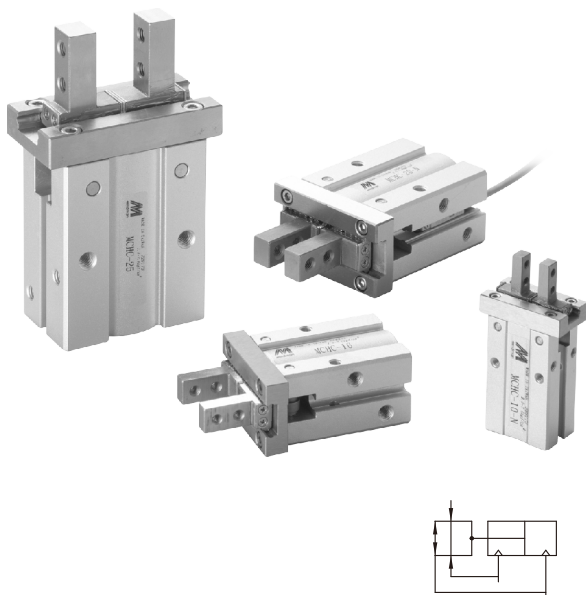




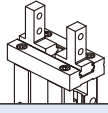
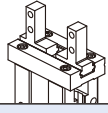
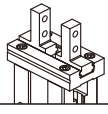
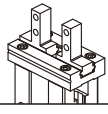
Order example

MCHC-20-N

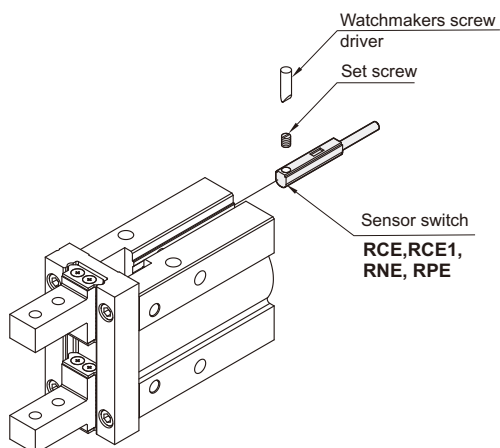
MODEL

TUBE I.D.

TYPE

Blank: Standard	1: Side tapped mounting
	
N: Narrow	N1: Narrow type side tapped mounting
	

Installation of sensor switch



Features

- Integral linear guide used for high rigidity and high precision.
- The material of finger is martensitic stainless steel.
- Grooves on the body for sensor switch to be inserted into.
- Standard with magnet.

Specification

Model	MCHC	
Acting type	Double acting	
Tube I.D. (mm)	10	16, 20, 25
Port size	M3×0.5	M5×0.8
Medium	Air	
Operating pressure range	0.2~0.7 MPa	0.1~0.7 MPa
Ambient temperature	-10~+60℃ (No freezing)	
Repeatability	±0.01 mm	
Max. frequency	180 cycles / min	
Lubricator	Not required	
Sensor switch (※)	RCE / RCE1: Reed switch, RNE: NPN, RPE: PNP	
Weight (g)	55	125, 250, 460

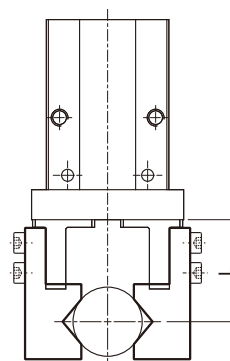
※ RCE, RCE1 specification, please refer to page V-09.

Gripping force

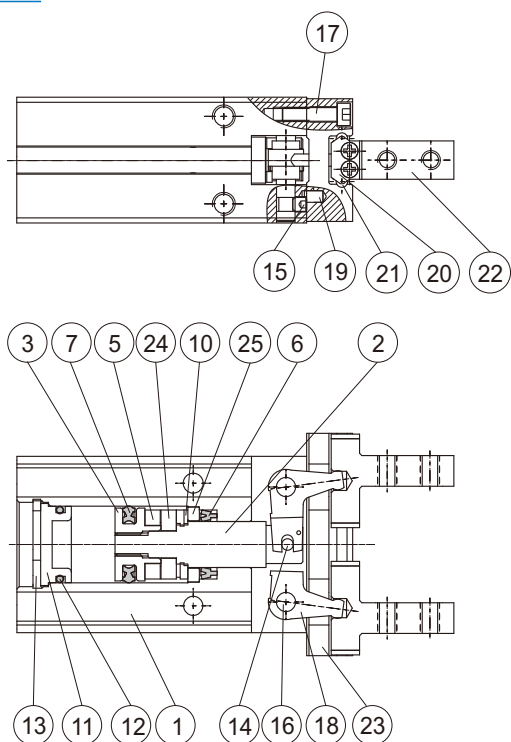
Tube I.D. (mm)	Gripping force ⁽¹⁾		Opening closing stroke (Both sides) (mm)
	Girpping force per finger effective value N (kgf)		
	External	Internal	
10	11 (1.1)	17 (1.7)	4
16	34 (3.5)	45 (4.6)	6
20	42 (4.3)	66 (6.7)	10
25	65 (6.6)	104 (10.6)	14

Note 1) Values based on pressure of 0.5 MPa, gripping point L=20mm, at center of stroke.

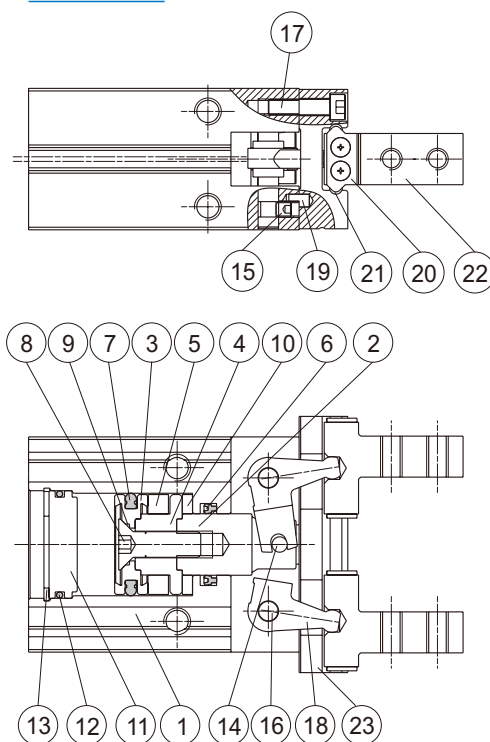
Length of gripping point



φ 10



φ 16~φ 25



Material

No.	Part name	Tube I.D.				Q'y	Repair kits (inclusion)
		10	16	20	25		
1	Body	Aluminum alloy				1	
2	Piston rod	Stainless steel				1	
3	Piston	Aluminum alloy				1	
4	Piston R	—	Aluminum alloy			1	
5	Magnet ring	Magnet material				1	
6	Rod packing	NBR				1	●
7	Piston packing	NBR				1	●
8	Screw	—	Stainless steel			1	
9	Gasket	—	NBR			1	●
10	Cushion pad	PU				1	●
11	Head cover	Aluminum alloy				1	
12	Cover ring	NBR				1	●
13	Stop ring	Stainless steel				1	
14	Spindle river	Carbon steel				1	
15	Screw	Carbon steel				4	
16	Grip rivet	Carbon steel				2	
17	Bolt	Stainless steel				4	

No.	Tube I.D. Part name	10	16	20	25	Q'y	Repair kits (inclusion)
18	Lever	Stainless steel				2	
19	Pin	Carbon steel				2	
20	Roller stopper	Stainless steel				4	
21	Steel balls	Stainless steel				24	
22	Finger	Stainless steel				2	
23	Guide	Stainless steel				1	
24	Snap ring	※1	—			1	
25	Stop ring	※1	—			1	

※1 : Stainless steel

Order example of repair kits

Tube I.D.	Repair kits
φ 10	PS-MCHC-10
φ 16	PS-MCHC-16
φ 20	PS-MCHC-20
φ 25	PS-MCHC-25

PARALLEL GRIPPERS

Model selection

Please select your model according to the weight of workpiece

- Although conditions differ according to the work piece shape and the coefficient of friction between the attachments and the workpiece, select a model that can provide a gripping force of 10 to 20 times the workpiece weight, or more.
- If high acceleration, deceleration or impact forces are encountered during motion, a further margin of safety should be considered.

When gripping a workpiece as in the figure as shown above:

F : Gripping force (N)

μ : Coefficient of friction between the attachments and the workpiece

m : Workpiece mass (kg)

g : Gravitational acceleration ($=9.8\text{m/s}^2$)

mg : Workpiece weight (N)

the conditions under which the workpiece will not drop are,

$$2 \times \mu F > mg$$

Number of fingers

Therefore,

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

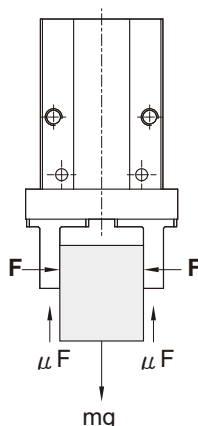
With "a" representing the extra margin, "F" is determined by the following formula:

$$F = \frac{mg}{2 \times \mu} \times a$$

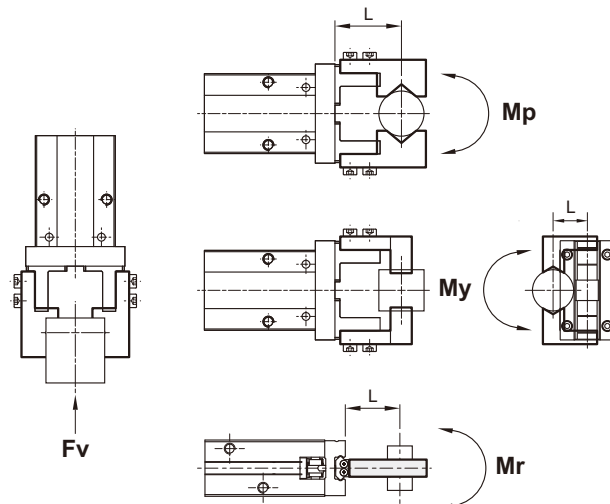
The "10 to 20 times or more of the workpiece weight" is calculated with a safety margin of $a=4$, which allows for impacts that occur during normal transportation, etc.

$\mu = 0.2$	$\mu = 0.1$
$F = \frac{mg}{2 \times 0.2} \times 4$	$F = \frac{mg}{2 \times 0.1} \times 4$
$= 10 \times mg$	$= 20 \times mg$
↓	↓
10 × workpiece weight	20 × workpiece weight

- ※1. Even in cases where the coefficient of friction is greater than $\mu = 0.2$, for reasons of safety, please select a gripping force which is at least 10 to 20 times greater than the workpiece weight.
- ※2. If high acceleration, deceleration or impact forces are encountered during motion, a further margin of safety should be considered.



Confirmation of external force on fingers



L: distance to the point at which the load is applied (mm)

Tube I.D. (mm)	Allowable vertical load $F_v(N)$	Maximum allowable moment		
		Pitch moment $M_p(N \cdot m)$	Yaw moment $M_y(N \cdot m)$	Roll moment $M_r(N \cdot m)$
10	58	0.26	0.26	0.53
16	98	0.68	0.68	1.36
20	147	1.32	1.32	2.65
25	255	1.94	1.94	3.88

※ Values for load and moment in the table indicate static values.

Allowable load calculation

$$\text{Allowable load } F(N) = \frac{M(\text{maximum allowable moment})(N \cdot m)}{L(m)}$$

Example

When a static load of $f=20\text{N}$ is operating, which applies pitch moment to point $L=25\text{mm}$ from the **MCHC-16** guide.

$$\text{Allowable load } F(N) = \frac{0.68(N \cdot m)}{25 \times 10^{-3}(m)} = 27.2(N)$$

Load $f=20(N) < 27.2(N)$, So can be used.

Model selection example

In the motion process did not produce high acceleration, deceleration or impact forces,

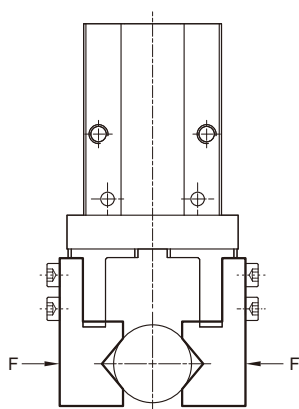
Workpiece mass : 300g , Gripping method : External gripping,
Operating pressure : 0.5 MPa , Coefficient of friction (μ) : 0.1,
Holding position : 20mm (no overhang)

- The conditions under which the workpiece will not drop are,
 $F = \frac{0.3}{2 \times 0.1} \times 4 = 6 \text{ (kgf)} \approx 60(N)$
- From Effective Gripping Force Fig,
Operating pressure: 0.5 MPa ; Holding position: 20mm
Effective gripping force is greater than 60(N)
So selected **MCHC-25** grippers.

Effective gripping force (Double acting)

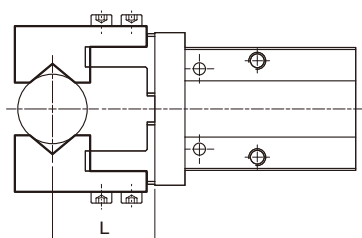
Indication of effective force :

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

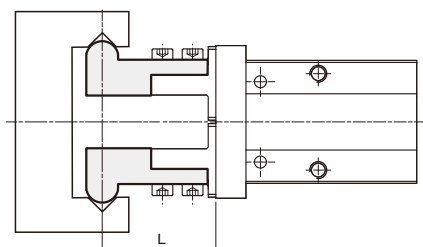


$$1\text{N}=0.102\text{ kgf}$$

$$1\text{MPa}=10.2\text{ kgf/cm}^2$$

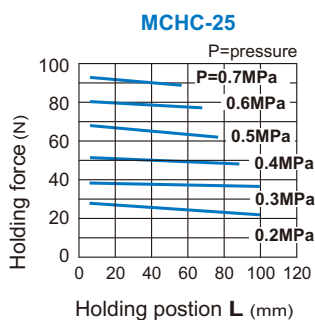
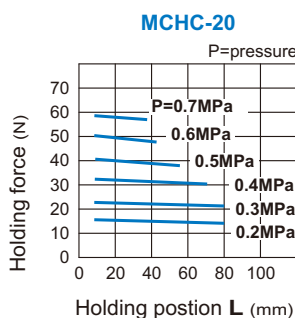
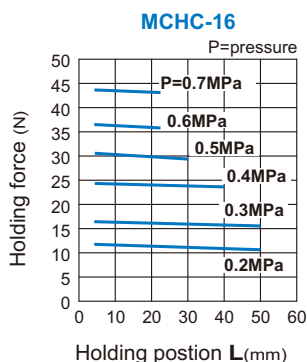
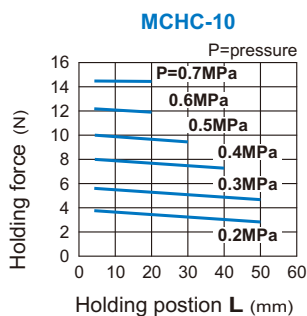


External grip

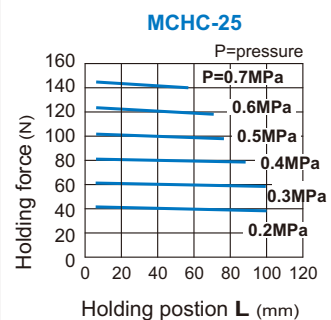
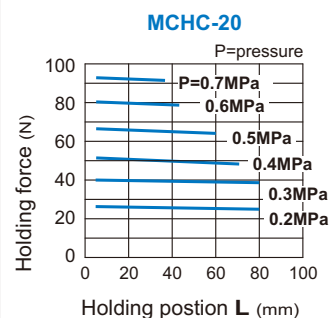
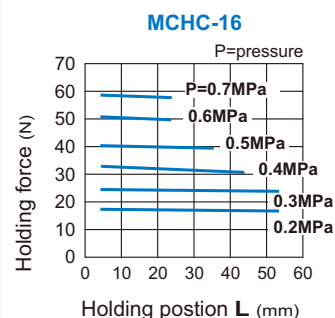
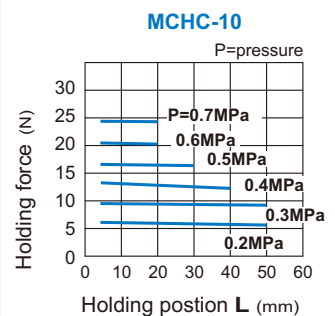


Internal grip

External gripping force

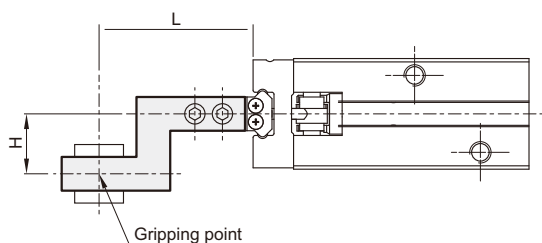


Internal gripping force

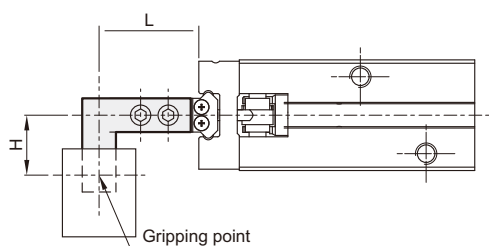


Confirmation of gripping point

- The air gripper should be operated so that the workpiece gripping point "L" and the amount of overhang "H" stay within the range shown for each operating pressure given in the graphs to the right.
- If the workpiece gripping point goes beyond the range limits, this will have an adverse effect on the life the air gripper.

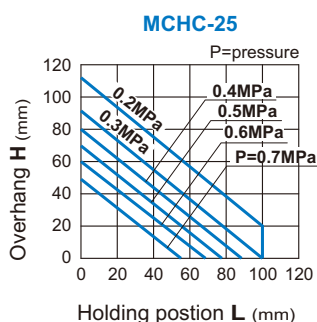
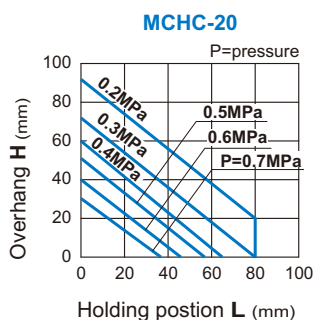
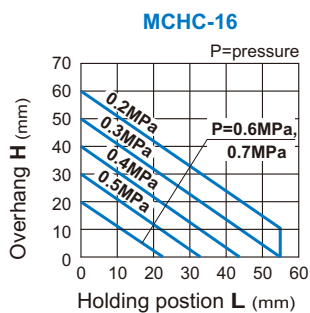
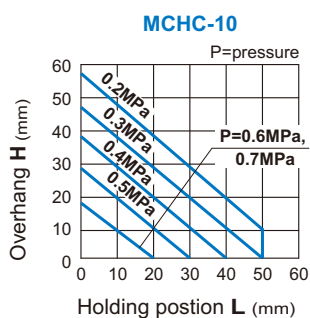


External grip

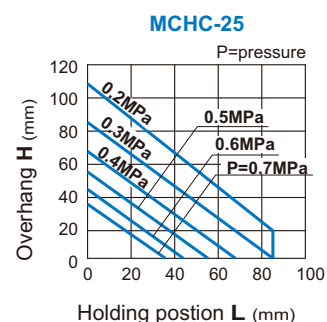
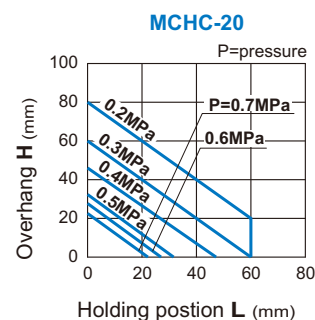
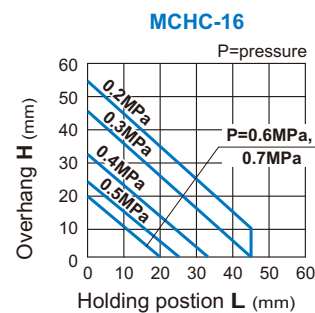
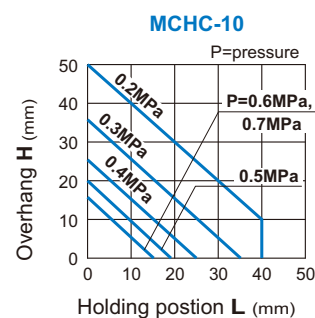


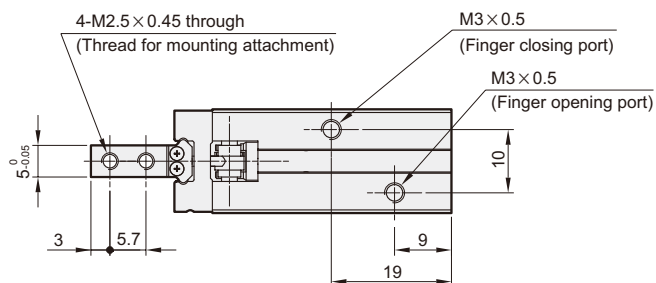
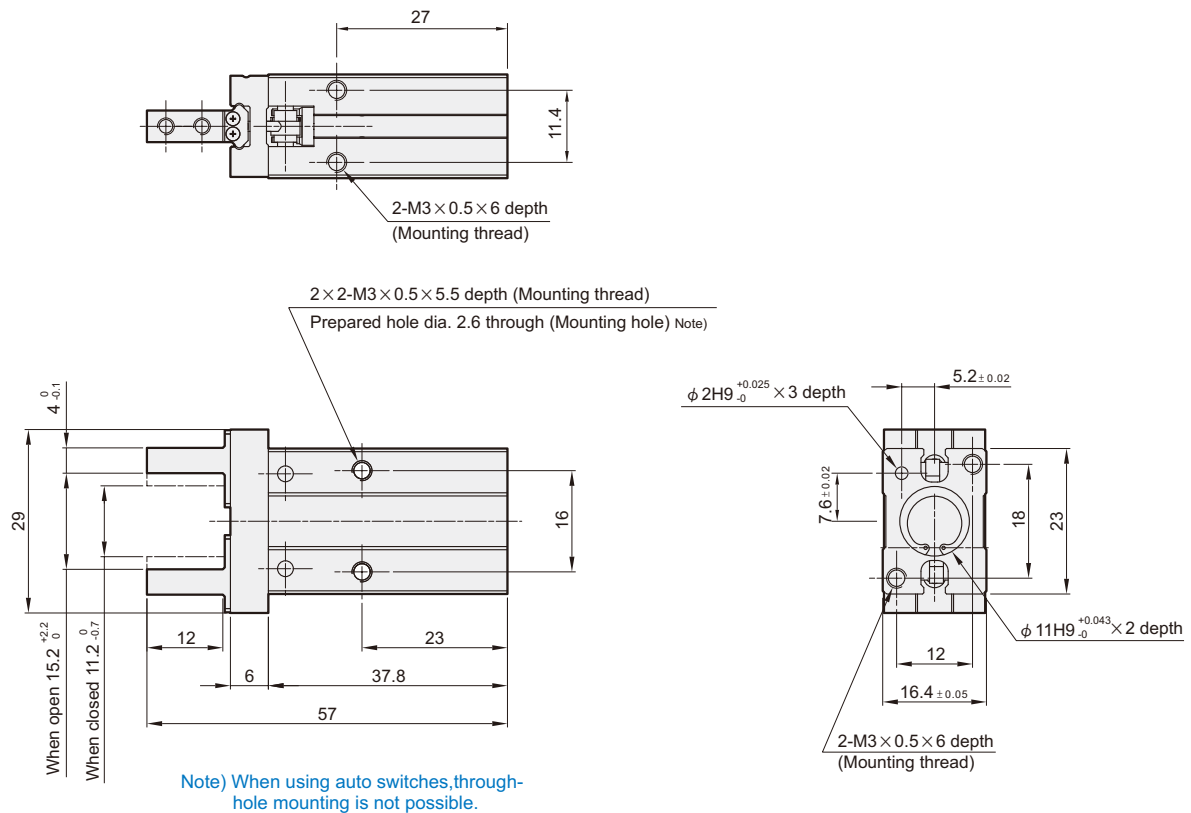
Internal grip

External gripping force

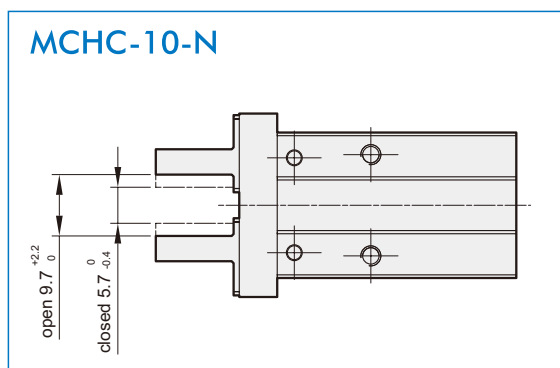


Internal gripping force

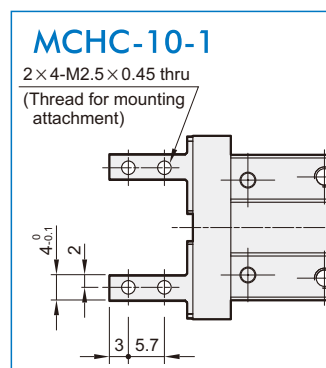




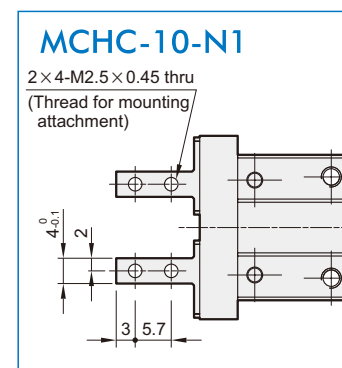
Finger position / Narrow type

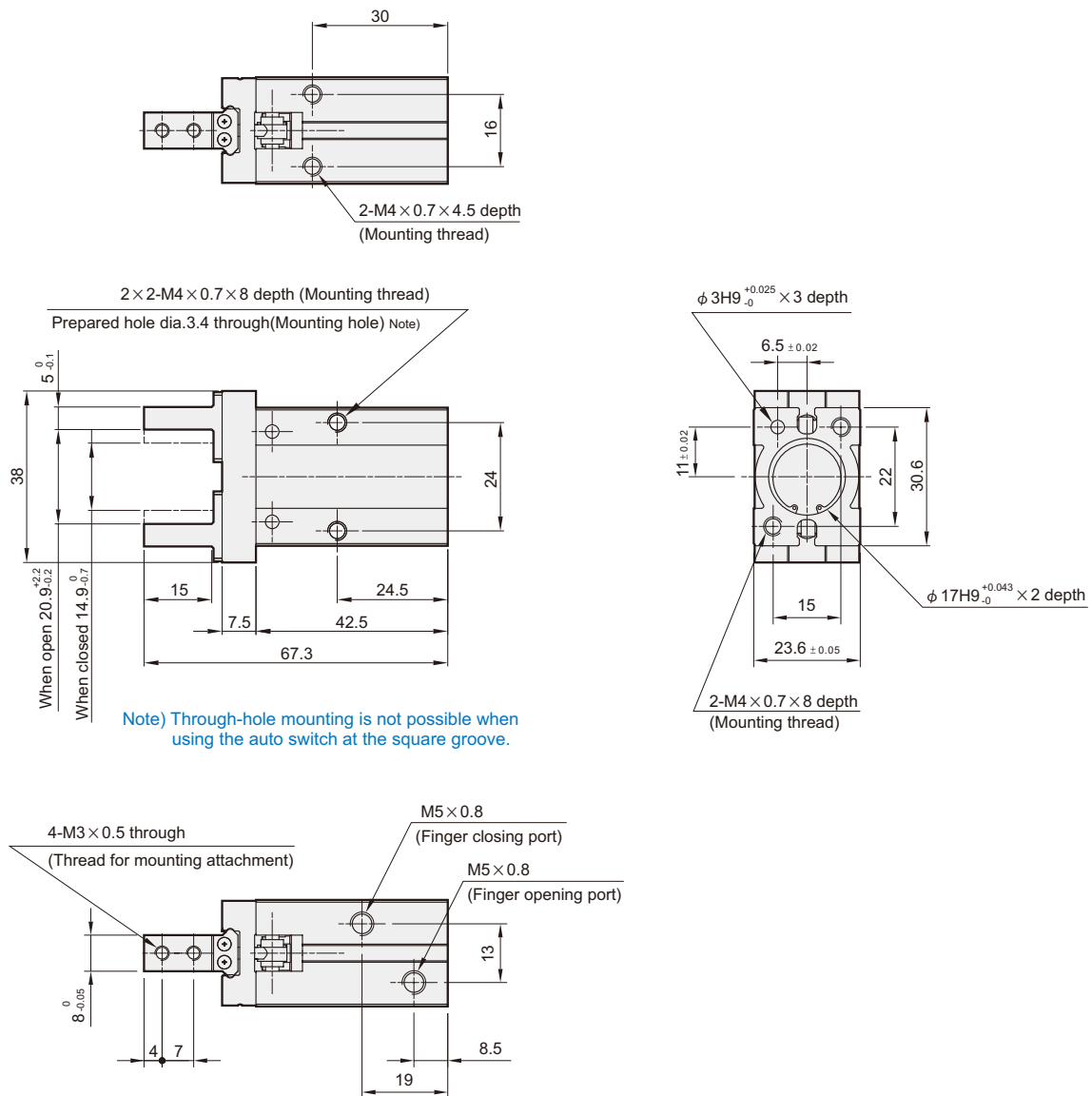


Side tapped mounting Standard

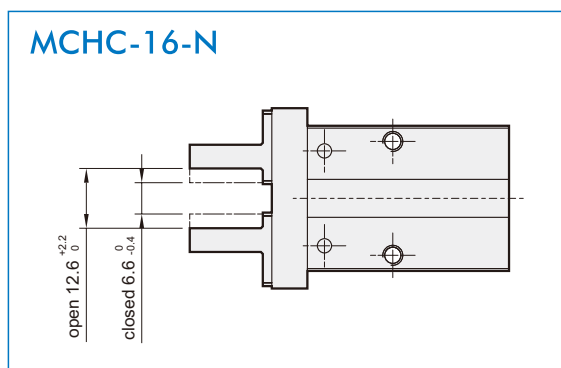


Narrow type

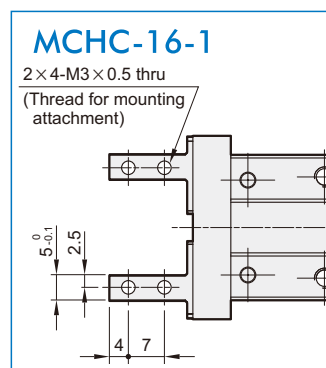




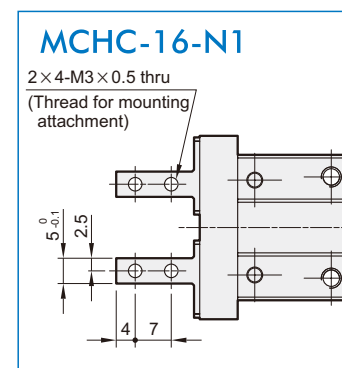
Finger position / Narrow type

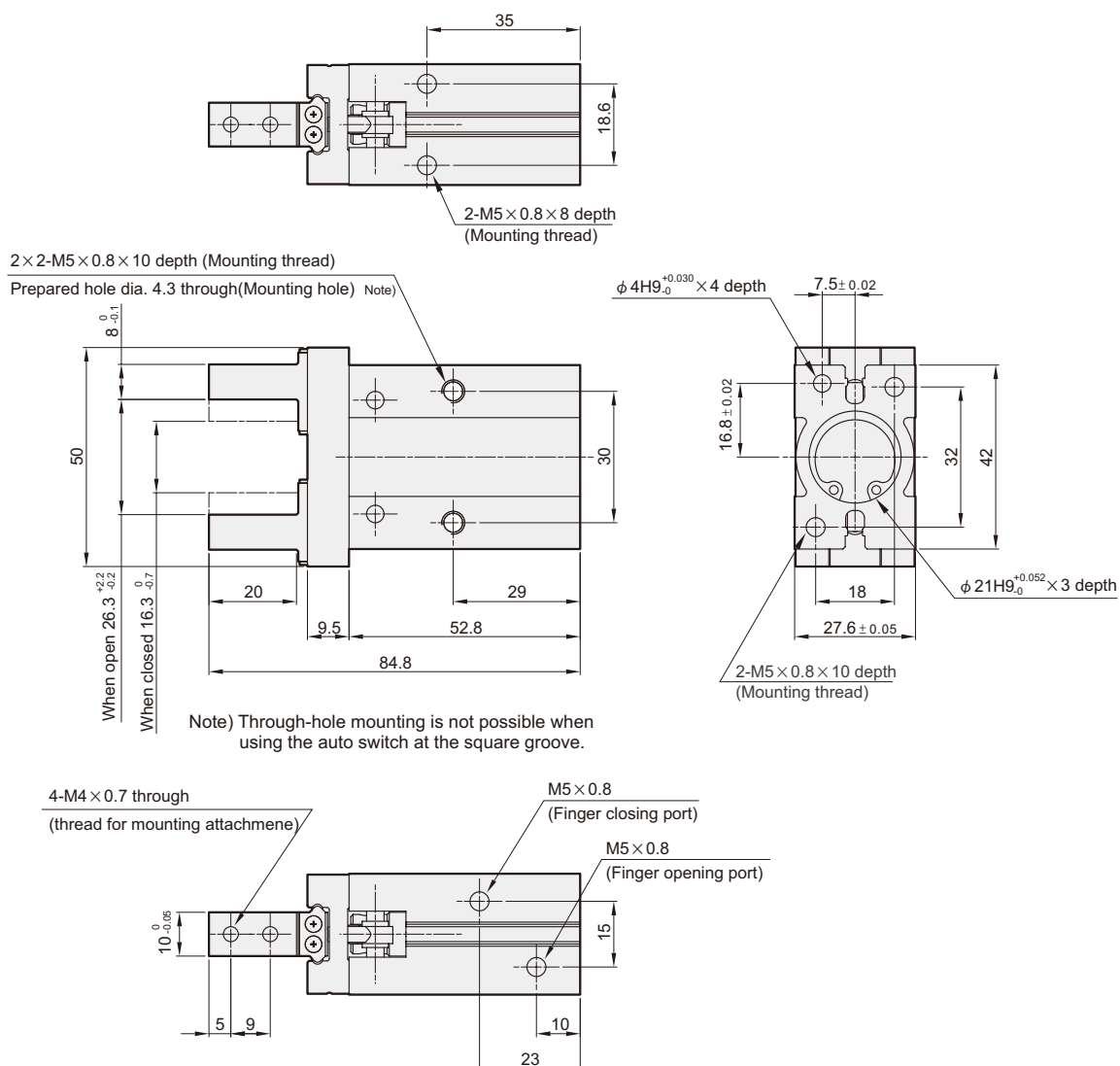


Side tapped mounting Standard

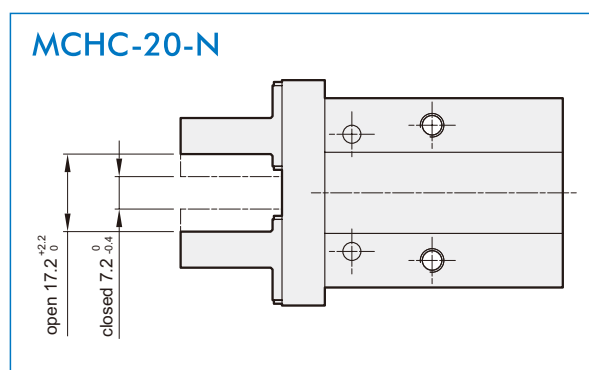


Narrow type

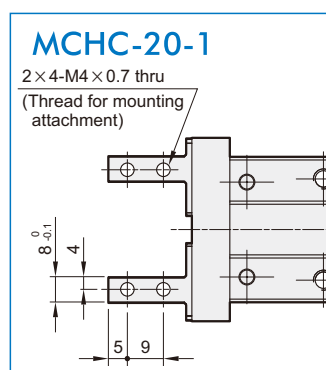




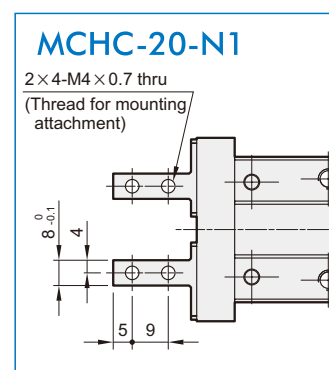
Finger position / Narrow type

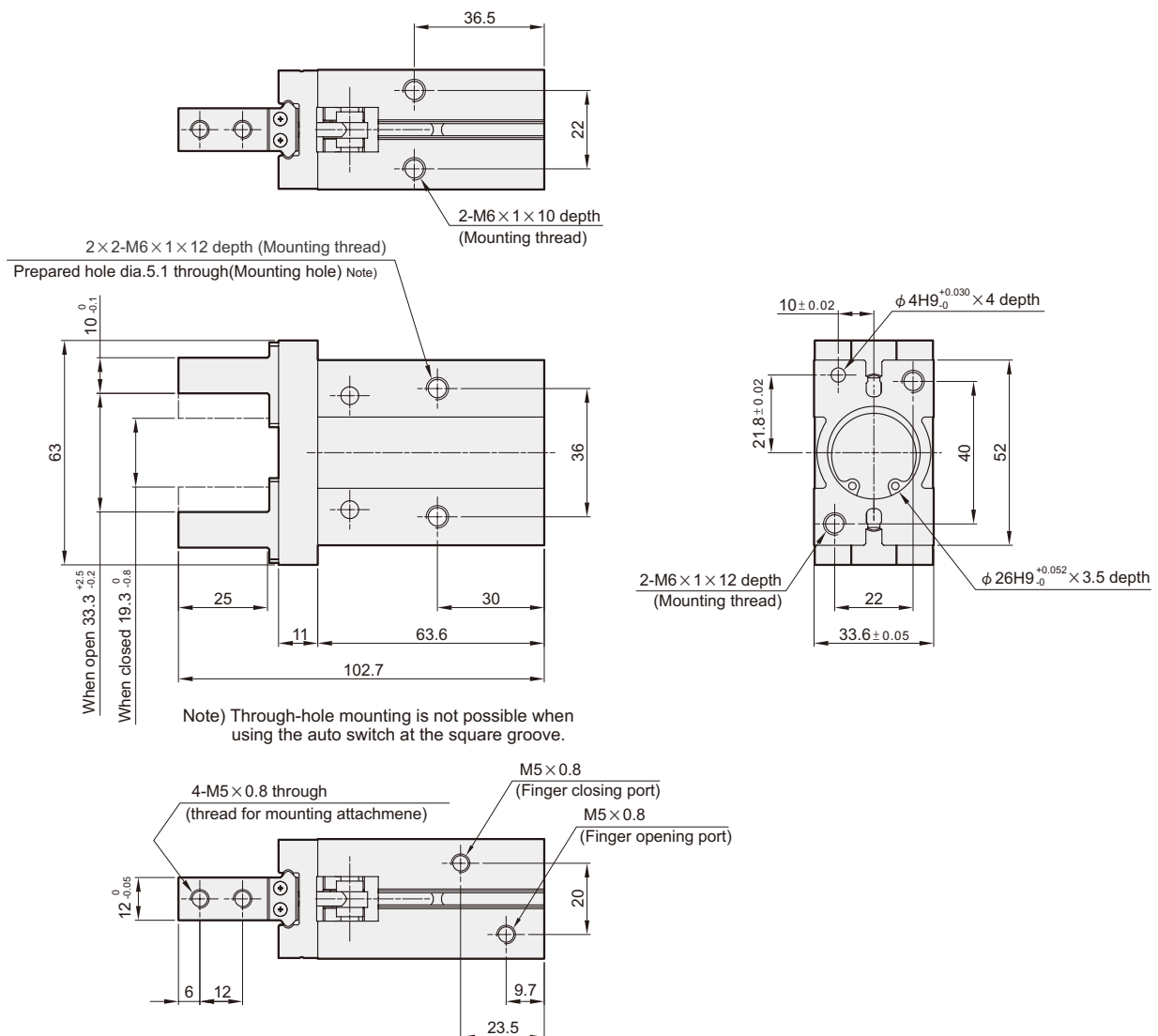


Side tapped mounting Standard

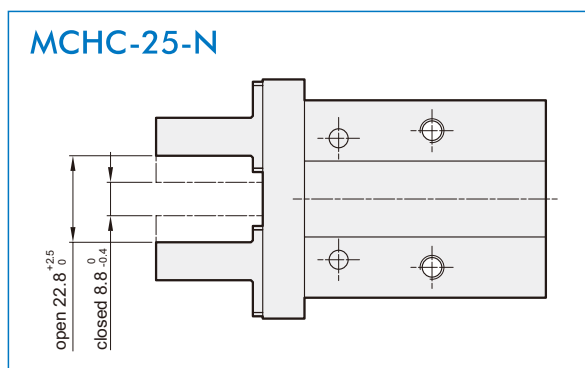


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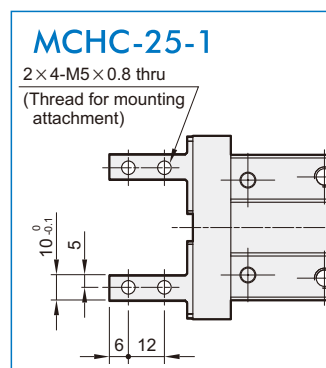




Finger position / Narrow type



Side tapped mounting Standard



Narrow type

