Wide Type Parallel Style Air Gripper

MHL2 Series

ø10, ø16, ø20, ø25, ø32, ø40

RoHS

How to Order

MHL2 – 16 □ D □ Z – M9BW □ – □

Wide type

Number of fingers

2	2

Bore size

10	10 mm
16	16 mm
20	20 mm
25	25 mm
32	32 mm
40	40 mm

Port thread type

Symbol	Type	Cylinder bore
Nil	M thread	ø10 to ø25
	Rc	ø32 to ø40
TN	NPT	
TF	G	

Action

D	Double acting

Auto switch

Nil	Without auto switch (Built-in magnet)

* For applicable auto switches, refer to the table below.

Number of auto switches

Nil	2
S	1
n	n

Made to order
Refer to page 4 for details.

Opening/Closing stroke [mm]

	Symbol	ø10	ø16	ø20	ø25	ø32	ø40
Short: MHL2-□**D** 	**Nil**	20	30	40	50	70	100
Medium: MHL2-□**D1** 	**1**	40	60	80	100	120	160
Long: MHL2-□**D2** 	**2**	60	80	100	120	160	200

Applicable Auto Switches/Refer to the **Web Catalog** or Best Pneumatics for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage			Auto switch model		Lead wire length [m]*1				Pre-wired connector	Applicable load	
					DC		AC	Perpendicular	In-line	0.5 (Nil)	1 (M)	3 (L)	5 (Z)			
Solid state auto switch	——	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	**M9NV**	**M9N**	●	●	●	○	○	IC circuit	Relay, PLC
				3-wire (PNP)				**M9PV**	**M9P**	●	●	●	○	○		
				2-wire		12 V		**M9BV**	**M9B**	●	●	●	○	○	—	
	Diagnostic indication (2-color indicator)			3-wire (NPN)		5 V, 12 V		**M9NWV**	**M9NW**	●	●	●	○	○	IC circuit	
				3-wire (PNP)				**M9PWV**	**M9PW**	●	●	●	○	○		
				2-wire		12 V		**M9BWV**	**M9BW**	●	●	●	○	○	—	
	Water resistant (2-color indicator)			3-wire (NPN)		5 V, 12 V		**M9NAV***2	**M9NA***2	○	○	●	○	○	IC circuit	
				3-wire (PNP)				**M9PAV***2	**M9PA***2	○	○	●	○	○		
				2-wire		12 V		**M9BAV***2	**M9BA***2	○	○	●	○	○	—	

*1 Lead wire length symbols: 0.5 m.....Nil (Example) M9NW
1 m..... M (Example) M9NWM
3 m..... L (Example) M9NWL
5 m..... Z (Example) M9NWZ

*2 Water resistant type auto switches can be mounted on the above models, but SMC cannot guarantee water resistance.

* Solid state auto switches marked with "○" are produced upon receipt of order.

* When using the 2-color indicator type, please make the setting so that the indicator is lit in red to ensure the detection at the proper position of the air gripper.

Long stroke
One unit can handle workpieces with various diameters.

A large amount of gripping force is provided, through the use of a double piston mechanism, while maintaining a compact design.

Double-end type oil-impregnated resin bearings are used for all shafts.

Specifications

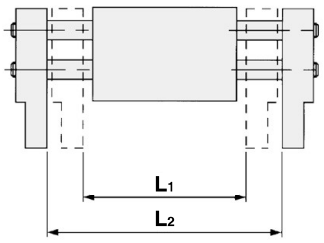
Bore size [mm]	10	16	20	25	32	40
Fluid	Air					
Action	Double acting					
Operating pressure [MPa]	0.15 to 0.6	0.1 to 0.6				
Ambient and fluid temperatures	–10 to 60°C (No freezing)					
Repeatability	±0.1					
Lubricant	Non-lube					
Effective gripping force [N]*1 at 0.5 MPa	14	45	74	131	228	396

*1 Gripping point distance = Bore size 10, 16, 20, 25: 40 mm, Bore size 32, 40: 80 mm

Model/Stroke

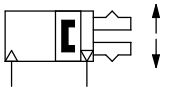
Model	Bore size [mm]	Max. operating frequency [c.p.m]	Opening/Closing stroke [mm] (L_2-L_1)	Closing width [mm] (L_1)	Opening width [mm] (L_2)	Weight [g]
MHL2-10DZ	10	60	20	56	76	280
MHL2-10D1Z		40	40	78	118	355
MHL2-10D2Z			60	96	156	430
MHL2-16DZ	16	60	30	68	98	525
MHL2-16D1Z		40	60	110	170	725
MHL2-16D2Z			80	130	210	845
MHL2-20DZ	20	60	40	82	122	940
MHL2-20D1Z		40	80	142	222	1335
MHL2-20D2Z			100	162	262	1520
MHL2-25DZ	25	60	50	100	150	1565
MHL2-25D1Z		40	100	182	282	2295
MHL2-25D2Z			120	200	320	2525
MHL2-32DZ	32	30	70	150	220	2875
MHL2-32D1Z		20	120	198	318	3770
MHL2-32D2Z			160	242	402	4585
MHL2-40DZ	40	30	100	188	288	5230
MHL2-40D1Z		20	160	246	406	6760
MHL2-40D2Z			200	286	486	7825

* The opening and closing widths represent the value when gripping the exterior of a workpiece.

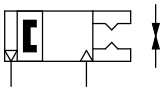


Symbol

Double acting: Internal grip



Double acting: External grip



Made to Order

Made to Order
(For details, refer to pages 17 to 24.)

Symbol	Specifications
-X4	Heat resistant (–10 to 100°C)
-X5	Fluororubber seal
-X28	With bolt for adjusting the closing width
-X50	Without magnet
-X53	Ethylene propylene rubber seal (EPDM)
-X63	Fluorine grease
-X79	Grease for food processing machines: Fluorine grease
-X79A	Grease for food processing machines: Aluminum complex soap base grease
-X85	Fine-particle proof specification
-X86□	With heavy duty scraper + Stable lubrication function (Lube-retainer) (Seal material: NBR, Fluororubber)

Refer to pages 14 and 15 for cylinders with auto switches.

- Auto Switch Installation Examples and Mounting Positions
- Auto Switch Hysteresis

⚠Specific Product Precautions

Be sure to read this before handling the products. Refer to page 25 for details.

Model Selection

Step 1 Check the gripping force. → **Step 2** Check the gripping point.

Step 1 Check the gripping force.

Check the conditions. → Select the model based on the workpiece length. → Calculate the required gripping force. → Select the model from effective gripping force graph.

Example

Workpiece form:
Length x Width
200 mm x 20 mm plate

→ Select the appropriate model for a 200 mm long workpiece.
(Refer to the Table 1.)
MHL2-16D2Z
MHL2-20D1Z, D2Z
MHL2-25D1Z, D2Z

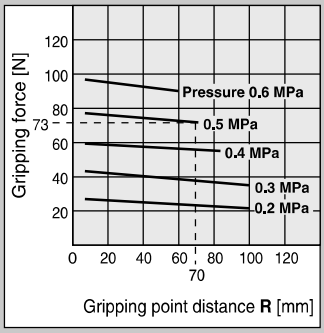
Workpiece mass: 0.3 kg

→ Guidelines for the selection of the gripper with respect to workpiece mass
(Refer to the Effective Gripping Force on page 6.)
- Although conditions differ according to the workpiece 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 mass, or more.
  Example) For setting the gripping force to be at least 20 times the workpiece mass: Required gripping force = 0.3 kg x 20 x 9.8 m/s² ≈ 60 N
- Further allowance should be provided when great acceleration or impact is expected during workpiece transfer.

Gripping point distance R = 70 mm →

Operating pressure: 0.5 MPa →

MHL2-20D$^{1}_{2}$Z

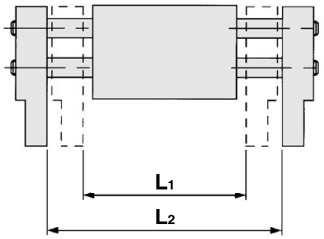


■ When the **MHL2-20D1Z** is selected A gripping force of 73 N is obtained from the intersection point of gripping point distance R = 70 mm and a pressure of 0.5 MPa.

■ The gripping force is 24 times greater than the workpiece mass, and therefore satisfies a gripping force setting value of 20 times or more.

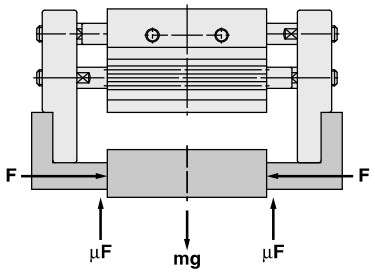
Table 1

Model	Bore size [mm]	Closing width [mm] (L_1)	Opening width [mm] (L_2)
MHL2-10DZ	10	56	76
MHL2-10D1Z		78	118
MHL2-10D2Z		96	156
MHL2-16DZ	16	68	98
MHL2-16D1Z		110	170
MHL2-16D2Z		130	210
MHL2-20DZ	20	82	122
MHL2-20D1Z		142	222
MHL2-20D2Z		162	262
MHL2-25DZ	25	100	150
MHL2-25D1Z		182	282
MHL2-25D2Z		200	320
MHL2-32DZ	32	150	220
MHL2-32D1Z		198	318
MHL2-32D2Z		242	402
MHL2-40DZ	40	188	288
MHL2-40D1Z		246	406
MHL2-40D2Z		286	486



∗ The opening and closing widths represent the value when gripping the exterior of a workpiece.

Calculation of Required Gripping Force



"Gripping force at least 10 to 20 times the workpiece weight"
- The "10 to 20 times or more of the workpiece weight" recommended by SMC is calculated with a margin of "a" = 4, which allows for impacts that occur during normal transportation, etc.

When μ = 0.2	When μ = 0.1
$F = \frac{mg}{2 \times 0.2} \times 4 = 10 \times mg$	$F = \frac{mg}{2 \times 0.1} \times 4 = 20 \times mg$
10 x Workpiece weight	20 x Workpiece weight

When gripping a workpiece as in the figure to the left, and with the following definitions,
F: Gripping force [N]
μ: Coefficient of friction between the attachments and the workpiece
m: Workpiece mass [kg]
g: Gravitational acceleration (= 9.8 m/s²)
mg: Workpiece weight [N]

the conditions under which the workpiece will not drop are

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

(2: Number of fingers)

and therefore,

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

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

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

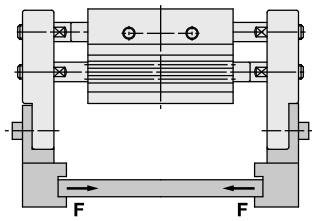
∗ • Even in cases where the coefficient of friction is greater than μ = 0.2, for reasons of safety, select a gripping force which is at least 10 to 20 times greater than the workpiece weight, as recommended by SMC.
• If high acceleration or impact forces are encountered during motion, a further margin should be considered.

Effective Gripping Force

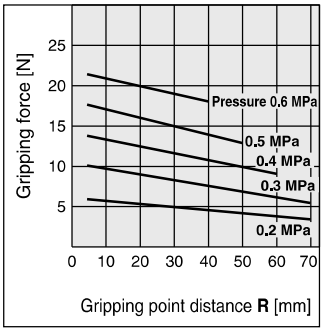
• Indication of effective gripping force

The gripping force shown in the tables represents the gripping force of one finger when all fingers and attachments are in contact with the workpiece.

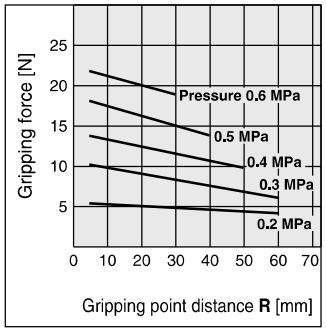
F = One finger thrust



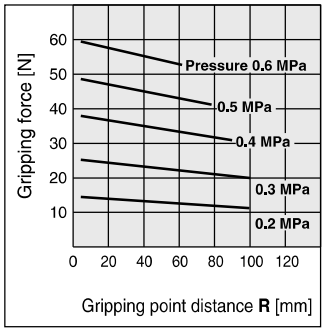
MHL2-10DZ



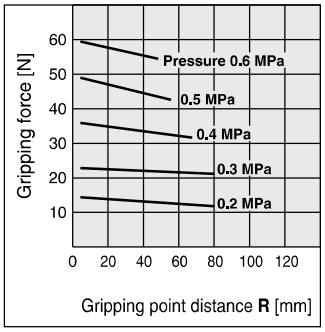
MHL2-10D$^{1}_{2}$Z



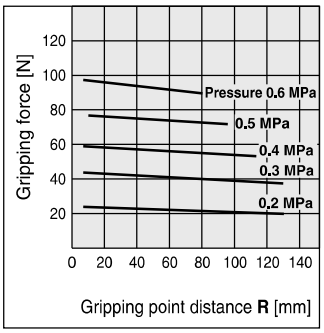
MHL2-16DZ



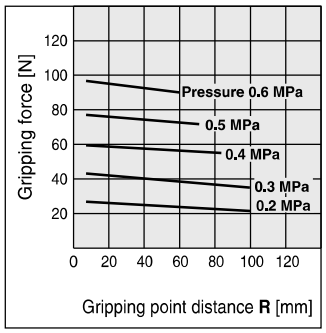
MHL2-16D$^{1}_{2}$Z



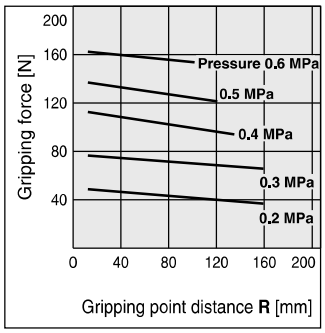
MHL2-20DZ



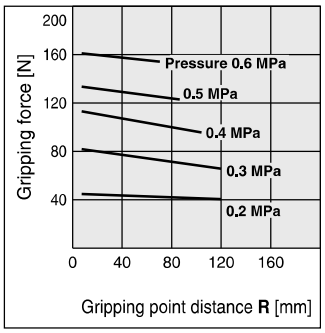
MHL2-20D$^{1}_{2}$Z



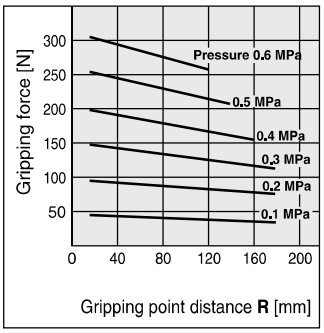
MHL2-25DZ



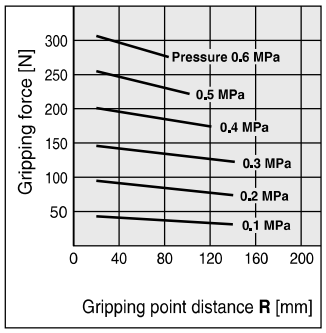
MHL2-25D$^{1}_{2}$Z



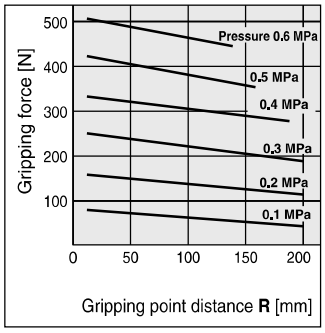
MHL2-32DZ



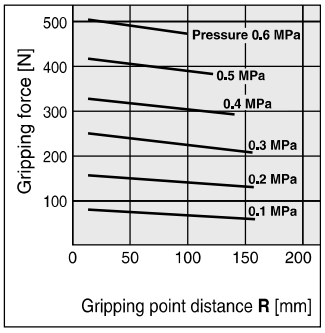
MHL2-32D$^{1}_{2}$Z



MHL2-40DZ

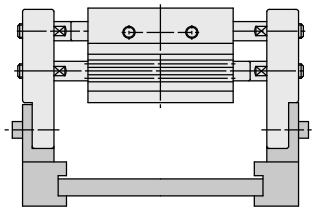


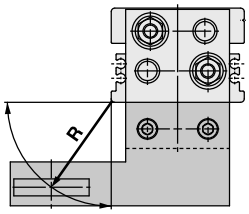
MHL2-40D$^{1}_{2}$Z



Step 2 Check the gripping point.

- The workpiece gripping point distance should be within the gripping force ranges given for each pressure in the effective gripping force graphs above.
- If operated with the workpiece gripping point beyond the indicated ranges, the load that will be applied to the fingers or the guide will become excessively unbalanced. As a result, the fingers could become loosened and adversely affect the service life of the unit.

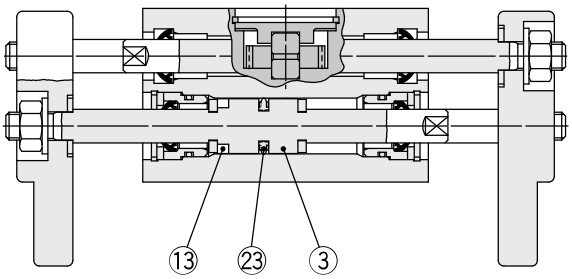




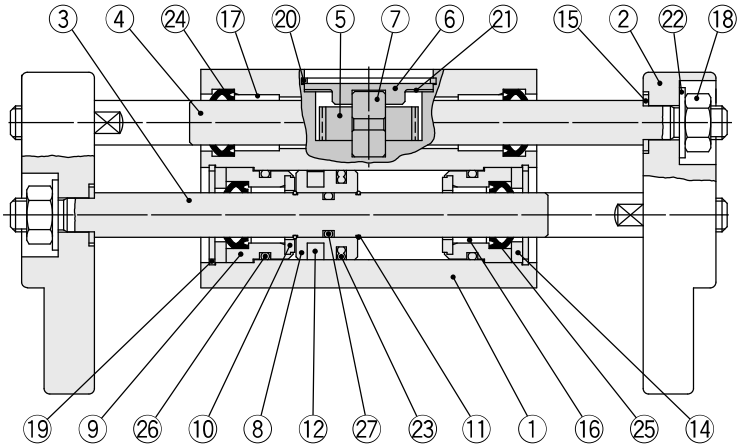
R: Gripping point distance [mm]

Construction

ø10



ø16 to ø40



Component Parts

No.	Description	Material	Note
1	**Body**	Aluminum alloy	Hard anodized
2	**Finger**	Aluminum alloy	Hard anodized
3	**Piston rod**	Stainless steel	
4	**Rack**	Stainless steel	
5	**Pinion**	Carbon steel	
6	**Pinion cover**	Carbon steel	Electroless nickel plating
7	**Pinion axis**	Stainless steel	
8	**Piston**	Aluminum alloy	Hard anodized
9	**Rod cover**	Aluminum alloy	Trivalent chromated
10	**Bumper**	Urethane rubber	
11	**Clip**	Stainless steel spring wire	
12	**Rubber magnet**	Synthetic rubber	
13	**Magnet**	—	Nickel plating
14	**Rod seal cover B**	Cold rolled carbon steel sheet	Electroless nickel plating

No.	Description	Material	Note
15	**Washer**	Stainless steel	
16	**Bearing**	Oil containing polyacetal	
17	**Bearing**	Oil containing polyacetal	
18	**U-nut**	Carbon steel	Trivalent chromated
19	**Inverted internal retaining ring**	Carbon steel	Phosphate coating
20	**C type retaining ring**	Carbon steel	Phosphate coating
21	**Wave washer**	Steel for spring	Phosphate coating
22	**Conical spring washer**	Carbon steel	
23	**Piston seal**	NBR	
24	**Rod seal**	NBR	
25	**Rod seal**	NBR	
26	**Gasket**	NBR	
27	**Gasket**	NBR	

Replacement Parts

Description		MHL2-10□Z	MHL2-16□Z	MHL2-20□Z	MHL2-25□Z	MHL2-32□Z	MHL2-40□Z	Contents
Seal kit		MHL10-PS	MHL16-PS	MHL20-PS	MHL25-PS	MHL32-PS	MHL40-PS	23, 24, 25, 26, 27
Piston assembly	MHL2-□□DZ	MHL-AA1001	MHL-AA1601	MHL-AA2001	MHL-AA2501	MHL-AA3201	MHL-AA4001	ø10: 3, 10, 13, 23 ø16 to ø40: 3, 8, 11, 12, 23, 27
	MHL2-□□D1Z	MHL-AA1002	MHL-AA1602	MHL-AA2002	MHL-AA2502	MHL-AA3202	MHL-AA4002	
	MHL2-□□D2Z	MHL-AA1003	MHL-AA1603	MHL-AA2003	MHL-AA2503	MHL-AA3203	MHL-AA4003	
Rack	MHL2-□□DZ	MHL-AA1004	MHL-AA1604	MHL-AA2004	MHL-AA2504	MHL-AA3204	MHL-AA4004	4
	MHL2-□□D1Z	MHL-AA1005	MHL-AA1605	MHL-AA2005	MHL-AA2505	MHL-AA3205	MHL-AA4005	
	MHL2-□□D2Z	MHL-AA1006	MHL-AA1606	MHL-AA2006	MHL-AA2506	MHL-AA3206	MHL-AA4006	
Rod cover assembly		MHL-AA1007	MHL-AA1607	MHL-AA2007	MHL-AA2507	MHL-AA3207	MHL-AA4007	ø10: 9, 14, 16, 19, 25, 26 ø16 to ø40: 9, 10, 14, 16, 19, 25, 26
Finger assembly		MHL-AA1008	MHL-AA1608	MHL-AA2008	MHL-AA2508	MHL-AA3208	MHL-AA4008	2, 15, 18, 22
Pinion assembly		MHL-AA1009	MHL-AA1609	MHL-AA2009	MHL-AA2509	MHL-AA3209	MHL-AA4009	5, 6, 7, 20, 21
Nut set		MHL-A1017	MHL-A1617	MHL-A2017	MHL-A2517	MHL-A3217	MHL-A4017	15, 18, 22
U-nut assembly		MHL-A1017A	MHL-A1617A	MHL-A2017A	MHL-A2517A	MHL-A3217A	MHL-A4017A	18, 22

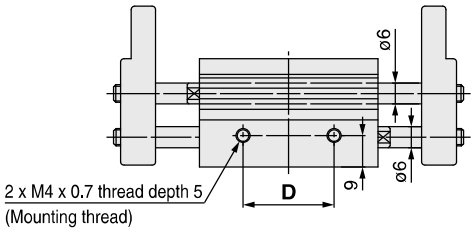
* Order one finger assembly, pinion assembly, nut set and U-nut assembly per unit.
* For piston assembly and rack, order 2 pieces per unit.
* For rod cover assembly, order 4 pieces per unit.
* The seal kit does not include a grease pack. Order it separately.

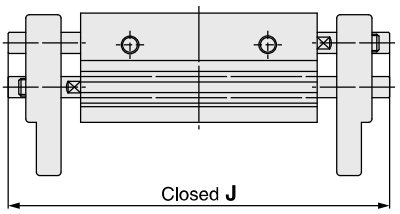
Replacement Parts/Grease Pack Part Nos.

MHL2-□□DZ (ø10 to ø20)	GR-S-010 (10 g)
MHL2-□□DZ (ø25, ø32)	GR-S-010 (10 g)
MHL2-□□DZ (ø40)	GR-S-020 (20 g)
MHL2-□□D1Z (ø10, ø16)	GR-S-010 (10 g)
MHL2-□□D1Z (ø20, ø25)	GR-S-010 (10 g)
MHL2-□□D1Z (ø32, ø40)	GR-S-020 (20 g)
MHL2-□□D2Z (ø10, ø16)	GR-S-010 (10 g)
MHL2-□□D2Z (ø20, ø25)	GR-S-010 (10 g)
MHL2-□□D2Z (ø32, ø40)	GR-S-010 (10 g), GR-S-020 (20 g) (1 pack each)

Dimensions

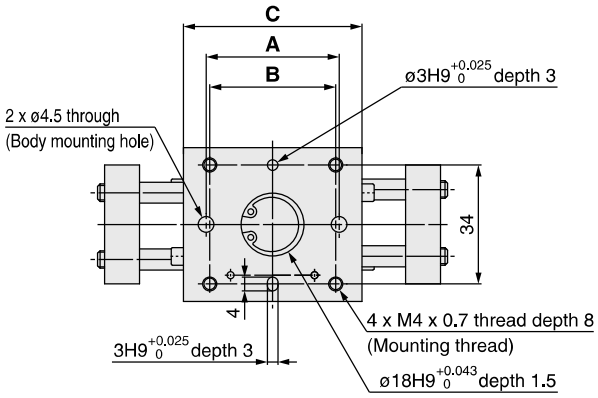
MHL2-10D□Z

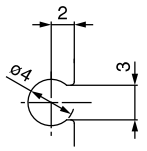




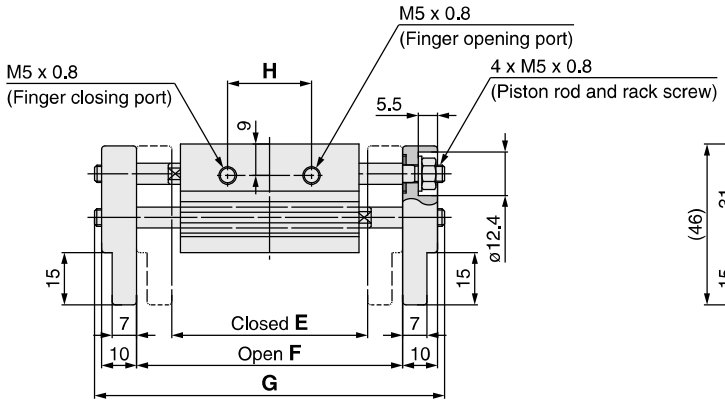
View K (Fingers closed)

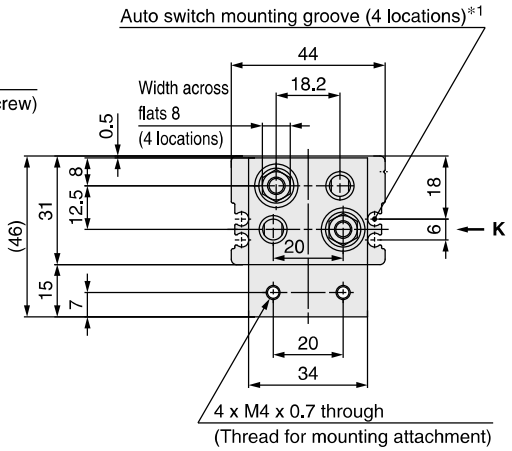
∗ The above figure shows the MHL2-10D1Z/10D2Z.





∗1 **Dimensions of auto switch mounting groove (Enlarged view)**



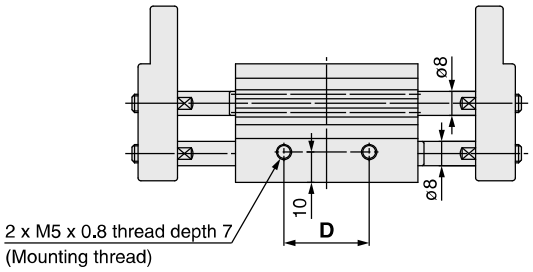


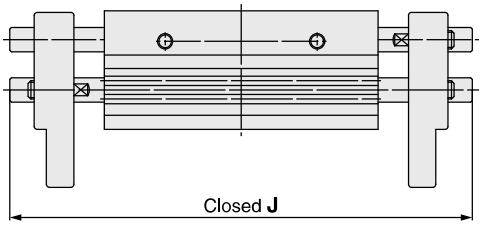
Model	A	B	C	D	E	F	G	H	J
MHL2-10DZ	38	36	51	26	56	76	100	24	80
MHL2-10D1Z	54	52	67	42	78	118	142	39	108
MHL2-10D2Z	72	70	85	60	96	156	180	57	146

∗ J-dimension is at fully closed.
∗ D1Z is different from D2Z at finger closed because shaft is ejected from finger end. J-dimension is different from the value which is subtracted stroke from G-dimension.

Dimensions

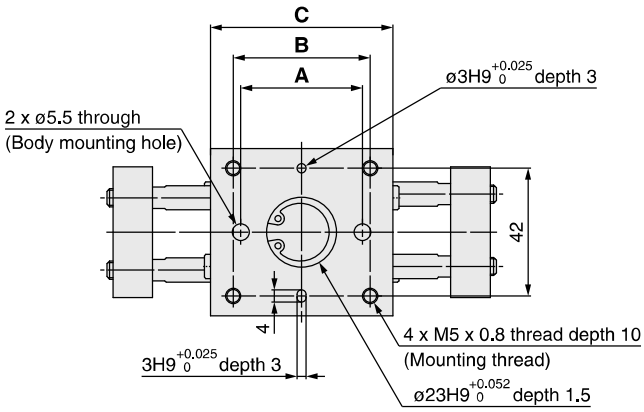
MHL2-16D□Z

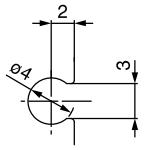




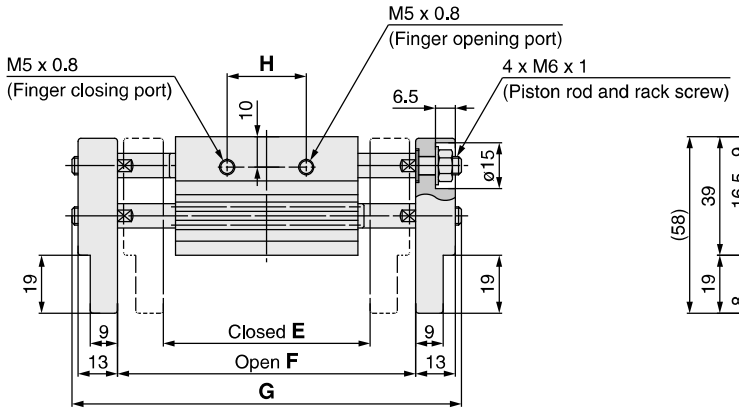
View K (Fingers closed)

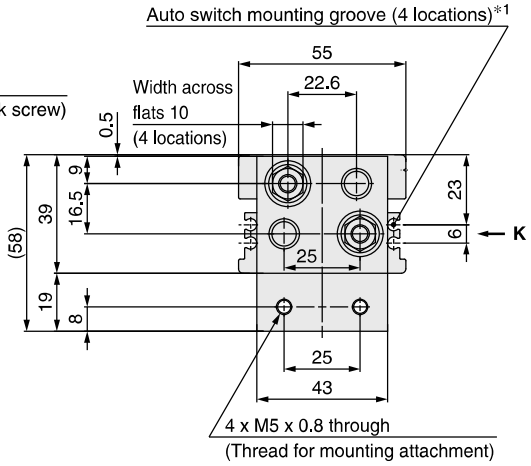
∗ The above figure shows the MHL2-16D1Z/16D2Z.





∗1 **Dimensions of auto switch mounting groove (Enlarged view)**



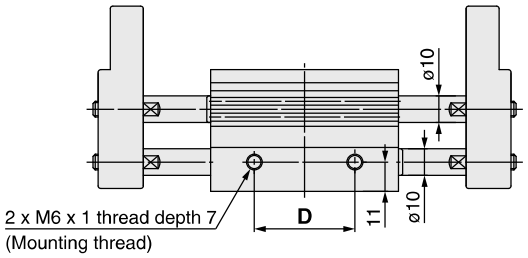


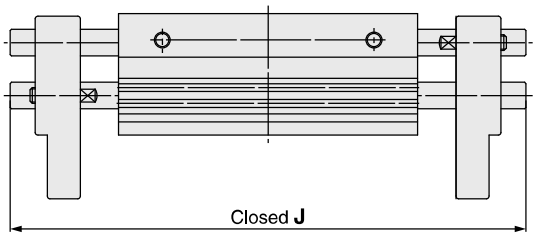
Model	A	B	C	D	E	F	G	H	J
MHL2-16DZ	40	45	60	28	68	98	128	26	98
MHL2-16D1Z	70	75	90	58	110	170	200	50	152
MHL2-16D2Z	90	95	110	78	130	210	240	70	192

∗ J-dimension is at fully closed.
∗ D1Z is different from D2Z at finger closed because shaft is ejected from finger end. J-dimension is different from the value which is subtracted stroke from G-dimension.

Dimensions

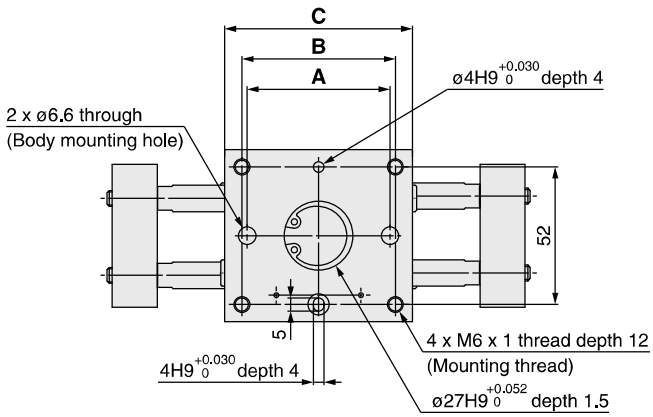
MHL2-20D□Z

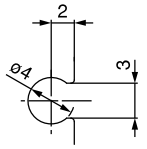




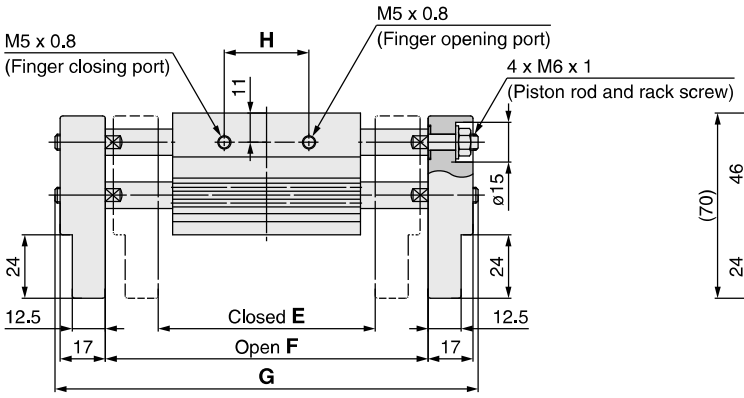
View K (Fingers closed)

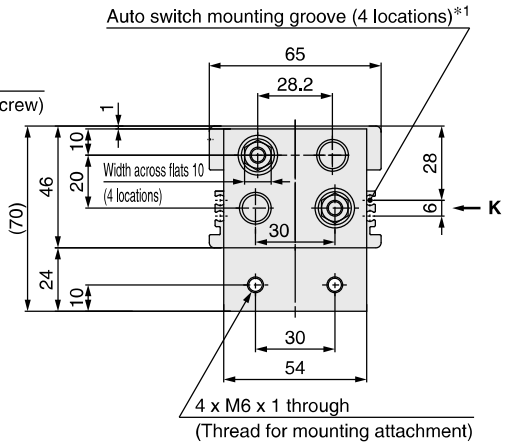
∗ The above figure shows the MHL2-20D1Z/20D2Z.





∗1 **Dimensions of auto switch mounting groove (Enlarged view)**



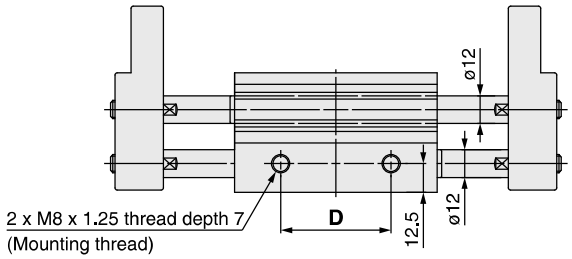


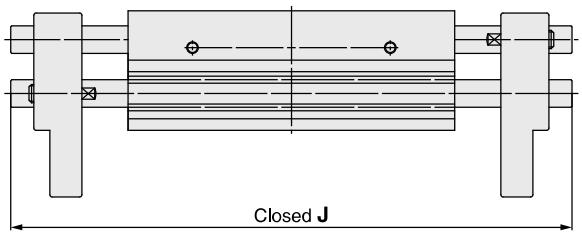
Model	A	B	C	D	E	F	G	H	J
MHL2-20DZ	54	58	71	38	82	122	160	32	120
MHL2-20D1Z	96	100	113	80	142	222	260	68	195
MHL2-20D2Z	116	120	133	100	162	262	300	88	235

∗ J-dimension is at fully closed.
∗ D1Z is different from D2Z at finger closed because shaft is ejected from finger end. J-dimension is different from the value which is subtracted stroke from G-dimension.

Dimensions

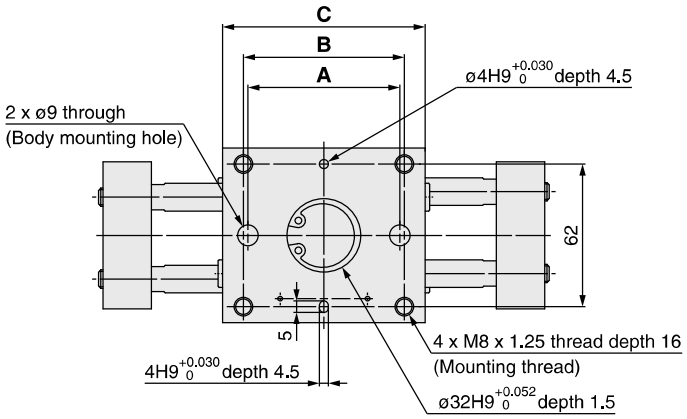
MHL2-25D□Z

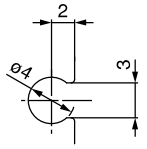




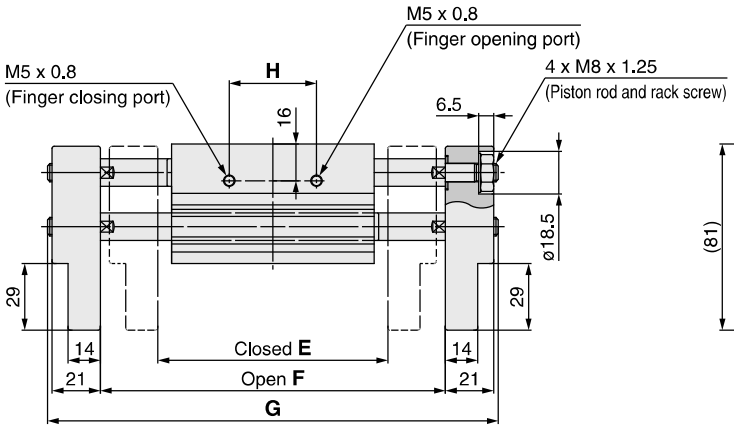
View K (Fingers closed)

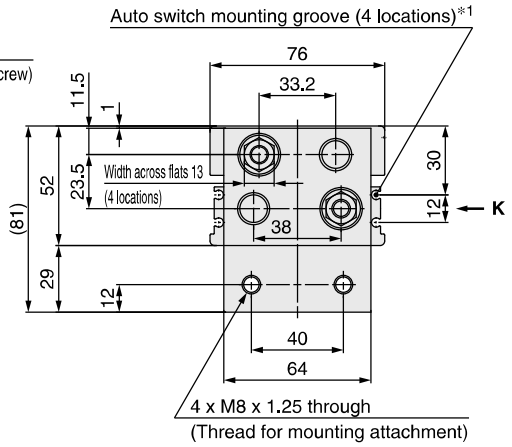
∗ The above figure shows the MHL2-25D1Z/25D2Z.





∗1 **Dimensions of auto switch mounting groove (Enlarged view)**



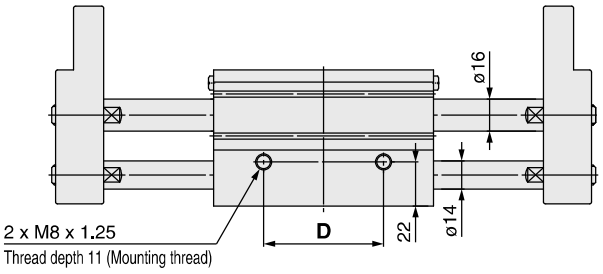


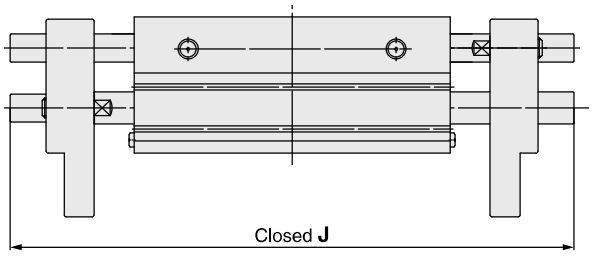
Model	A	B	C	D	E	F	G	H	J
MHL2-25DZ	66	70	88	48	100	150	196	38	146
MHL2-25D1Z	120	124	142	102	182	282	328	86	244
MHL2-25D2Z	138	142	160	120	200	320	366	104	282

∗ J-dimension is at fully closed.
∗ D1Z is different from D2Z at finger closed because shaft is ejected from finger end. J-dimension is different from the value which is subtracted stroke from G-dimension.

Dimensions

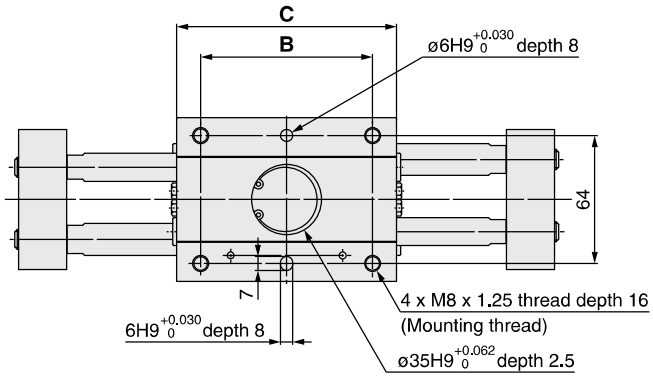
MHL2-32D□Z

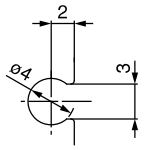




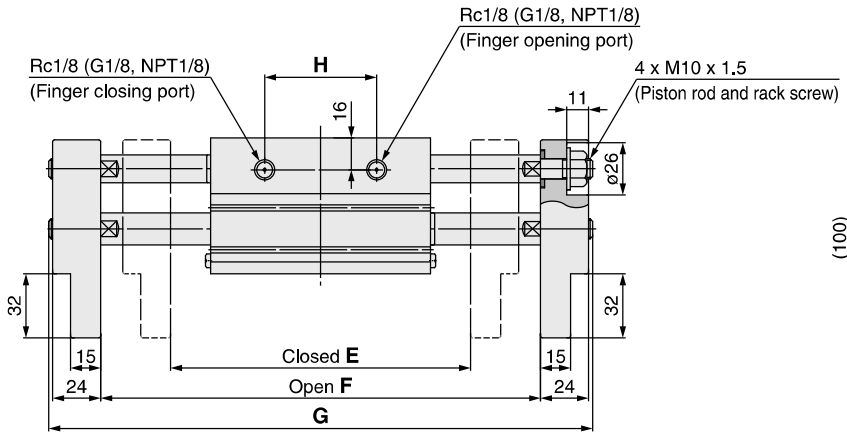
View K (Fingers closed)

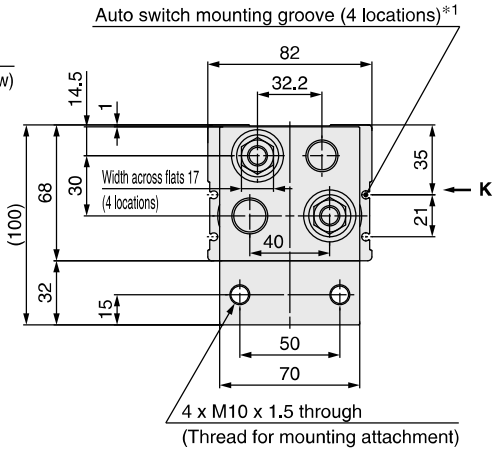
∗ The above figure shows the MHL2-32D1Z/32D2Z.





∗1 **Dimensions of auto switch mounting groove (Enlarged view)**





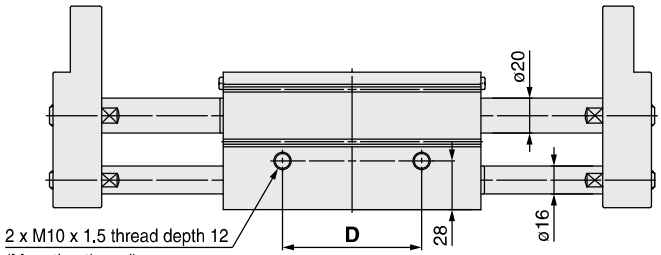
Model	B	C	D	E	F	G	H	J
MHL2-32DZ	86	110	60	150	220	272	56	202
MHL2-32D1Z	134	158	108	198	318	370	104	282
MHL2-32D2Z	178	202	152	242	402	454	148	366

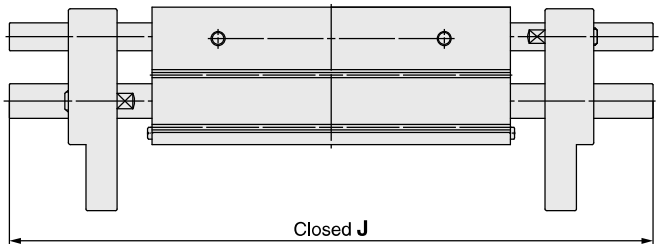
∗ J-dimension is at fully closed.

∗ D1Z is different from D2Z at finger closed because shaft is ejected from finger end.
J-dimension is different from the value which is subtracted stroke from G-dimension.

Dimensions

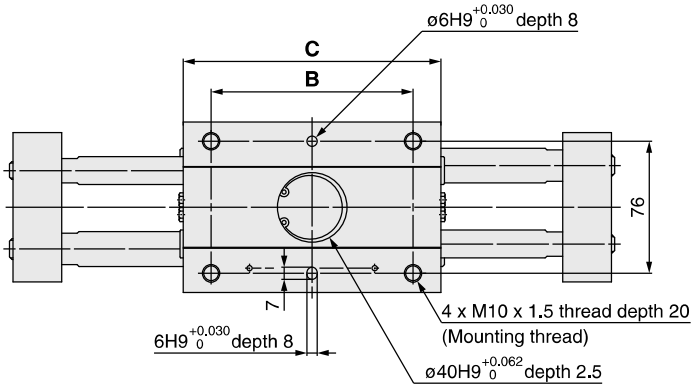
MHL2-40D□Z

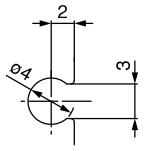




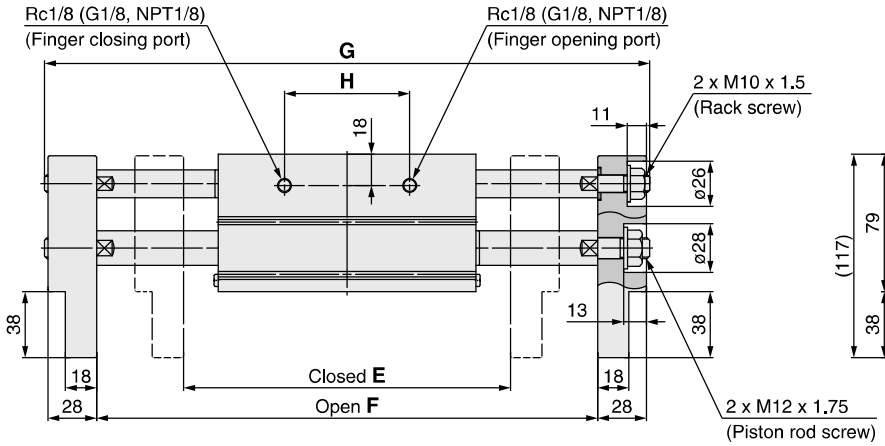
View K (Fingers closed)

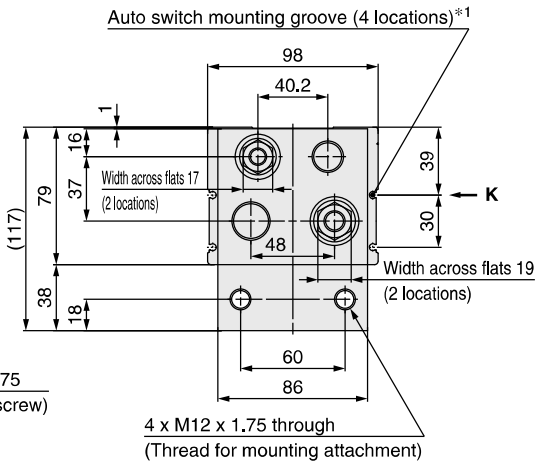
∗ The above figure shows the MHL2-40D1Z/40D2Z.





∗1 **Dimensions of auto switch mounting groove (Enlarged view)**





Model	B	C	D	E	F	G	H	J
MHL2-40DZ	116	148	80	188	288	348	72	252
MHL2-40D1Z	174	206	138	246	406	466	130	370
MHL2-40D2Z	214	246	178	286	486	546	170	450

∗ J-dimension is at fully closed.

∗ D1Z is different from D2Z at finger closed because shaft is ejected from finger end.
J-dimension is different from the value which is subtracted stroke from G-dimension.