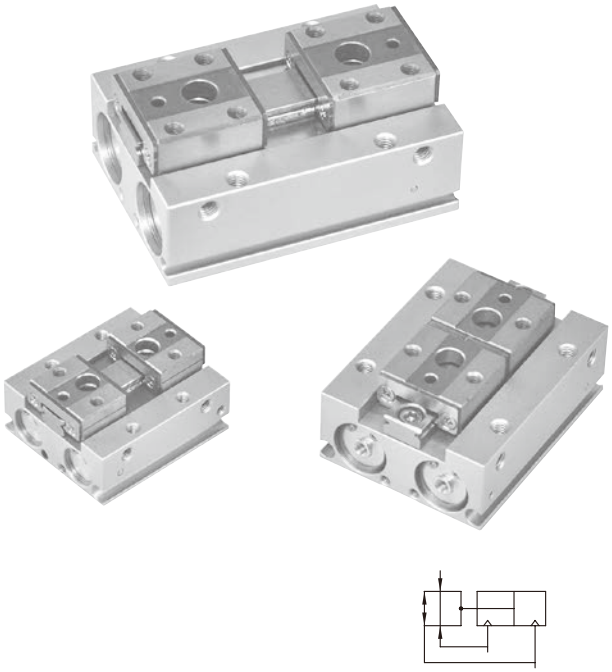
MCHD series

PARALLEL GRIPPER (2-Finger)



Features

- Low profile design saves space and reduces bending moments, improved accuracy with smooth operation.
- Improved mounting repeatability, easy positioning for mounting.
- Double piston construction achieves compact design with strong gripping force.
- High rigidity and high precision with martensitic stainless steel.
- Grooves on the body for sensor switch to be inserted into.
- Standard with magnet.

Specification

Model		MCHD			
Acting type		Double acting			
Tube I.D. (mm)		8	12	16	20
Port size		M3×0.5	M5×0.8		
Medium		Air			
Operating pressure range		0.15~0.7	0.1~0.7 MPa		
Ambient temperature		-10~+60°C (No freezing)			
Repeatability		± 0.05 mm (*1)			
Max. frequency	Short	120 c.p.m			
	Medium	120 c.p.m			
	Long	60 c.p.m			
Lubricator		Not required			
Sensor switch (*2)	2 wire	**RDFE(V)**: Solid state type			
	3 wire	**RNFE(V)**: NPN, **RPFE(V)**: PNP			
Attached bolt		2 pcs	—		

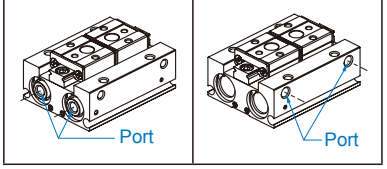
* 1. This is the value when no offset load is applied to the finger. When an offset load is applied to the finger, the maximum value is ±0.15mm due to the influence of backlash of the rack and pinion.

* 2. R*FE(V) specification, please refer to page 5-10.

Order example

MCHD — 20R — □

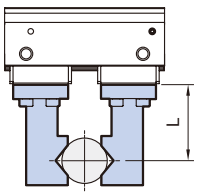
- MODEL
- TUBE I.D. **8, 12, 16, 20**
- PIPING TYPE
  - Blank: Axial piping
  - **R**: Side piping
- STROKE *
  - Blank: Short
  - **1**: Medium
  - **2**: Long



* Stroke selection

Tube I.D. / Stroke (mm)	8	12	16	20
Short stroke	8	12	16	20
Medium stroke	16	24	32	40
Long stroke	32	48	64	80

Gripping force



Model	Gripping force per finger effective value (N) (*)	Weight (g)
MCHD-8	19	65
MCHD-8-1		79.1
MCHD-8-2		113.3
MCHD-12	48	150
MCHD-12-1		191.3
MCHD-12-2		291.2
MCHD-16	90	350
MCHD-16-1		454.2
MCHD-16-2		678.3
MCHD-20	141	660
MCHD-20-1		869
MCHD-20-2		1310.6

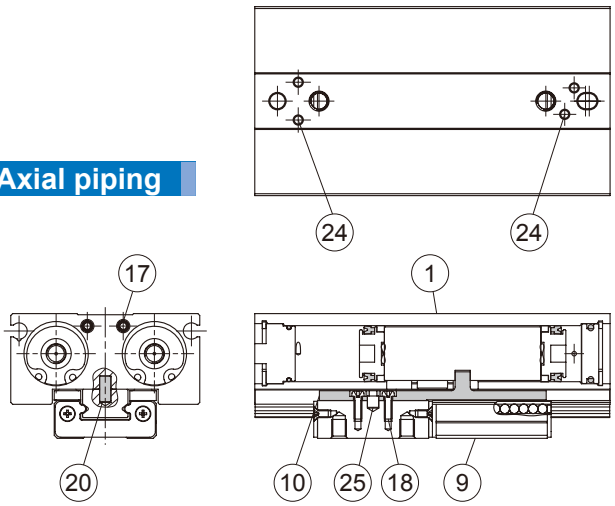
* Values based on pressure of 0.5 MPa, gripping point L=20mm, at center of stroke.

MCHD Inside structure & Parts list

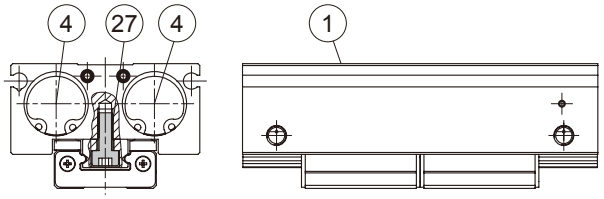
PARALLEL GRIPPER (2-Finger)

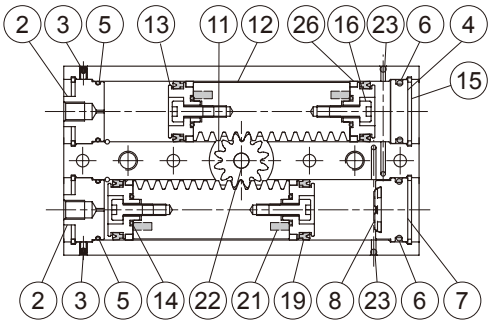
mindman

Axial piping



Side piping





Order example of repair kits

Tube I.D.	Repair kits
ø8	**PS-MCHD-8**
	PS-MCHD-8R
ø12	**PS-MCHD-12**
	PS-MCHD-12R

Tube I.D.	Repair kits
ø16	**PS-MCHD-16**
	PS-MCHD-16R
ø20	**PS-MCHD-20**
	PS-MCHD-20R

Material

No.	Tube I.D. / Part name	Material 8	12	16	20	Q'y Axial	Side	Repair kits (inclusion)
1	Body	Aluminum alloy				1	1	
2	Cover A	Aluminum alloy				2	0	
3	Hexgon screw	Stainless steel				2	0	
4	Cover B	Aluminum alloy				1	3	
5	O-ring	NBR				2	0	●
6	O-ring	NBR				2	4	●
7	Cover C	Aluminum alloy				1	1	
8	Cushion pad	TPU				1	1	●
9	Guide set	Stainless steel				1	1	
10	Lever	Stainless steel				2	2	
11	Pinion	SCM				1	1	
12	Pinion piston	Stainless steel				2	2	
13	Piston	*1	Aluminum alloy			4	2	
14	O-ring	NBR				4	4	●
15	Snap ring	Stainless steel				4	4	
16	Bolt	–	Stainless steel			4	4	
17	Screw	Stainless steel				4	4	
18	Screw	Stainless steel				4	4	

No.	Tube I.D. / Part name	Material 8	12	16	20	Q'y Axial	Side	Repair kits (inclusion)
19	Piston packing	NBR				4	4	●
20	Pin	Stainless steel				2	2	
21	Magnet	Magnet material				4	4	
22	Needle	Stainless steel				1	1	
23	Ball	Stainless steel				2	2	
24	Ball	Stainless steel				4	4	
25	Needle	Stainless steel				2	2	
26	Wear ring *2	Teflon				4	4	
27	Bolt *3	Stainless steel				**K**	**K**	

*1. Stainless steel

*2. Model MCHD-8(R)(-1), MCHD-12(R)(-1) without wear ring.

*3. **Bolt** Q'y

Model	K
MCHD-8	2
MCHD-8-1	2
MCHD-8-2	4
MCHD-12	2
MCHD-12-1	4
MCHD-12-2	4

Model	K
MCHD-16	2
MCHD-16-1	4
MCHD-16-2	4
MCHD-20	2
MCHD-20-1	4
MCHD-20-2	4

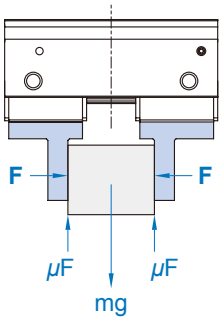
Model selection

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 (=9.8m/s^2)
mg : Workpiece weight (N)
the conditions under which the workpiece will not drop are,



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

(2: Number of fingers)

Therefore,

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

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

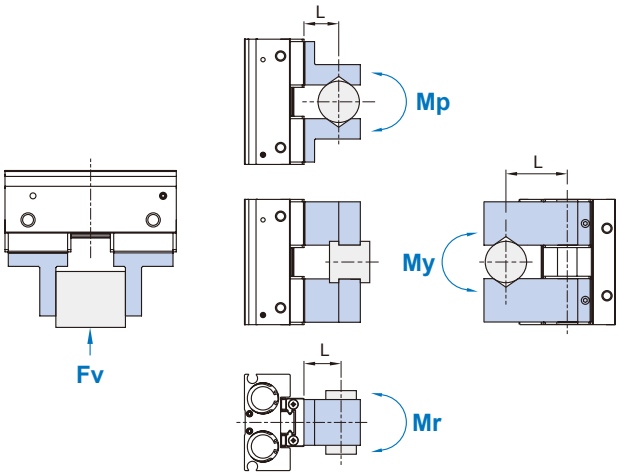
$$F = \frac{mg}{2\times\mu} \times a$$

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.

μ=0.2	μ=0.1
$F = \frac{mg}{2\times0.2} \times 4$ = 10×mg	$F = \frac{mg}{2\times0.1} \times 4$ = 20×mg
↓	↓
10×workpiece weight	20×workpiece weight

* 1. Even in cases where the coefficient of friction is greater than μ=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 Fv(N)	Maximum allowable moment		
		Pitch moment Mp(N-m)	Yaw moment My(N-m)	Roll moment Mr(N-m)
8	58	0.26	0.26	0.53
12	98	0.68	0.68	1.4
16	176	1.4	1.4	2.8
20	294	2	2	4

* 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=20N is operating, which applies pitch moment to point L=25mm from the **MCHD-16** guide.

$$\text{Allowable load } F(N) = \frac{1.4\ (N\cdot m)}{25\times10^{-3}(m)}$$

$$= 56\ (N)$$

Load f=20 (N) < 56 (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)

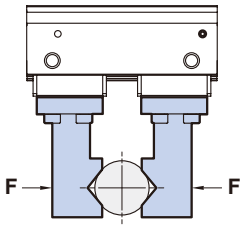
1. The conditions under which the workpiece will not drop are,

$$F = \frac{0.3}{2\times0.1} \times 4 = 6\ (kgf) \approx 60\ (N)$$

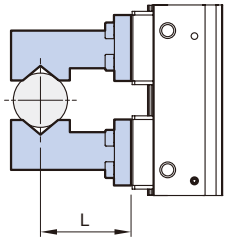
2. From Effective Gripping Force Fig,
Operating pressure: 0.5 MPa; Holding position: 20 mm
Effective gripping force is greater than 60 (N)
So selected **MCHD-16** grippers.

Effective gripping force (Double acting)

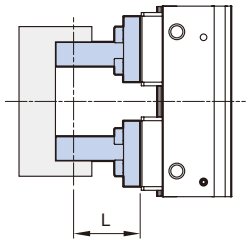
Indication of effective force.
The effective gripping force shown in the graphs to the right is expressed as F, which is the thrust of one finger, when both fingers and attachments are in full contact with the workpiece as shown in the figure below.



1N=0.102 kgf
1MPa=10.2 kgf/cm^2

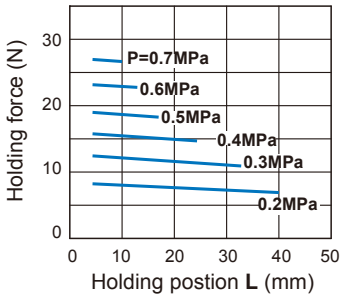


External grip

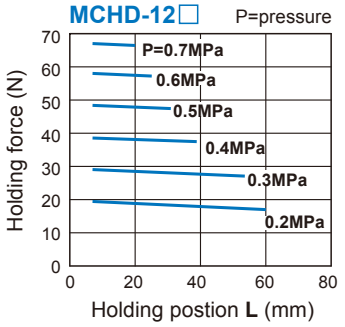


Internal grip

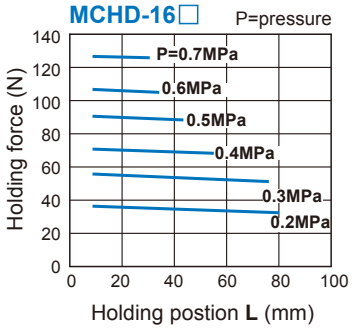
MCHD-8□ P=pressure



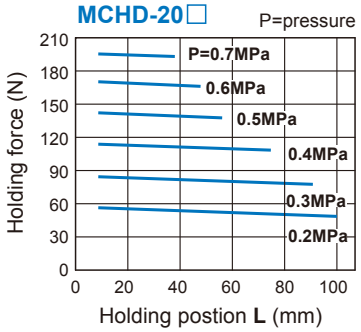
MCHD-12□ P=pressure



MCHD-16□ P=pressure

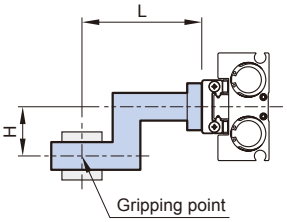


MCHD-20□ P=pressure

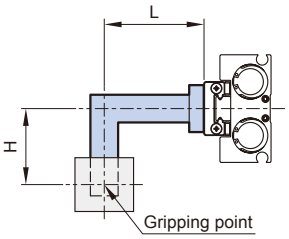


Confirmation of gripping point

- 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.
- If the workpiece gripping point goes beyond the range limits, this will have an adverse effect on the life the air gripper.

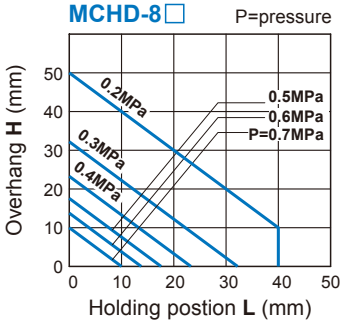


External grip

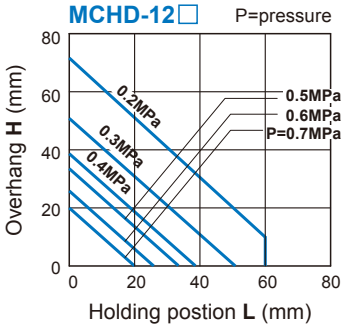


Internal grip

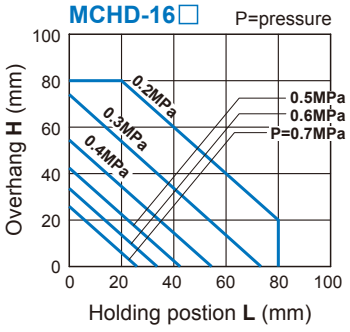
MCHD-8□ P=pressure



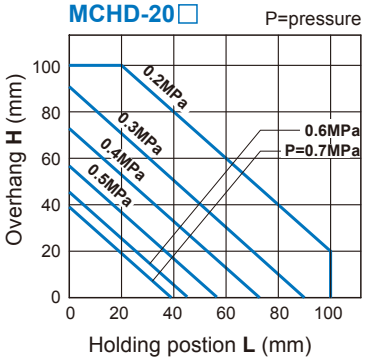
MCHD-12□ P=pressure



MCHD-16□ P=pressure



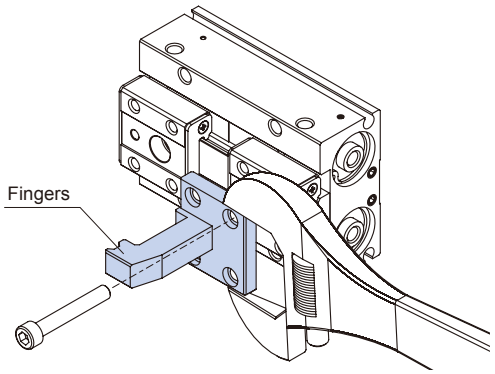
MCHD-20□ P=pressure



Product precautions

Before mount the fingers, sure be refer the tightening torque values in the table below.

Tube I.D. (mm)	Bolt	Max. tightening torque (N.m)
8	M2.5×0.45	0.36
12	M3×0.5	0.63
16	M4×0.7	1.5
20	M4×0.7	1.5



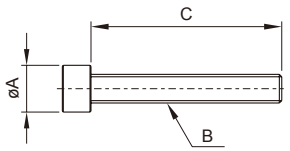
Order example of attached bolt

* One set includes 2 pcs, long stroke type need two sets (4 pcs).

BOLT — MCHD — 8

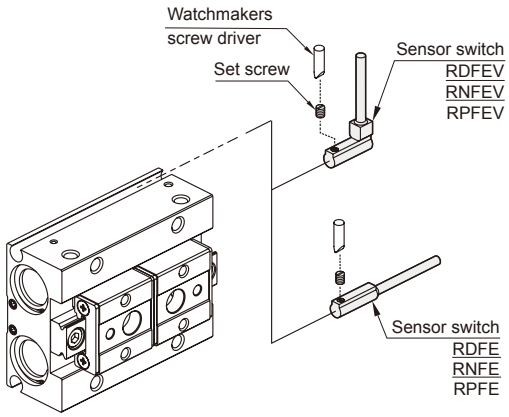
ATTACHED BOLT

TUBE I.D.
8
12



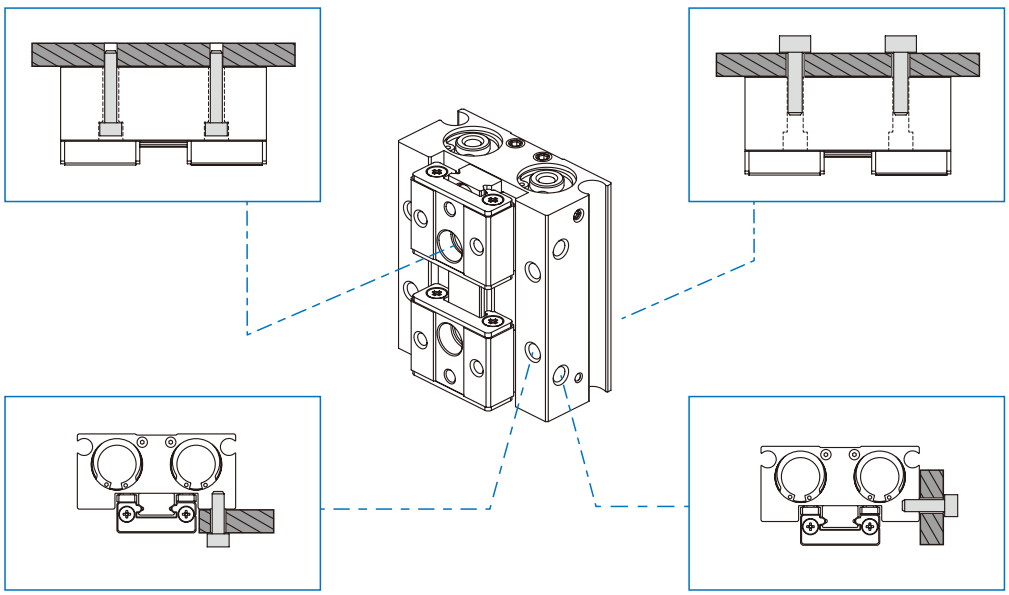
Code / Tube I.D.	A	B	C
8	3.8	M2.5×0.45	15
12	4.9	M3×0.5	20

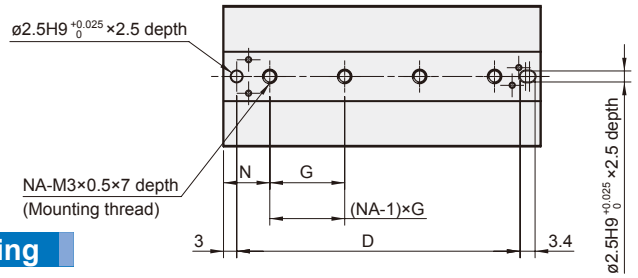
Installation of sensor switch

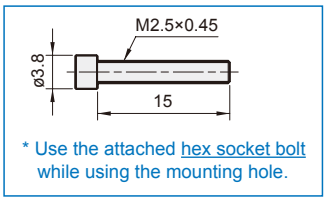


High degree of mounting flexibility

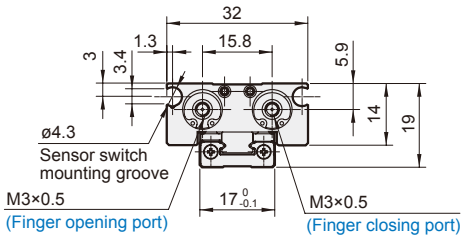
* Use the attached bolt for mounting in tube I.D. ø8, ø12.

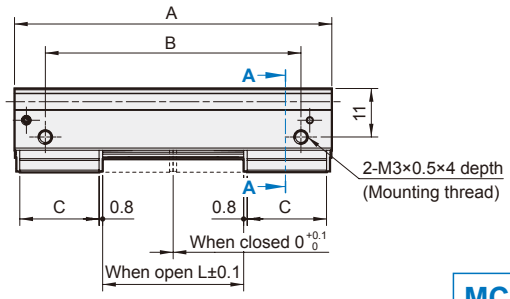


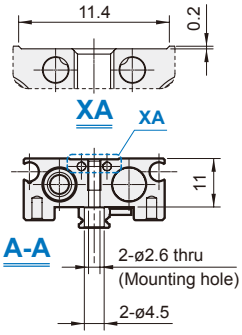


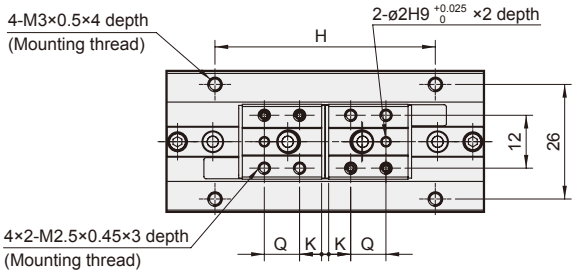


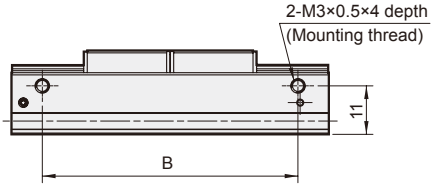
Axial piping



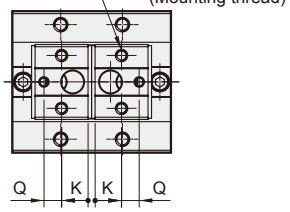




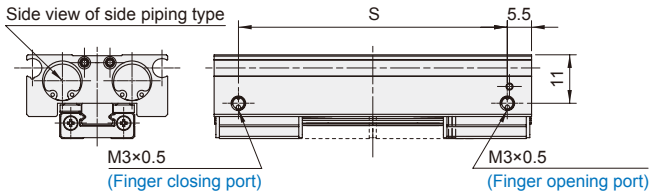




MCHD-8(R)
MCHD-8(R)-1

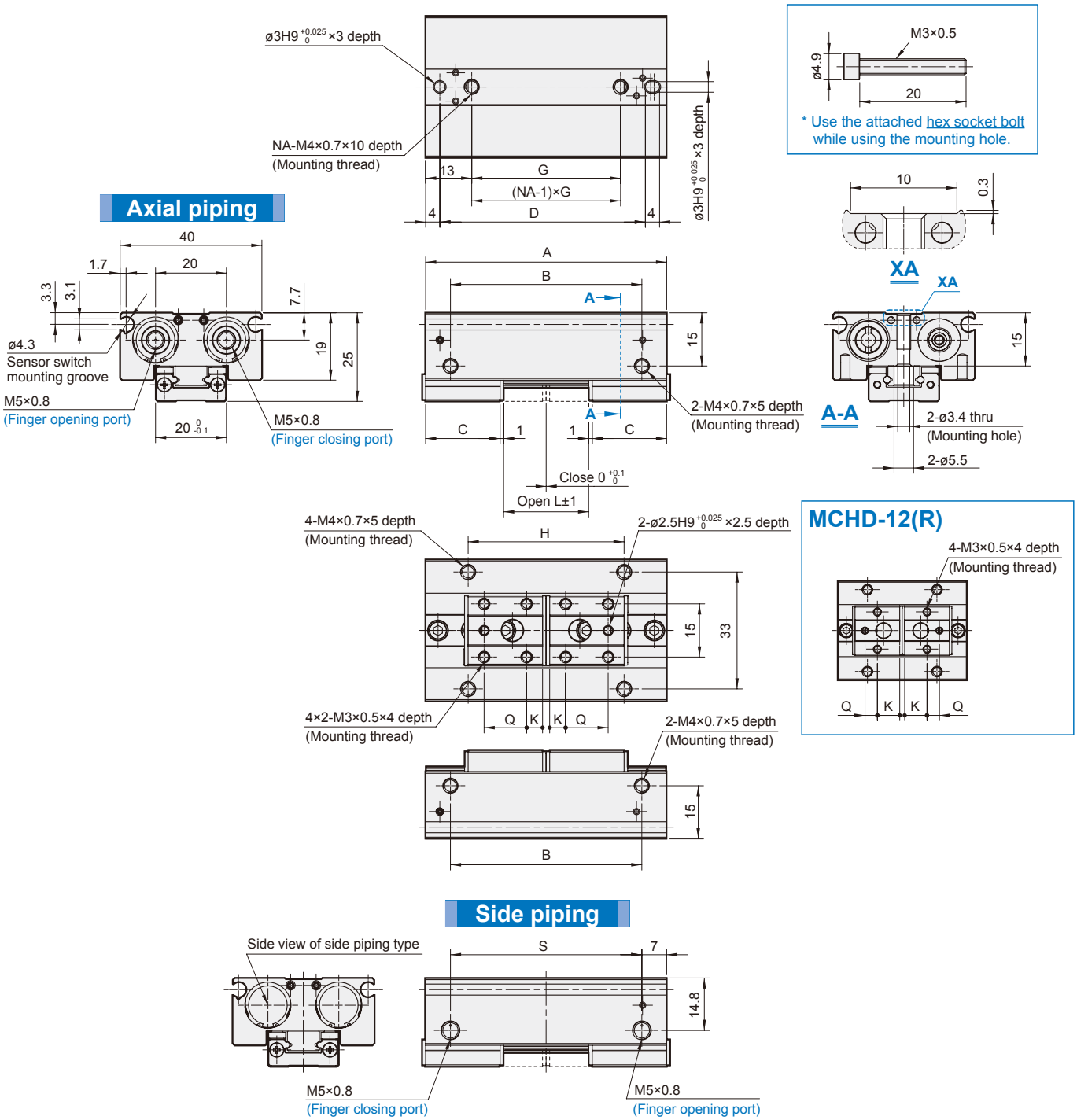


Side piping



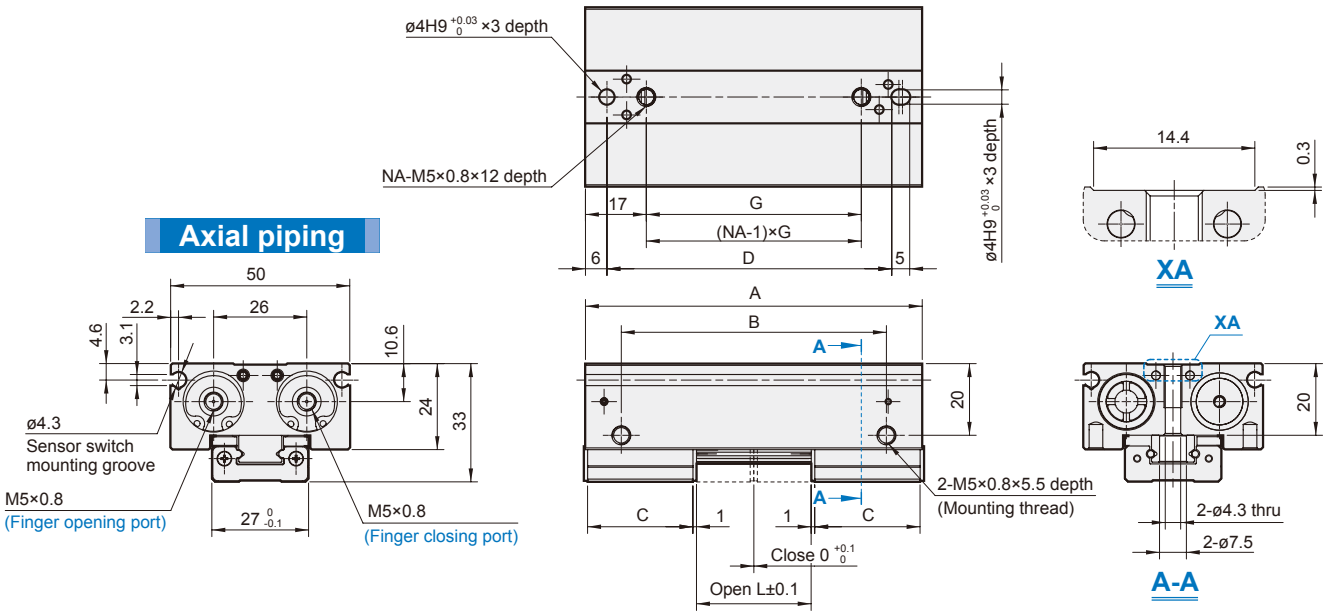
Unit: mm

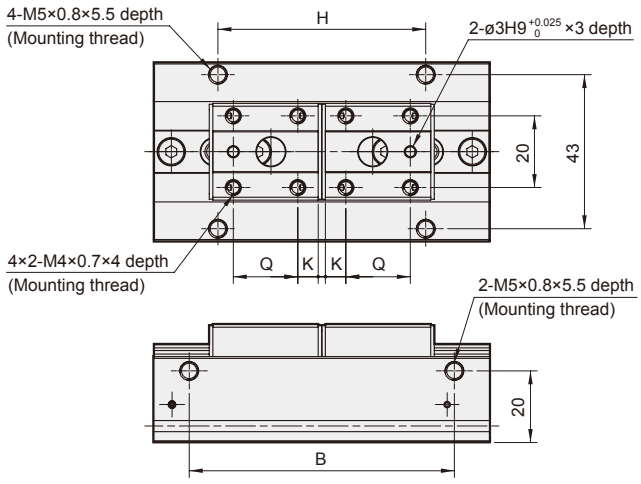
Code / Model	A	B	C	D	G	H	K	L	N	NA	Q	S
MCHD-8(R)	36	22	12	28.3	16	14	6	8	10	2	4	25
MCHD-8(R)-1	48	34	14	40.3	28	26	7	16	10	2	4	37
MCHD-8(R)-2	72	58	18	64.3	17	50	5	32	10.5	4	8	61

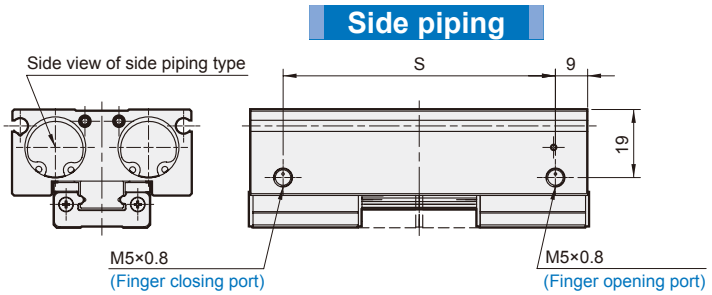


Unit: mm

Code / Model	A	B	C	D	G	H	K	L	NA	Q	S
MCHD-12(R)	52	38	18	42	26	28	9	12	2	5	38
MCHD-12(R)-1	68	54	21	58	42	44	4.5	24	2	12	54
MCHD-12(R)-2	104	90	27	94	26	80	4.5	48	4	18	90

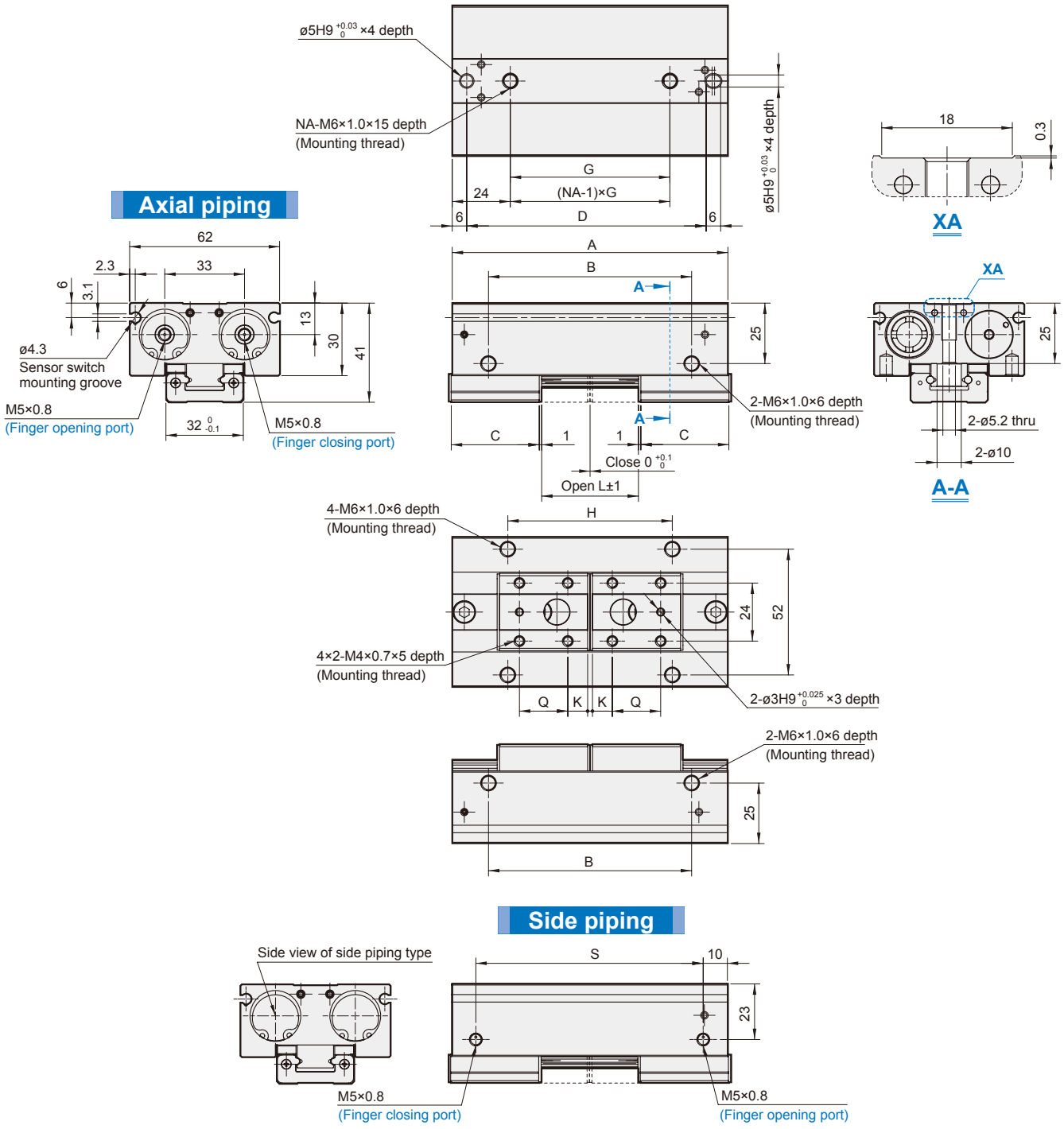






Unit: mm

Code / Model	A	B	C	D	G	H	K	L	NA	Q	S
MCHD-16(R)	72	52	25.4	57.5	38	36	5.2	16	2	15	54
MCHD-16(R)-1	94	74	29.4	79.5	60	58	5.7	32	2	18	76
MCHD-16(R)-2	142	122	37.4	127.5	36	106	5.7	64	4	26	124



Unit: mm

Code / Model	A	B	C	D	G	H	K	L	NA	Q	S
MCHD-20(R)	86	56	31.4	71	38	40	7.7	20	2	16	66
MCHD-20(R)-1	114	84	36.4	99	66	68	8.2	40	2	20	94
MCHD-20(R)-2	174	144	46.4	159	42	128	8.2	80	4	30	154