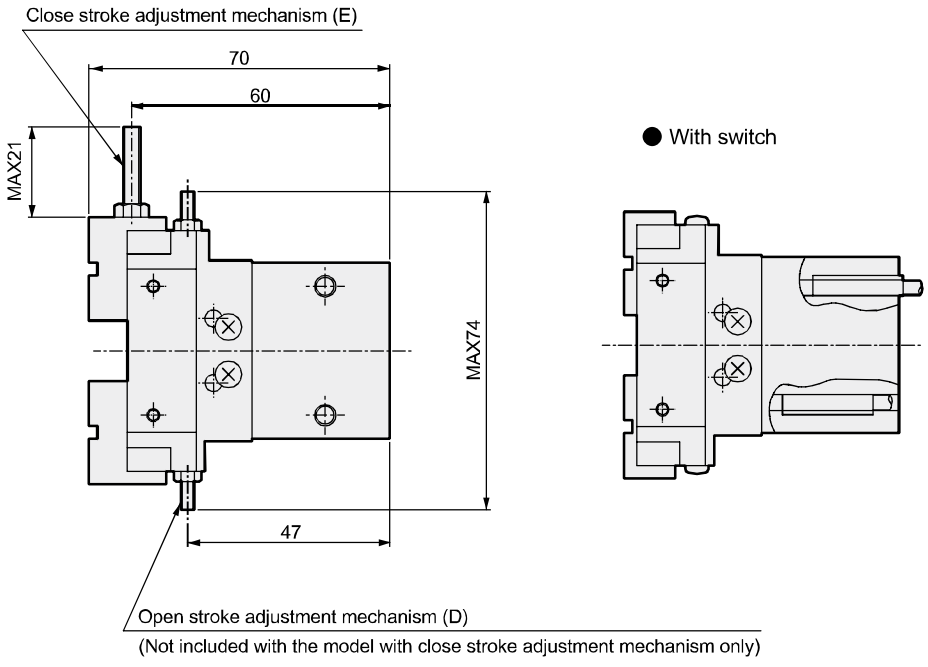


Dimensions CAD

● BHE-04CS (Standard)
● BHE-04CS-D (Open stroke adjustment mechanism)

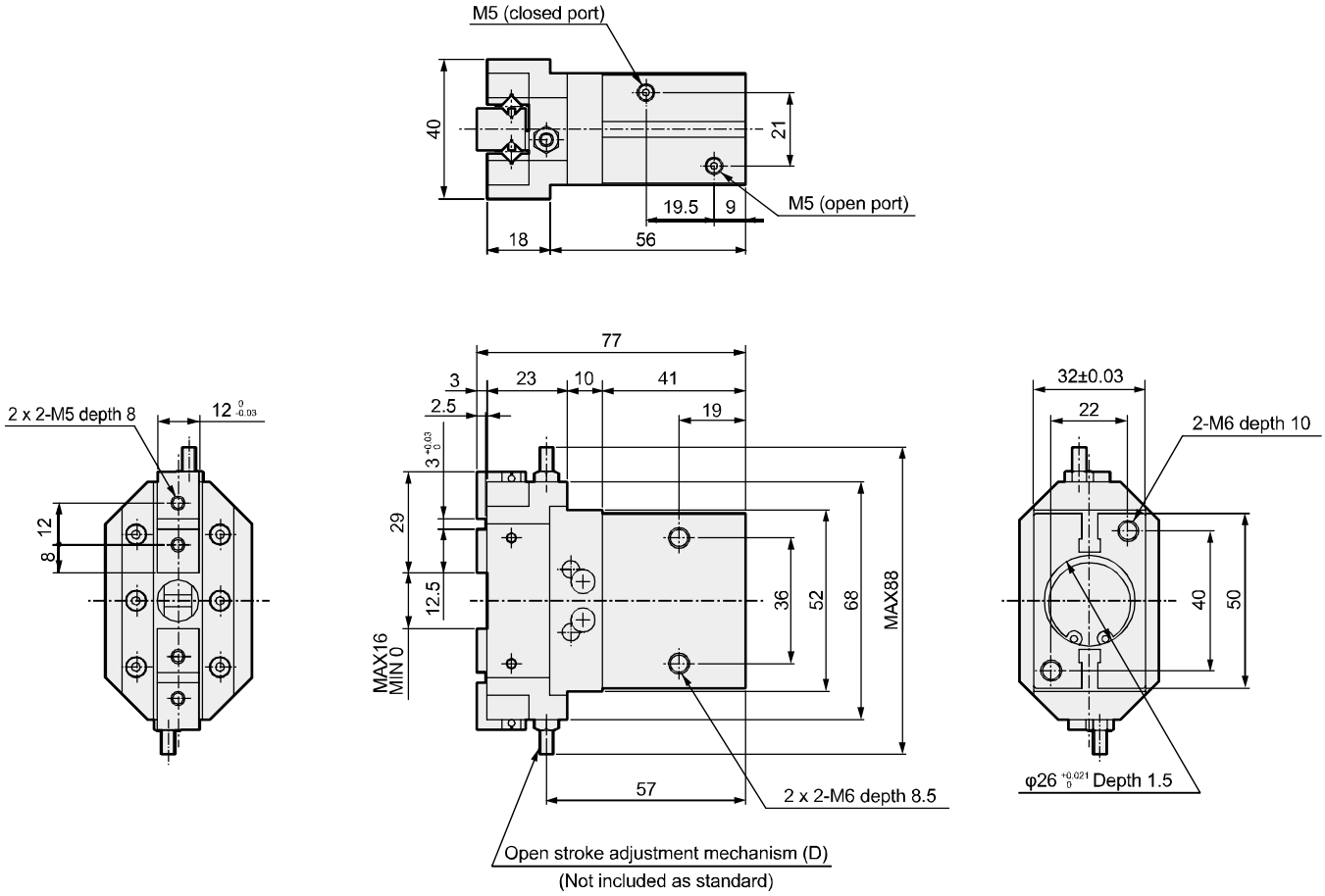


● BHE-04CS-E (Close stroke adjustment mechanism)
● BHE-04CS-DE (Open and close stroke adjustment mechanism)

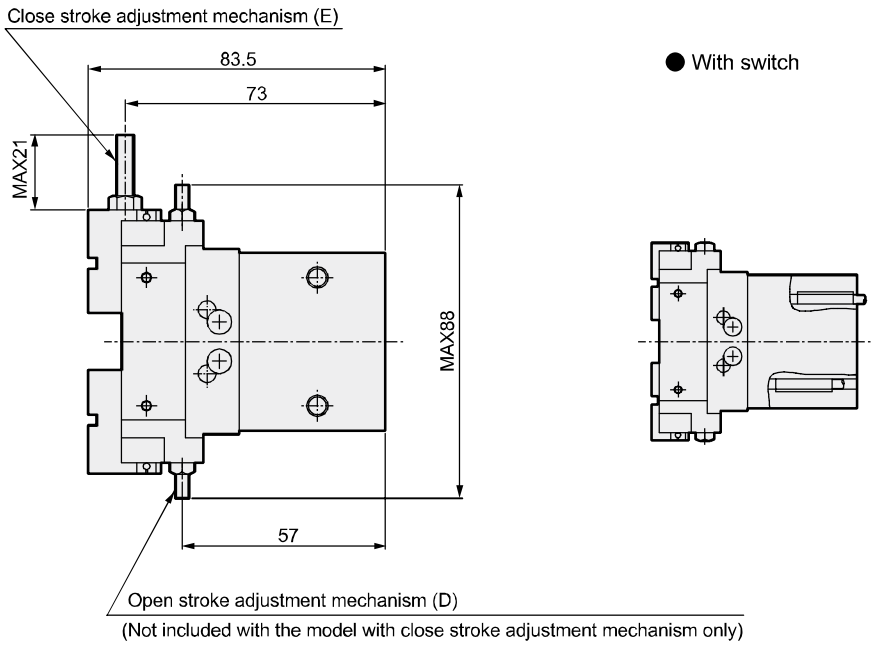


Dimensions

● BHE-05CS (Standard)
● BHE-05CS-D (Open stroke adjustment mechanism)

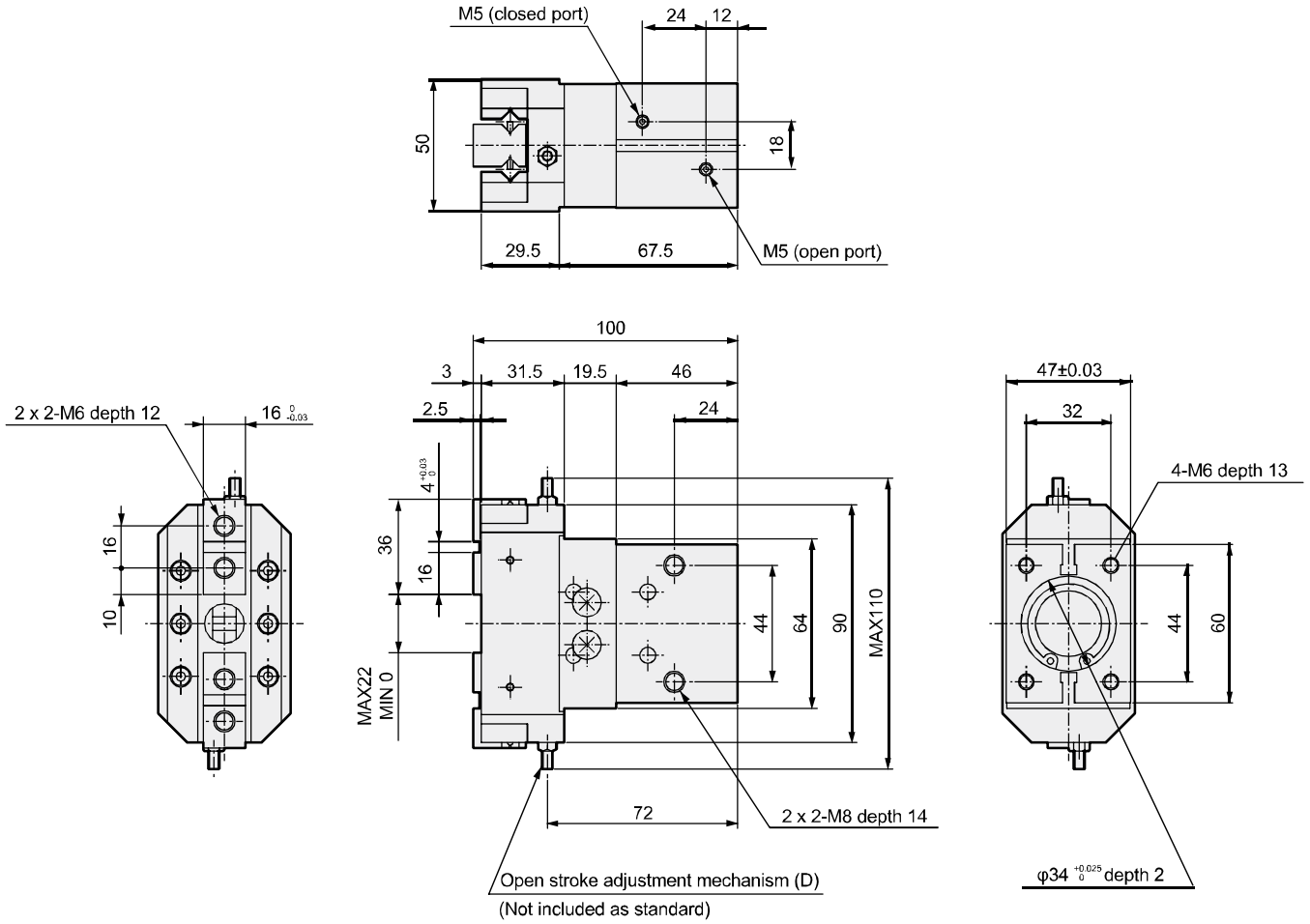


● BHE-05CS-E (Close stroke adjustment mechanism)
● BHE-05CS-DE (Open and close stroke adjustment mechanism)

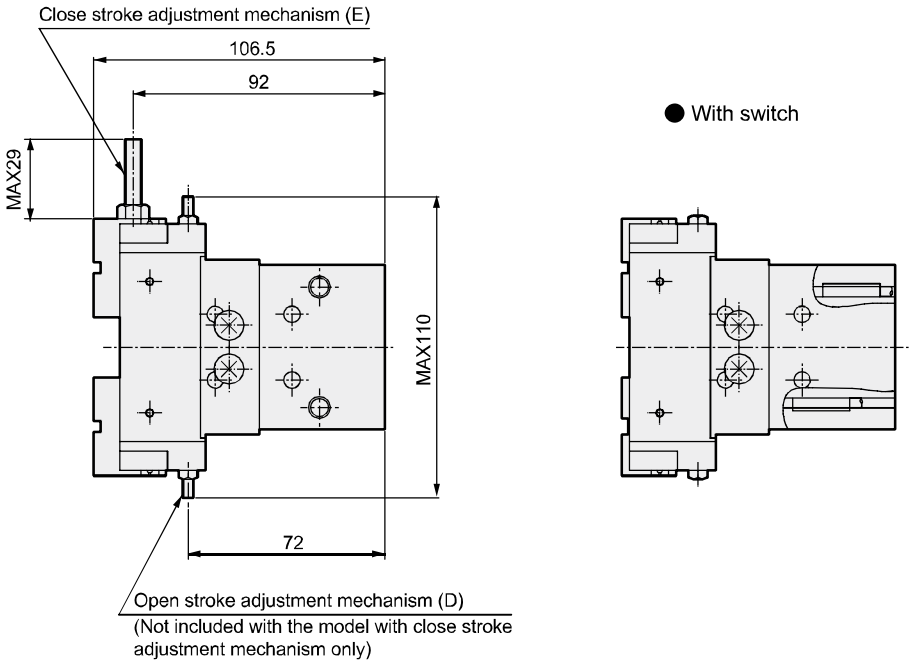


Dimensions CAD

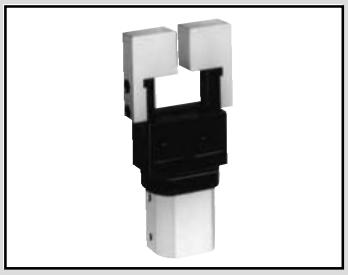
● BHE-06CS (Standard)
● BHE-06CS-D (Open stroke adjustment mechanism)



● BHE-06CS-E (Close stroke adjustment mechanism)
● BHE-06CS-DE (Open and close stroke adjustment mechanism)



MEMO



Small jaw

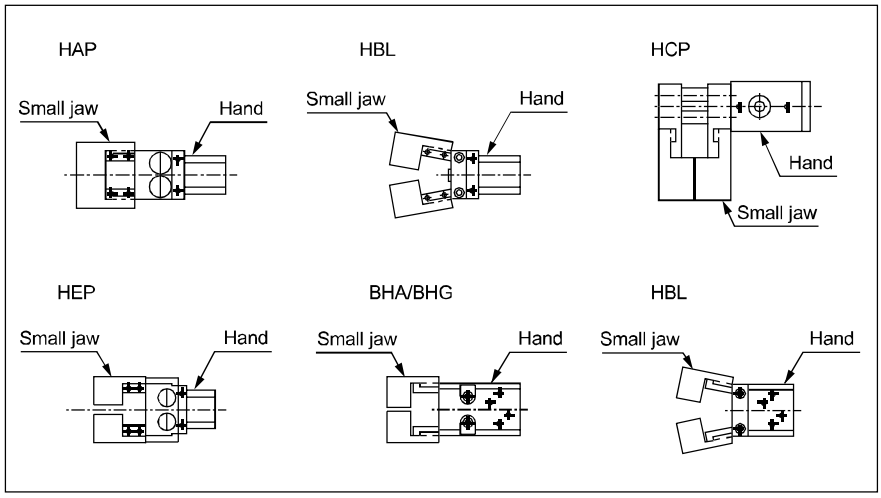
● Material : Iron, engineering plastic

RoHS CAD

Features

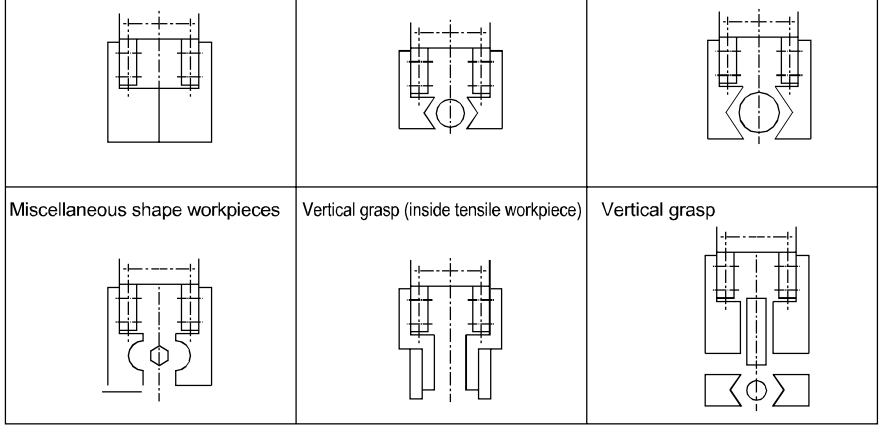
A variety of small jaws (soft) is available to match user machining needs.
● Socket and spigot section machined
Troublesome reference section (spigot section) machined.
Wide series variation to select according to workpiece shape and dimension.
● 2 types of material for small jaw
Iron (S50C) and engineering plastic (MC nylon) are available for optimum selection according to material and working condition of workpiece.

Compatible model for standard small jaw



Small jaw applications

Hand applications		
Soft jaw	Compact workpiece	Large workpiece
Miscellaneous shape workpieces	Vertical grasp (inside tensile workpiece)	Vertical grasp



How to order

(Note : When ordering repair parts, 1 pc. is provided.)

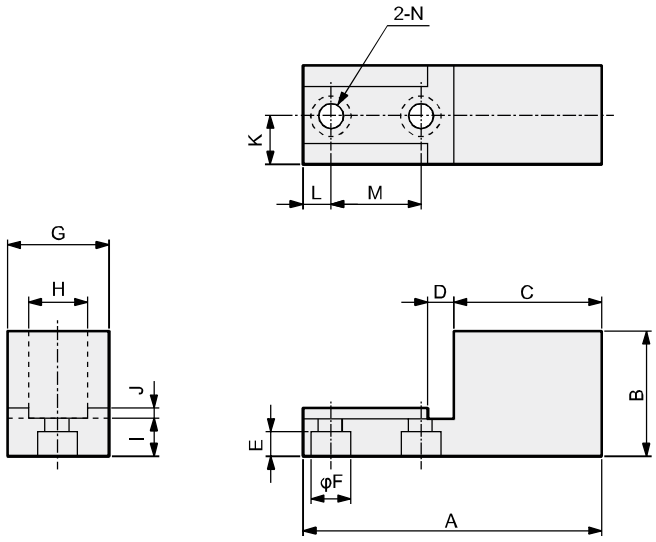
BHA - Y1 - 110

Ⓐ Model Ⓑ Material Ⓒ Small jaw No.

Ⓐ Model		Ⓑ Material		Ⓒ Small jaw No.			
Code	Content	Code	Content	Code	Compatibility	Code	Compatibility
FH	Feather hand (FH100/FH500)	**Y1**	Material S50C	**110**	HAP-1C	**210**	HEP-5CS
HAP	Parallel hand	**Y2**	Material MC nylon	**120**	HAP-2CS, HBL-2CS	**310**	FH110, FH510
BHA	Compact cross roller parallel hand			**130**	HAP-3CS, HBL-3CS	**320**	FH112, FH512
BHG	Compact cross roller parallel hand with rubber cover			**140**	HAP-4CS, HBL-4CS	**330**	FH116, FH516
HEP	Bearing parallel hand			**150**	HBL-1CS	**340**	FH120, FH520
HCP	Lateral parallel hand			**160**	HCP-2CS	**350**	FH125
HBL	Fulcrum hand			**170**	HCP-3CS	**260**	BHA-01CS1, BHG-01CS
				180	HCP-4CS	**270**	BHA-03CS1, BHG-03CS
				190	HEP-3.5CS	**280**	BHA-04CS1, BHG-04CS
				200	HEP-4CS	**290**	BHA-05CS1, BHG-05CS

Dimensions CAD

● 110 to 350



* Material
Y1:S50C
Y2: MC nylon

Small jaw No.	Compatibility	* Material	Dimensions (mm) A	B	C	D	E	φF	G	H	I	J	K	L	M	φN	Weight (g)
110	HAP-1C	Y1	40	17	24.5	4.5	3	6	10	8	5	1.5	5	3.5	8	3.5	39
		Y2		21							9						8
120	HAP-2CS HBL-2CS	Y1	50	26	28	5.5	4	8	20	10	6	2	10	5	12	4.5	135
		Y2		30							10						25
130	HAP-3CS HBL-3CS	Y1	60	33	30.5	6.5	5	9.5	20	12	8	2	10	5.5	18	5.5	194
		Y2															29
140	HAP-4CS HBL-4CS	Y1	80	43	44	7.5	6	11	20	14	10	2	10	8	20	6.5	352
		Y2		50							17						53
150	HBL-1C	Y1	40	19	19	4.5	3	6	12	8	5	1.5	6	4	10	3.5	44
		Y2			21												7
160	HCP-2CS	Y1	60	29	33	9.5	5	9.5	22	$18^{+0.2}_{+0.1}$	9	2	11	11	10	5.5	206
		Y2															31
170	HCP-3CS	Y1	70	35	34	11.5	6	11	25	$20^{+0.2}_{+0.1}$	10	2	12.5	8	20	6.5	303
		Y2															45
180	HCP-4CS	Y1	80	40	42	13	6	11	35	$25^{+0.2}_{+0.1}$	10	2	17.5	10	20	6.5	563
		Y2	78	44						25	14			8			97
190	HEP-3.5CS	Y1	80	41	50	7.5	5	9.5	20	14	10	2	10	6	18	5.5	360
		Y2		49							18						70
200	HEP-4CS	Y1	120	60	81	11.5	6	11	30	22	13	2	15	8	20	6.5	1245
		Y2		77					32		30		16				270
210	HEP-5CS	Y1	135	60	91	14.5	8	14	30	28	16	2	15	10	25	8.5	1443
		Y2		79					38		35		19				382
310	FH110 FH510	Y1	29.5	15	14	4.5	3	6	12	7	4	1.5	6	3.5	8	3.5	22
		Y2															4
320	FH112 FH512	Y1	29.5	16.5	14	4.5	3	6	12	7	4	1.5	6	3.5	8	3.5	23
		Y2															4
330	FH116 FH516	Y1	39	20	20.5	5.5	4	8	12	10	5	1.5	6	3.5	10	4.5	48
		Y2															8
340	FH120 FH520	Y1	39	22.5	20.5	5.5	4	8	12	10	5	1.5	6	3.5	10	4.5	53
		Y2		25.5							8						10
350	FH125	Y1	48.5	22.5	28.5	6.5	5	9.5	14	12	8	2	7	4.5	10	5.5	105
		Y2		25.5							14						17
260	BHA-01CS1 BHG-01CS	Y1	30	17.5	14.5	4.5	3	6	14	10	5	1.5	7	4	8	3.5	38
		Y2															6
270	BHA-03CS1 BHG-03CS	Y1	40	21	21	5.5	4	8	14	10	6	1.5	7	4.5	10	4.5	61
		Y2		23							8						11
280	BHA-04CS1 BHG-04CS	Y1	40	26.5	21	5.5	4	8	14	10	6	1.5	7	4.5	10	4.5	76
		Y2		29.5							9						12
290	BHA-05CS1 BHG-05CS	Y1	50	33	28.5	6.5	5	9.5	14	10	8	2	7	6	10	5.5	123
		Y2		39							14						23

Safety Precautions

Be sure to read this section before use.

Refer to Intro Page 73 for general information of the cylinder, and to Intro Page 80 for general information of the cylinder switch.

Product-specific cautions: Hand Series

Design/selection

1. Common

⚠ WARNING

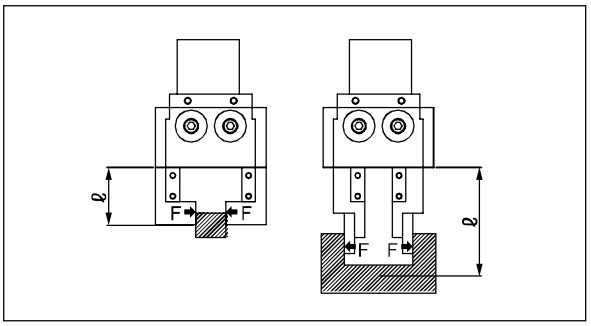
■ If the moving workpiece poses a possible risk to personnel or if fingers could be caught in the master key, etc., install a protective cover, etc.

■ If the circuit pressure drops due to power failure or air source trouble, the gripping power may decrease and the workpiece may fall. Provide position locking measures, etc., so that personnel are not injured or machines damaged.

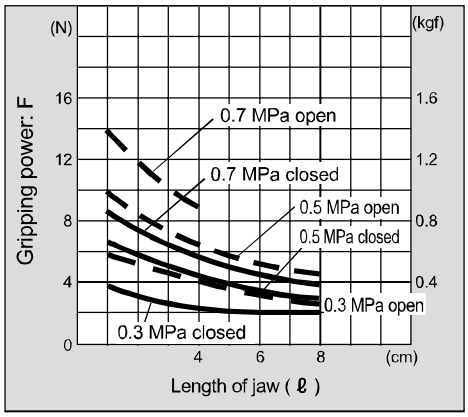
⚠ CAUTION

■ Precautions for gripping power

- Gripping power represents the force holding the workpiece, as shown in the figure below.



- Performance data indicates the gripping power at hand jaw length ℓ at a supply pressure of 0.15 to 0.7 MPa.



- To find the gripping power from performance data, if the distance from the small jaw to the workpiece center of gravity when manufactured is ℓ, gripping power F

  When ℓ = ℓ1 F = F1

  When ℓ = ℓ2 F = F2 Refer to the upper right figure is expressed as above.

- When mounting an L-shaped jaw, select length as shown below.

  Example: If the L-shape is 30 mm in the master key direction and 30 mm at a 90° angle, assume the small jaw length is 60 mm.

- Length of jaw should be within the numerical value given in the gripping power performance data table of each model.
- Max. working length of jaw should be within the performance data.

  When transferring workpiece (weight W_L), the reference is as below.

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

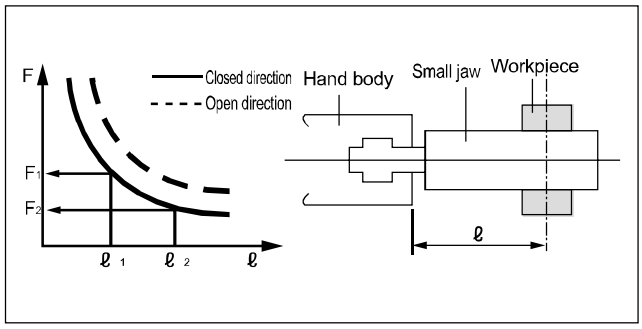
  $W_L \times 9.8 \times 10 < (F \times N)$ [normal transport]

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

  W_L: Weight of workpiece [kg]

  F : Gripping power [N]

  N : Number of jaws [pcs.]



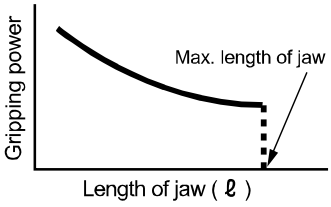
■ Use small jaws as short and lightweight as possible.

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

- Length of small jaw should be within the numerical values of performance data.
- The weight of the small jaw affects durability, so check that the weight is less than the following value:

  W < 1/4H (1 pc.) W : Weight of small jaw

  H : Product weight of Hand



- Single acting has minimum gripping power near the stroke end (open end for NO, closed end for NC). Due to the spring structure, it may not return when operating with a short stroke; therefore, consider a jaw shape that clamps the workpiece with a sufficient stroke.

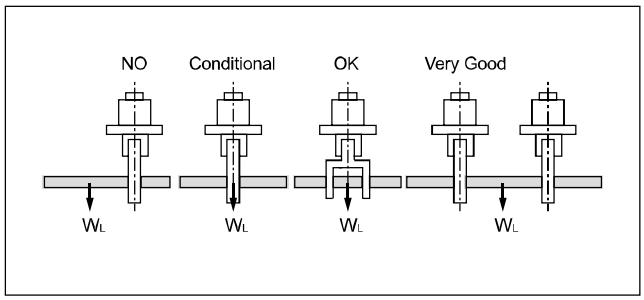
■ Working environment

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

Do not use the equipment under the following environments.

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

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



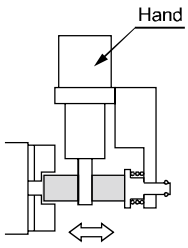
■ Select a model that has sufficient power to grip the workpiece weight.

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

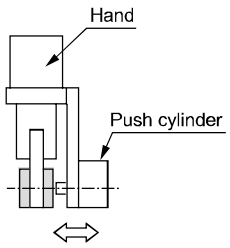
■ If directly inserting the workpiece into the jig with the hand, consider clearance during design. The hand could be damaged.

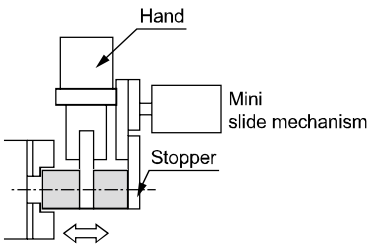
Hand

● Push-in jig with ejector



● When using push cylinder





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

■ If the small jaw is not rigid enough, the resulting sag could cause the master key to twist or adversely affect operation.

■ Adjust the chuck open/close speed with the speed controller (optional).
When used at high speed, backlash may occur sooner.

2. Linear slide cylinder LSH Series

■ When mounting an L-shaped jaw, use within the range on page 1480.

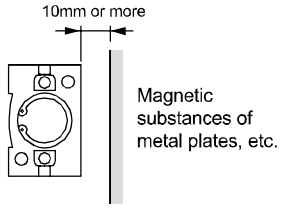
Mounting, installation and adjustment

1. Common

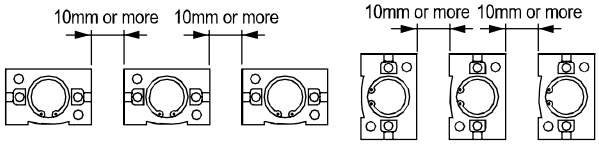
⚠CAUTION

■ If a lateral load or load with a large impact is applied to the master key, play or damage could occur. Adjust and check that external force is not applied to the master key.

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



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

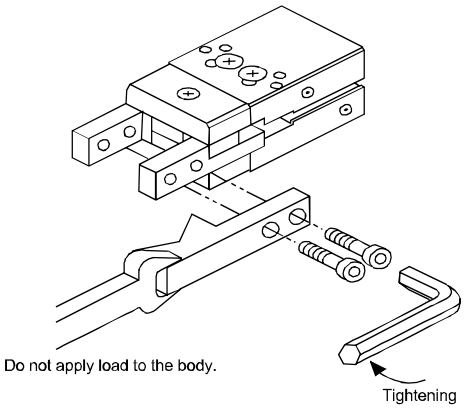


■ Clamping operation is accurate when performed as softly as possible at a low speed. Repeatability is also stable.

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

■ Installing the jaw

When mounting the jaw to the master key, to prevent any effect on the hand, support with a wrench, etc., when tightening so that the master key is not twisted.

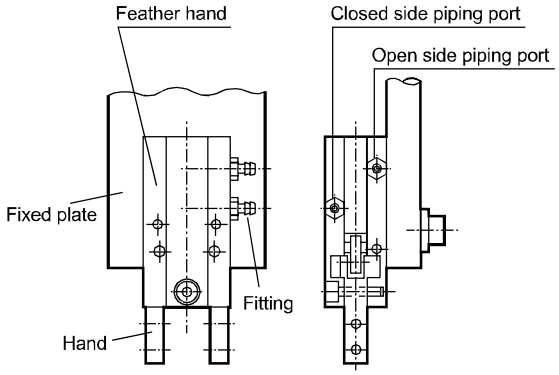


■ Do not retighten or disassemble, other than the screws used for fixing the body and jaw. This could lead to malfunction.

2. Installation

■ Do not cause dents or scratches that may damage flatness or perpendicularity on the body mounting surface or master key.

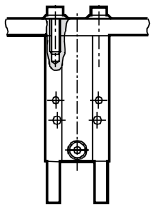
■ If there is a limit to the thickness direction of the FH Series body, the available piping fitting will be limited. Refer to the following fittings.



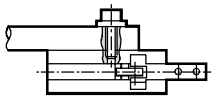
Model		FH*10	FH*12		FH*16	FH*20	FH*25
Bore size		M3			M5		
Fitting		Model No.	Applicable O.D. (mm)	Eff. X-sectional area (mm²)	Model No.	Applicable O.D. (mm)	Eff. X-sectional area (mm²)
Barbed fitting	Straight FTS	FTS4-M3	φ3.2/φ4	0.4	FTS4-M5	φ3.2/φ4	2.1
		-	-	-	FTS6-M5	φ6	4.1

■ Refer to the following section for FH Series body mounting.

● Top mounting

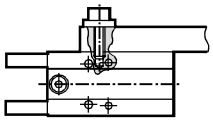


● Front mounting



Note) For types with switch, ensure that the screw insertion depth is less than that in the table below, so that the bolt tip does not press the switch.

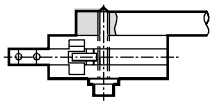
● Side mounting



Note) Ensure that the fixed plate does not contact the master key fulcrum.

Model	Working bolt size	Max. screw insertion depth (mm)	Recommended tightening torque (N·cm)
FH*10	M3×0.5	4.5	70
FH*12	M3×0.5	4.5	70
FH*16	M4×0.7	6	160
FH*20	M5×0.8	7.5	330
FH*25	M5×0.8	12	330

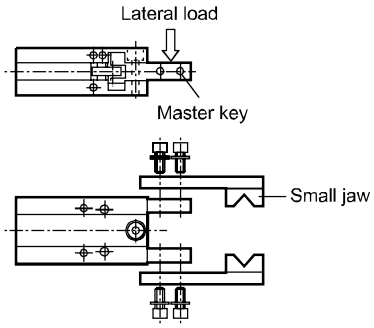
● Use of through hole



Model	Working bolt size	Recommended tightening torque (N·cm)
FH*10	M3×0.5	32
FH*12	M2.5×0.45	32
FH*16	M3×0.5	90
FH*20	M4×0.7	210
FH*25	M4×0.7	210

Note) Through hole cannot be used when switch is provided.
Note) Ensure that the fixed plate does not contact the master key fulcrum.

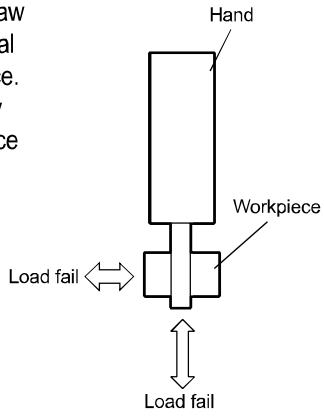
■ When installing the small jaw, check that a lateral load is not applied to the master key.



■ Tighten with the following tightening torque when mounting.

Thread nominal	M3	M4	M5	M6	M8
Recommended tightening torque (N·m)	0.59	1.4	2.8	4.8	12.0

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

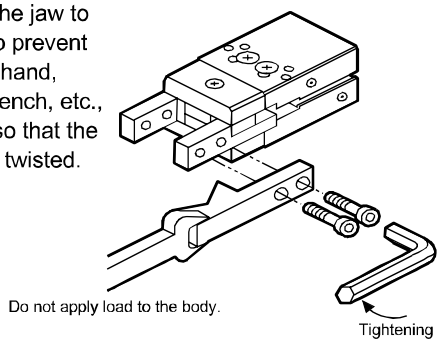


3. Linear Slide Hand LSH Series

⚠ CAUTION

■ Installing the jaw

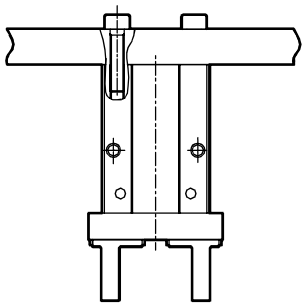
When mounting the jaw to the master key, to prevent any effect on the hand, support with a wrench, etc., when tightening so that the master key is not twisted.



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

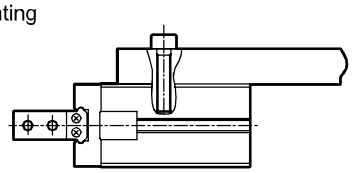
■ Refer to the following section for body mounting.

● Top mounting



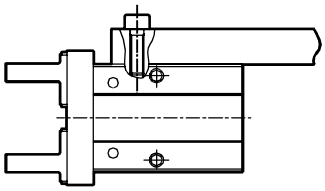
Descriptions	Bolt used	Tightening torque (N·m)	Max. insertion depth L (mm)
LSH-10	M3×0.5	0.88	6
LSH-16	M4×0.7	2.1	8
LSH-20	M5×0.8	4.3	10
LSH-25	M6×1.0	7.3	12

● Front mounting



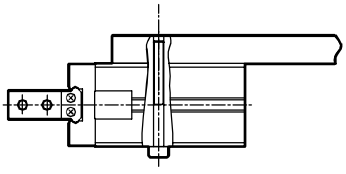
Descriptions	Bolt used	Tightening torque (N·m)	Max. insertion depth L (mm)
LSH-10	M3×0.5	0.69	5
LSH-16	M4×0.7	2.1	8
LSH-20	M5×0.8	4.3	10
LSH-25	M6×1.0	7.3	12

● Side mounting



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

● Use of through hole



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

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

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

Use/maintenance

1. Common

⚠CAUTION

■ Do not disassemble or modify the body.
(excluding LSH Series)

■ Repeatability

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

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