Range of gripping power at supply pressure 0.5MPa and general jaw length

(Note) Grip applies to one jaw.
The actual value is grip x 2.

	Variation	Model no.	Action of jaw (J)	Gripping power (N)	Switch model no.	Page
Wide angle hand	Feather hand (Min-fulcrum hand)	FH500		510 (10° open -25° closed) 512 (10° open -25° closed) 516 (10° open -25° closed) 520 (10° open -25° closed)	T2H/V T3H/V	376
	Fulcrum hand	HBL		1C (15) 2CS (20) 3CS (25) 4CS (40)	T2H/V T3H/V	382
	Wide angle hand	HDL		3CS (25) 4CS (40)	T2H/V T3H/V	388
	Thin wide angle hand	HMD		16C (184° open -4° closed) 25C (184° open -4° closed)	T2H/V T3H/V	392
Parallel hand	Toggle hand	HJL		32CS (28° open -3° closed) 40CS (28° open -3° closed) 50CS (28° open -3° closed) 63CS (28° open -3° closed)	T2H/V T3H/V	396
Centering hand	Centering hand	BHE		01CS (7) 03CS (10) 04CS (14) 05CS (16) 06CS (22)	T2H/V T3H/V	402

(Example)
110 (8)
Model Gripping power Stroke length (mm) or open and close degree

Safety precautions

Always read this section before starting use.
Refer to Intro 69 for general precautions of the cylinder, and to Intro 78 for general precautions of the cylinder switch.

Hand Series

Design & Selection

1. COMMON

⚠ WARNING

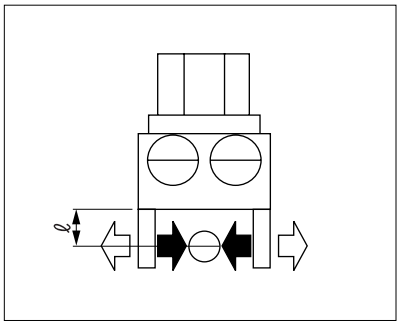
■ If the moving workpiece poses a possible risk to personnel or if fingers could be caught in the master key, etc., install a protective cover, etc.

■ If circuit pressure drops due to a service interruption or problems in the air source, gripping power drops and the workpiece could drop. Provide position locking measures, etc., so that personnel are not injured or machines damaged.

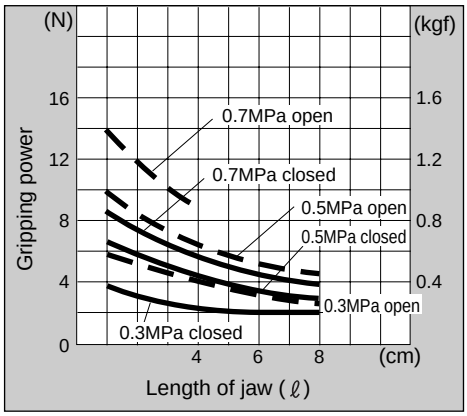
⚠ CAUTION

■ Cautions on gripping power

● The grip is for one master jaw when all master and small jaws contact the workpiece as shown below.



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



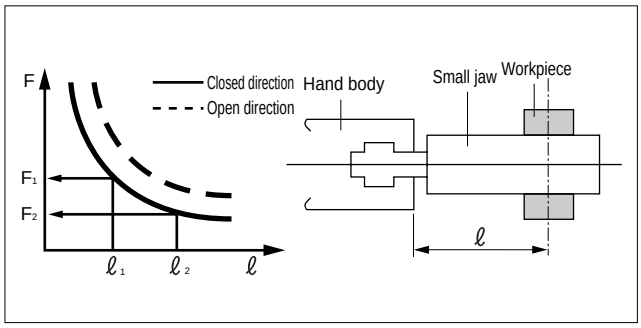
● To obtain gripping power from performance data, if the distance to the workpiece's center of gravity is ℓ when manufacturing the small jaw, gripping power F is expressed as follows

When ℓ = ℓ 1, then F = F1
When ℓ = ℓ 2, then F = F2

Refer to the drawing below.

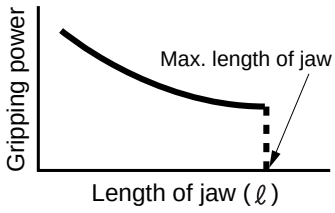
● The jaw's working max. length can be used within performance data.
When N is used to express the number of jaws as reference for the coefficient for transferring workpiece weight W_L

WL × 9.8: (F × N) = 1:5 (only gripping)
WL × 9.8: (F × N) = 1:10 (normal transfer)
WL × 9.8: (F × N) = 1:20 (sudden acceleration transfer)
WL × 9.8: Workpiece weight (kg)
F: Gripping power (N)
N: Number of jaws

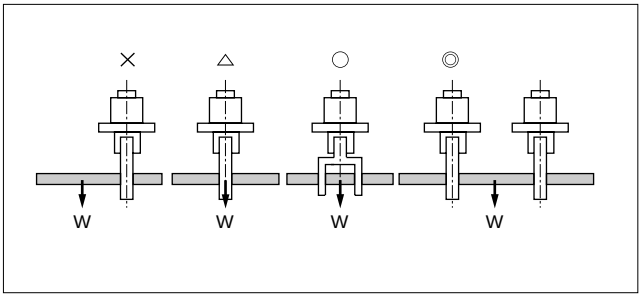


■ Use as short and light a small jaw as possible.
If the small jaw is long and heavy, inertia increases when opening and closing. This may cause play in the master key, and may adversely affect life.

● The small jaw's length must be within performance data.
● The weight of the small jaw affects life, so check that it is within the following value.
W < 1/4H (1 pc.) W: Weight of small jaw
H: Product weight of hand



■ When gripping a long object or large workpiece, the center of gravity must be gripped to provide stable prehension. It is also necessary to stabilize prehension by increasing the size or using multiple jaws.



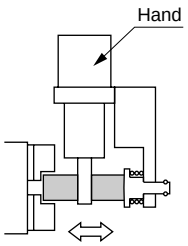
■ Select a model that has sufficient power to grip the workpiece weight.

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

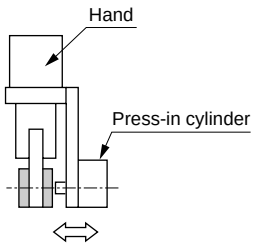
■ If directly inserting the workpiece into the jig with the hand, consider clearance during design to avoid damaging the hand.

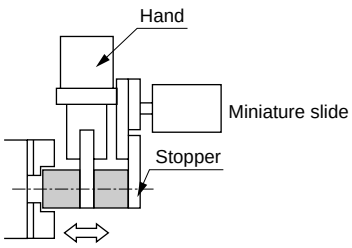
Hand

● Pushing against jig with spring



● Using a press-in cylinder





Note) The workpiece is slid along the top of the small jaw, so chuck life could drop markedly. Sufficient consideration should be made for the shape of the small jaw.

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

■ Adjust the chuck open/close speed with the speed control valve (optional).
Play may occur quickly when used at a high speed.

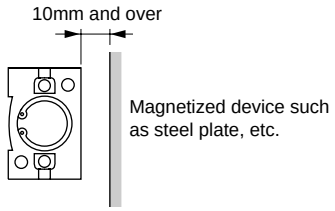
Installation & Adjustment

1. COMMON

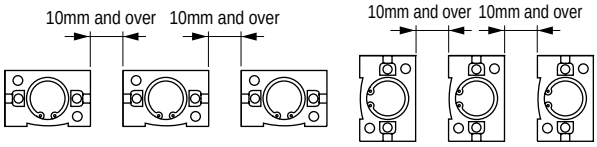
⚠ CAUTION

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

■ The cylinder switch could malfunction if there is magnetic substance, such as a steel plate, near the cylinder switch. Keep magnetic substance at least 10mm from the cylinder.



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

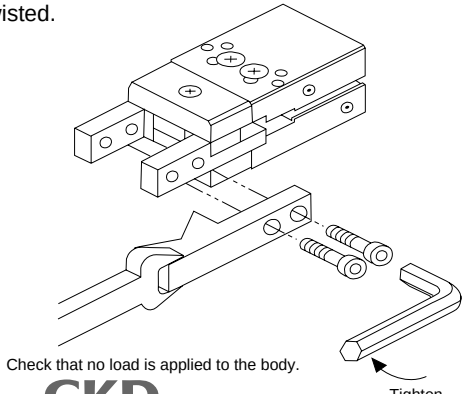


■ If the clamp is operated carefully and slowly as possible, accuracy increases. Repeatability also stabilizes.

■ Regularly grease the sliding section of the master key. Periodic replenishment of grease will extend the life of the part.

■ Installing the jaw

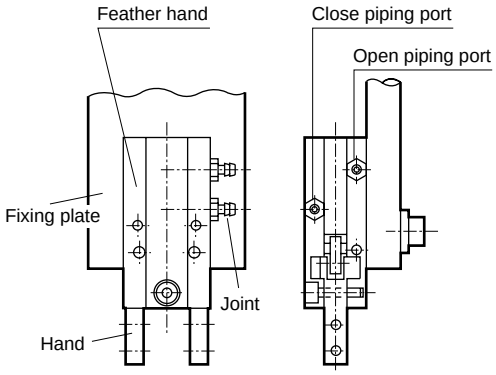
To prevent any effect onto the hand, support the master key with a wrench, etc., and tighten so that the master key is not twisted.



2. Installation

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

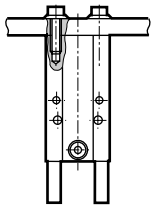
■ If there is a limit to the thickness direction of the FH series body, the available piping joint will be limited. Refer to the following joints.



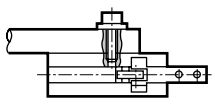
Model	FH*10	FH*12	FH*16	FH*20	FH*25
Port size	M3		M5		
Joint	Model no.	Applicable O.D. (mm)	Effective sectional area (mm²)	Model no.	Applicable O.D. (mm)	Effective sectional area (mm²)
Barbed joint — Straight FTS	FTS4-M3	φ3.2·φ4	0.4	FTS4-M5	φ3.2·φ4	2.1
	-	-	-	FTS6-M5	φ6	4.1

■ Refer to the section below for details on installing the FH series.

● Top installation



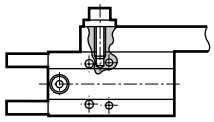
● Front installation



Note) When a switch is provided, screw the bolt into as shown below so the switch is not pressed by the end of the bolt.

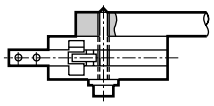
Note) Check that the fixed plate does not overlap the master jaw support.

● Side installation



Model	Applicable bolt size	Max. screw 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 throught hall

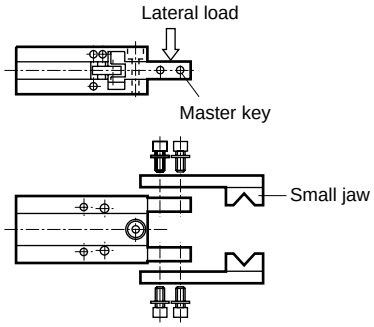


Model	Applicable bolt size	Recommended tightening torque (N·cm)
FH*10	M3 ×0.5	32
FH*12	M2.5×0.45	32
FH*16	M3 ×0.5	90
FH*20	M4 ×0.7	210
FH*25	M4 ×0.7	210

Note) A throught hall cannot be used when a switch is provided.

Note) Check that the fixed plate does not overlap the master jaw support.

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



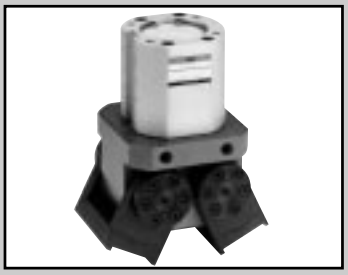
■ Tighten with the following tightening torque.

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

During Use & Maintenance

⚠ CAUTION

■ Do not dissemble or modify the body.



Wide angle hand Double acting/single acting

HDL Series

● Open and close angle: 0° to 180°

RoHS CAD

Specifications

Descriptions		HDL	
Size		3CS	4CS
Cylinder bore size	mm	ϕ25	ϕ40
Actuation		Double acting/single acting	
Working fluid		Compressed air	
Max. working pressure	MPa	0.7	
Min. working pressure	MPa	0.3	
Ambient temperature	℃	5 to 60	
Port size		M5	Rc1/8
Open angle	Degree	0 to 180	
Rod diameter	mm	ϕ14	ϕ16
Capacity of reciprocating	cm_3	7.8	53.2
Repeatability	mm	±0.2	±0.1
Product weight	kg	0.6	2.40
Lubrication		Not required (when lubricating, use turbine oil Class 1 ISO VG32)	

Switch specifications

Descriptions	Proximity 2 wire	Proximity 3 wire
	T2H/T2V	T3H/T3V
Applications	Programmable controller	Programmable controller, relay
Output method	-	NPN output
Power voltage	-	10 to 28 VDC
Load voltage/current	10 to 30 VDC, 5 to 20 mA (Note 1)	30 VDC or less, 100mA or less
Light	LED (ON lighting)	
Leakage current	1mA or less	10μA or less
Maximum shock resistance	980m/s_2	
Lead wire	Standard 1m (oil resistant vinyl cabtire cable 2-conductor 0.2mm^2)	Standard 1m (oil resistant vinyl cabtire cable 2-conductor 0.2mm^2)

Note 1: Max. load current above: 20 mA at 25℃.
The current will be lower than 20mA if ambient temperature around switch is higher than 25℃. (5 to 10mA with 60℃)

How to order

Without switch

HDL - 3CS - O

With switch

HDL - 3CS - O - T2H - R

Ⓐ Size

Ⓑ Option

Ⓒ Switch model no.
* indicates lead wire length.

Ⓓ Switch quantity

Symbol	Descriptions
Ⓐ Size	
3CS	
4CS	
Ⓑ Option	
Blank	Standard (double acting)
O	Single acting (normally open)
C	Single acting (normally closed)
Ⓒ Switch model no.	

Axial lead wire	Radial lead wire	Contact	Indicator	Lead wire
T2H*	**T2V***	Proximity	1 color indicator type	2-wire
T3H*	**T3V***			3-wire

***Lead wire length**	
Blank	1m (standard)
3	3m (option)
5	5m (option)
Ⓓ Switch quantity	
R	One on open side
H	One on closed side
D	Two

<Example of model number>

HDL-3CS-O-T2H-R

Model: Wide angle hand
Ⓐ Size : 3CS
Ⓑ Option : Single acting, normally open type
Ⓒ Switch model no.: Proximity T2H switch, lead wire 1m
Ⓓ Switch quantity : One on open side

How to order switch

● For switch T*H*

· Switch body + mounting bracket

HDL - T2H

Switch model no.
(Item above Ⓒ)

· Switch body

SW - T2H

Switch model no.
(Item above Ⓒ)

· Mounting bracket

HDL - T

● For switch T*V*

· Switch body + mounting bracket

HDL - T2V - *

Switch model no.
(Item above Ⓒ)

· Switch body

SW - T2V

Switch model no.
(Item above Ⓒ)

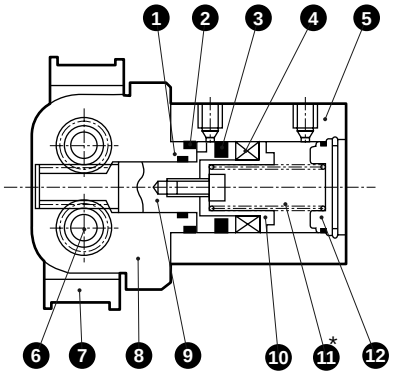
· Mounting bracket

HDL - TV - *

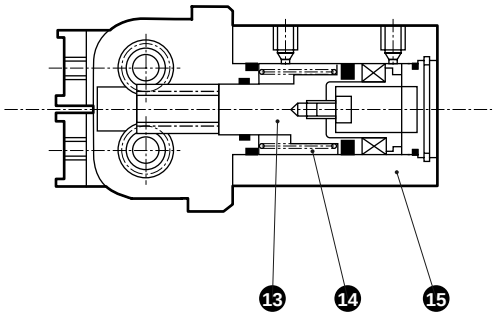
(Select either R (open) or H (closed) for sections marked with an asterisk (*).)

Internal structure and parts list

● Standard (double acting)/O (normally open) type



● C (normally closed) type



* Spring of ⓫ is not contained in standard (double acting) type.

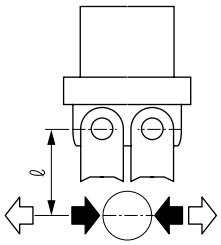
No.	Parts name	Material	Remarks	No.	Parts name	Material	Remarks
1	Rod packing seal	Nitrile rubber		9	Piston A	Stainless steel	
2	Cylinder gasket	Nitrile rubber		10	Piston B	Acetar resin	
3	Piston packing seal	Nitrile rubber		11	Spring	Stainless steel	Only O type
4	Magnet			12	Cylinder guard	Acetar resin	
5	Cylinder	Aluminum alloy		13	Piston	Stainless steel	
6	Pinion gear	Steel		14	Spring	Stainless steel	
7	Master key	Steel		15	Cylinder	Aluminum alloy	
8	Body	Aluminum alloy					

Gripping power performance data

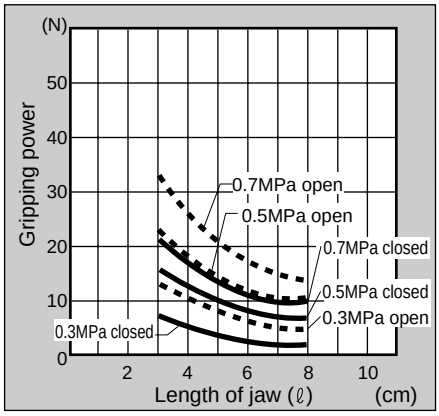
Gripping power that functions to open and closed directions with jaw length ℓ of hand at supply pressure 0.3, 0.5 and 0.7 MPa is shown.

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

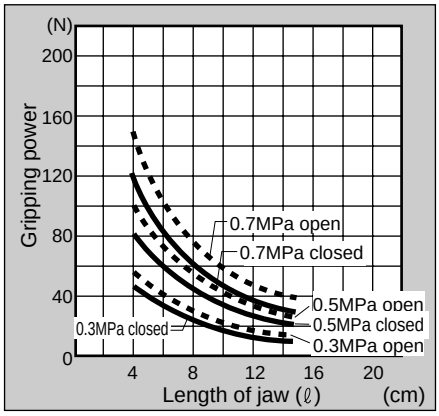
● Closed direction (➡) ——— (shown with continuous line)



● HDL-3CS



● HDL-4CS

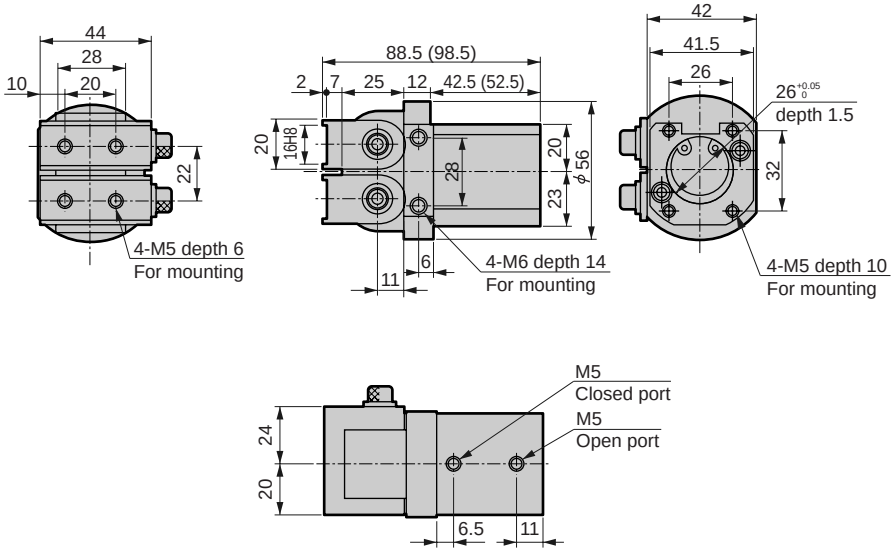


(Note) O type gripping power decreases approximate 20 to 30 % comparing to double acting type to closed direction.
C type gripping power decreases approximate 10 to 20 % comparing to double acting type to open direction.
Grip performance data indicates the grip for one jaw. Since two jaws are used, double the grip in the graph when making a selection.

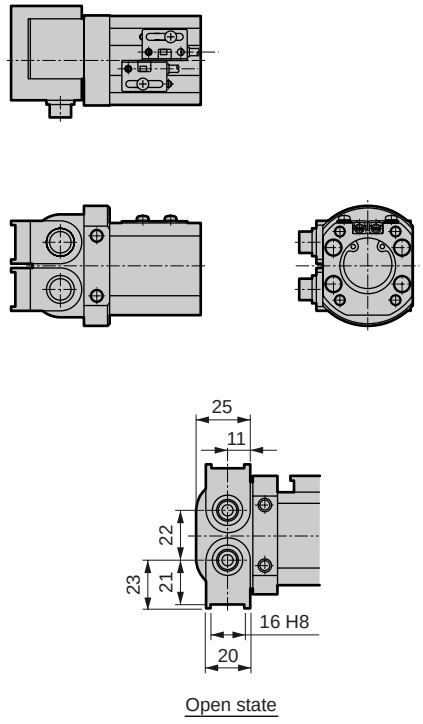
Dimensions CAD

● HDL-3CS standard/O/C

● Dimension in ( ) for C (normally closed) specifications.



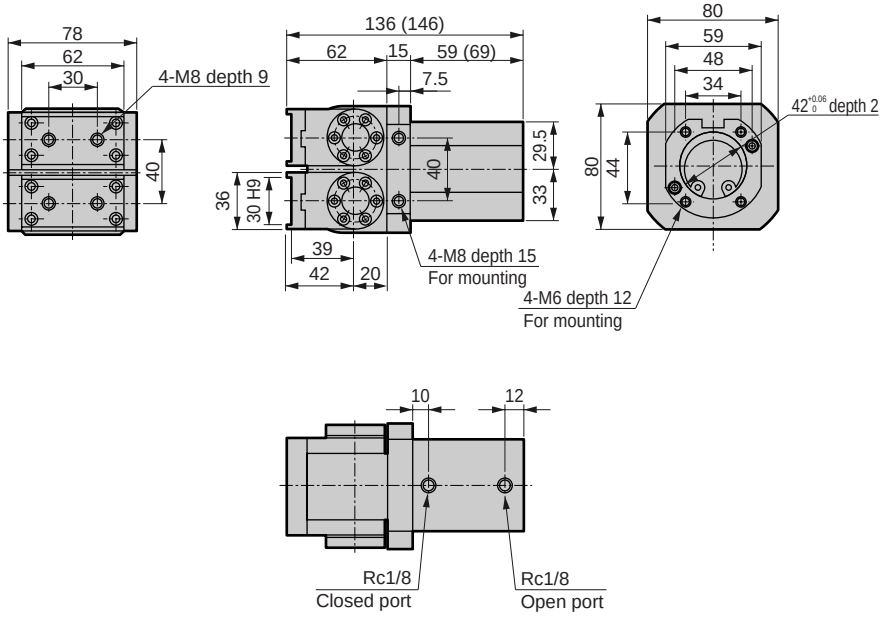
● With switch



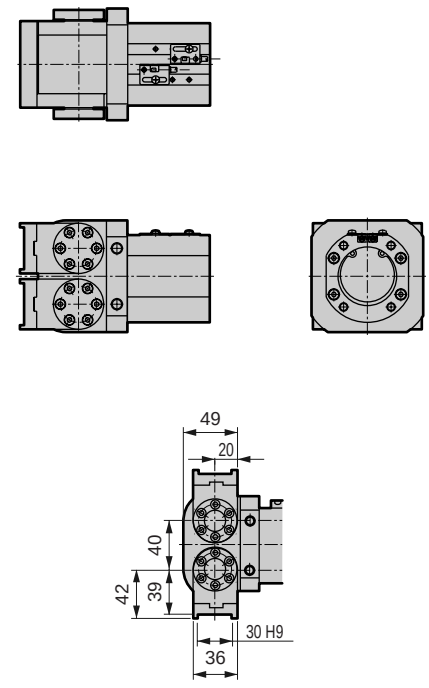
Open state

● HDL-4CS standard/O/C

● Dimension in ( ) for C (normally closed) specifications.



● With switch



Open state