

Small cylinder with suction pad double acting/single rod

MVC Series

● Bore size: $\phi 6/\phi 10$



Specifications

Descriptions	MVC	
Bore size mm	$\phi 6$	$\phi 10$
Actuation	Double acting	
Working fluid	Compressed air	
Max. working pressure MPa	0.7 (≈ 100 psi, 7 bar)	
Min. working pressure MPa	0.15 (≈ 22 psi, 1.5 bar)	0.1 (≈ 15 psi, 1 bar)
Proof pressure MPa	1.05 (≈ 150 psi, 10.5 bar)	
Vacuum port pressure	-101 kPa (≈ -15 psi, -1.01 bar) to 0.6 MPa (≈ 87 psi, 6 bar) *1	
Ambient temperature $^{\circ}\text{C}$	0 (32°F) to 60 (140°F) (no freezing) *2	
Port size	M3	M5
Stroke tolerance mm	+1.0 0	
Working piston speed mm/s	50 to 500	
Cushion	Rubber cushion	
Non-rotating accuracy $^{\circ}$	± 0.5 (*3)	
Lubrication	Not required (use turbine oil ISO VG32 if necessary for lubrication)	
Applicable pad	Refer to pages 1358 and 1363 for details.	
Allowable absorbed energy J	0.0046	0.035

*1: Application of pressure from the vacuum port can be performed only at vacuum burst. In addition, use burst pressure equal to the cylinder working pressure or less for this process.

*2: When using MVC with proximity switch, use the cylinder at an ambient temperature of 40°C or less. Failure to do so could lead to switch detection malfunction.

*3: Initial value at the pull end.

With buffer specifications Specifications other than below are the same as above.

Descriptions	MVC-*-B
Buffer stroke length mm	4
Buffer part spring load N	When set: 1.3 Operated: 1.62 (buffer stroke length of 4 mm operated)
Non-rotating accuracy (reference value) $^{\circ}$	± 2.6 ($\phi 6$), ± 2.0 ($\phi 10$) (*2)

*1: Use the cylinder within buffer stroke length of 4 mm. Otherwise, malfunctions may result.

*2: Initial value at the pull end.

Stroke length

Bore size (mm)	Standard stroke length (mm)	Max. stroke length (mm)	Min. stroke length with two switches (mm)		Min. stroke length with one switch (mm)	
			Reed switch	Proximity switch	Reed switch	Proximity switch
$\phi 6$	5/10/15/20/25/30	30	10	5(10)	5	5
$\phi 10$	5/10/15/20/25/30	30	10	5(10)	5	5

*1: Products with stroke length other than standard stroke length are not available.

*2: For F2Y, F3Y or F3P, the min. stroke length will be the dimensions in ().

Switch specifications

Descriptions	Reed 2-wire	Proximity 2-wire			Proximity 3-wire			
	FOH/V	F2H/F2V	F2S	F2YH/F2YV	F3H/F3V	F3S	F3PH/F3PV (Custom order)	F3YH/F3YV
Applications	Dedicated for programmable controller	Dedicated for programmable controller			For programmable controller, relay			
Output method	-	-			NPN output		PNP output	NPN output
Power supply voltage	-	-			10 to 28 VDC		4.5 to 28 VDC	10 to 28 VDC
Load voltage	24 VDC	10 to 30 VDC		24 VDC ±10%	30 VDC or less			
Load current	5 to 20 mA (*1)	5 to 20 mA (*1)			50mA or less			
Indicator lamp	Yellow LED (Lit when ON)	Yellow LED (Lit when ON)	LED (Lit when ON)	Red/green LED (Lit when ON)	Yellow LED (Lit when ON)	LED (Lit when ON)	Yellow LED (Lit when ON)	Red/green LED (Lit when ON)
Leakage current	1mA or less	1mA or less			10 µA or less			
Weight	g	1 m:10 3 m:29						

*1 : Max. load current: 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.

Cylinder weight table

(Unit: g)

Stroke length (mm)	5	10	15	20	25	30	Weight per switch
Bore size (mm)							
φ6	30.8	35.6	40.4	45.2	50	54.8	10
φ10	43.8	50	54.7	59.4	64.1	68.8	10

Theoretical thrust table

(Unit: N)

Bore size (mm)	Operating direction	Working pressure MPa							
		0.1	0.15	0.2	0.3	0.4	0.5	0.6	0.7
φ6	Push	-	4.24	5.65	8.48	11.3	14.1	17.0	19.8
	Pull	-	2.36	3.14	4.71	6.28	7.85	9.42	11.0
φ10	Push	7.85	11.8	15.7	23.6	31.4	39.3	47.1	55.0
	Pull	5.03	7.54	10.1	15.1	20.1	25.1	30.2	35.2

SCP*3

CMK2

CMA2

SCM

SCG

SCA2

SCS2

CKV2

CAV2/
COVP/N2

SSD2

SSG

SSD

CAT

MDC2

MVC

SMG

MSD/
MSDG

FC*

STK

SRL3

SRG3

SRM3

SRT3

MRL2

MRG2

SM-25

ShkAbs

FJ

FK

Spd
Contr

Ending

SCP*3
CMK2
CMA2
SCM
SCG
SCA2
SCS2
CKV2
CAV2/
COVPIN2
SSD2
SSG
SSD
CAT
MDC2
MVC
SMG
MSD/
MSDG
FC*
STK
SRL3
SRG3
SRM3
SRT3
MRL2
MRG2
SM-25
ShkAbs
FJ
FK
Spd
Contr
Ending

How to order

● Without switch (built-in magnet for switch)



● With switch (built-in magnet for switch)



Model No.

A Bore size

B Stroke length

C Switch model No.

[Example of model No.]

MVC-6-10-F0H-D-P2A-B

A Bore size : φ6 mm

B Stroke length : 10 mm

C Switch model No.: Reed F0H switch, lead wire 1 m

D Switch quantity : 2

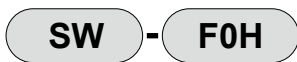
E Pad : Nitrile rubber, O.D. φ2 mm

F Buffer : With buffer

D Switch quantity

E Pad

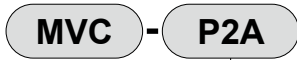
How to order switch



Switch model No.
(Item C above)

How to order socket and pad assembling parts

(assembling parts: socket + pad + hexagon socket set screw)



Pad
(Item E above)

How to order pads



Pad
(Item E above)

Specifications for rechargeable battery (Catalog No. CC-1226A)

● Design compatible with rechargeable battery manufacturing process

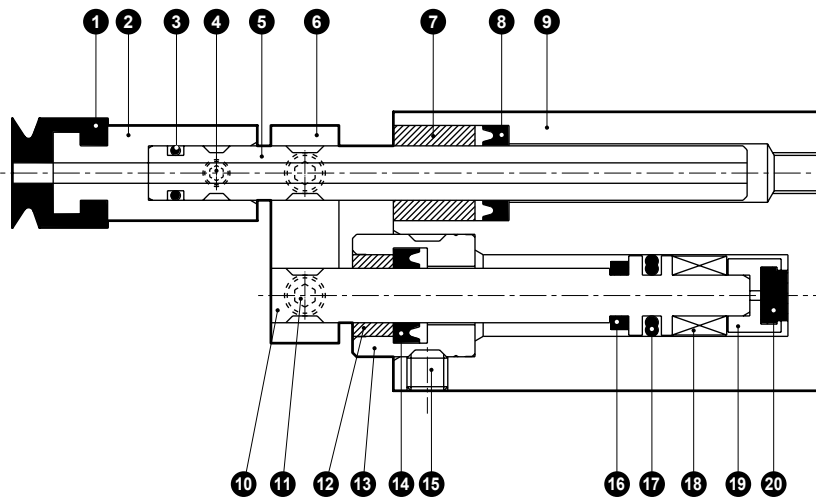


F Buffer

Code	Content				
A Bore size (mm)					
6	φ6				
10	φ10				
B Stroke length (mm)					
5, 10, 15, 20, 25, 30					
C Switch model No.					
Axial lead wire	Radial lead wire	Contact	Voltage	Display	Lead wire
F0H*	F0V*	Reed	AC	DC	1-color display
F2S*		Prox.			
F2H*	F2V*				
F3S*					1-color display (PNP output) (custom)
F3H*	F3V*				
F3PH*	F3PV*				2-color display
F2YH*	F2YV*				
F3YH*	F3YV*				
* Lead wire length					
Blank	1 m (standard)				
3	3 m (option)				
D Switch quantity					
R	1 on rod side				
H	1 head side				
D	2				
E Pad					
Blank	Without pad				
P2A	Material: Nitrile rubber				
P3.5A					
P5A					
P6A					
P8A					
P10A	Material: Urethane rubber				
P2AU					
P3.5AU					
P5AU					
P6AU					
P8AU					
P10AU	Material: Silicone rubber				
P2AS					
P3.5AS					
P5AS					
P6AS					
P8AS					
P10AS	Material: Fluoro rubber				
P2AF					
P3.5AF					
P5AF					
P6AF					
P8AF					
P10AF					
F Buffer					
Blank	Without buffer				
B	With buffer				

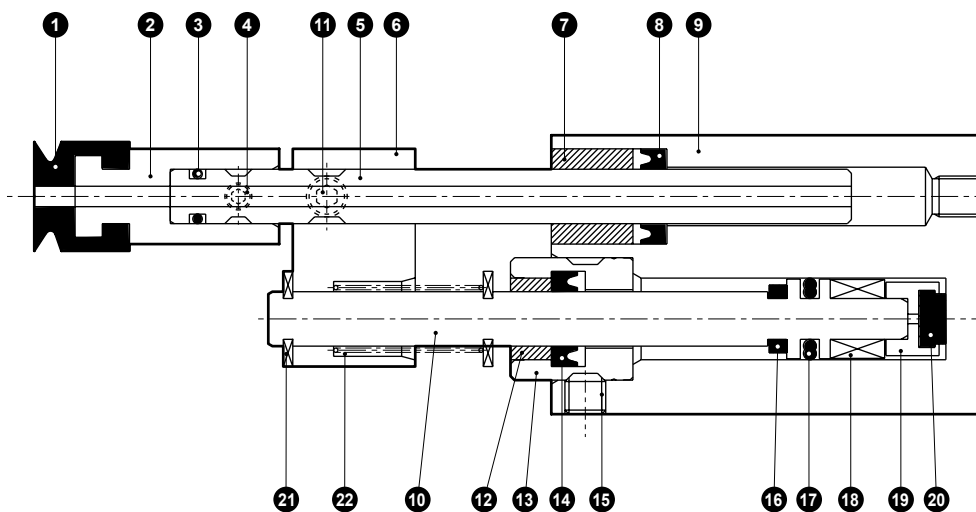
Internal structure and parts list

● MVC-6, 10



* The above figure shows the internal structure when with pad.
When without pad there is no ① ② ④.

● MVC-6, 10-B (with buffer)



* The above figure shows the internal structure when with pad.
When without pad there is no ① ② ④.

Cannot be disassembled

No.	Part name	Material	Remarks	No.	Part name	Material	Remarks
1	Pad			12	Bush	Oil-impregnated copper alloy	
2	Socket	Aluminum alloy	Chromate	13	Rod metal	Stainless steel	
3	O-ring	Nitrile rubber		14	Rod packing	Nitrile rubber	
4	Hexagon socket set screw	Stainless steel		15	Hexagon socket set screw	Stainless steel	
5	Guide rod	Stainless steel		16	Cushion rubber R	Urethane rubber	
6	Plate	Aluminum alloy	Chromate	17	Piston packing	Nitrile rubber	
7	Guide bush	Phosphor bronze		18	Magnet	Plastic	
8	Guide packing	Nitrile rubber		19	Adaptor	Aluminum alloy	
9	Cylinder body	Aluminum alloy	Hard alumite	20	Cushion rubber H	Urethane rubber	
10	Piston	Stainless steel		21	E ring	Stainless steel	
11	Hexagon socket set screw	Stainless steel		22	Spring	Piano wire	Electrodeposition

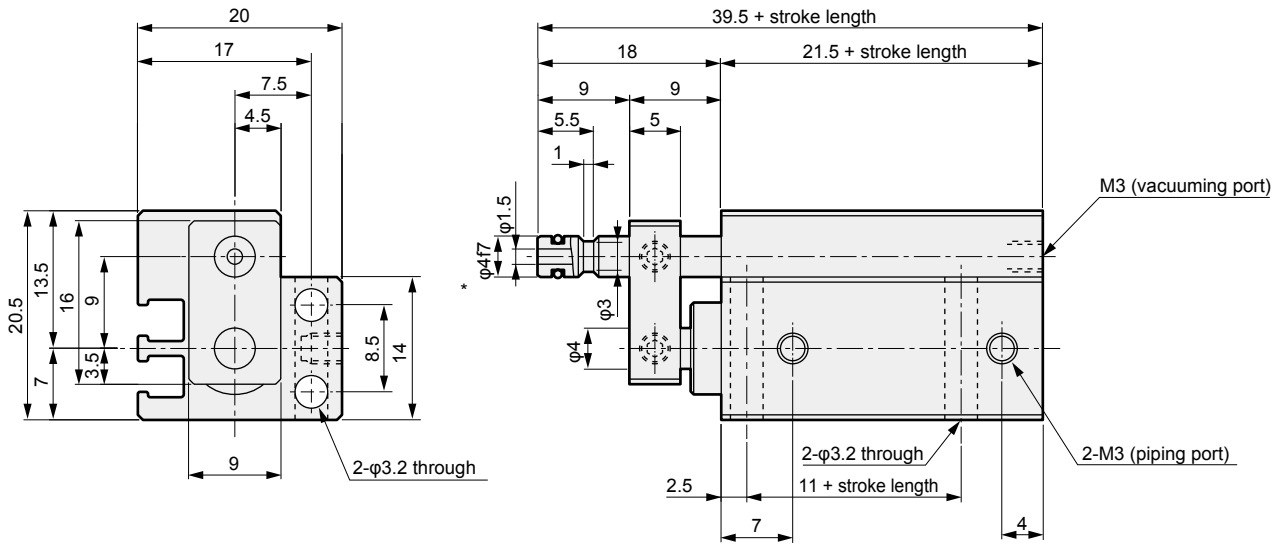
- SCP*3
- CMK2
- CMA2
- SCM
- SCG
- SCA2
- SCS2
- CKV2
- CAV2/
COVP/N2
- SSD2
- SSG
- SSD
- CAT
- MDC2
- MVC**
- SMG
- MSD/
MSDG
- FC*
- STK
- SRL3
- SRG3
- SRM3
- SRT3
- MRL2
- MRG2
- SM-25
- ShkAbs
- FJ
- FK
- Spd
Contr
- Ending

Dimensions



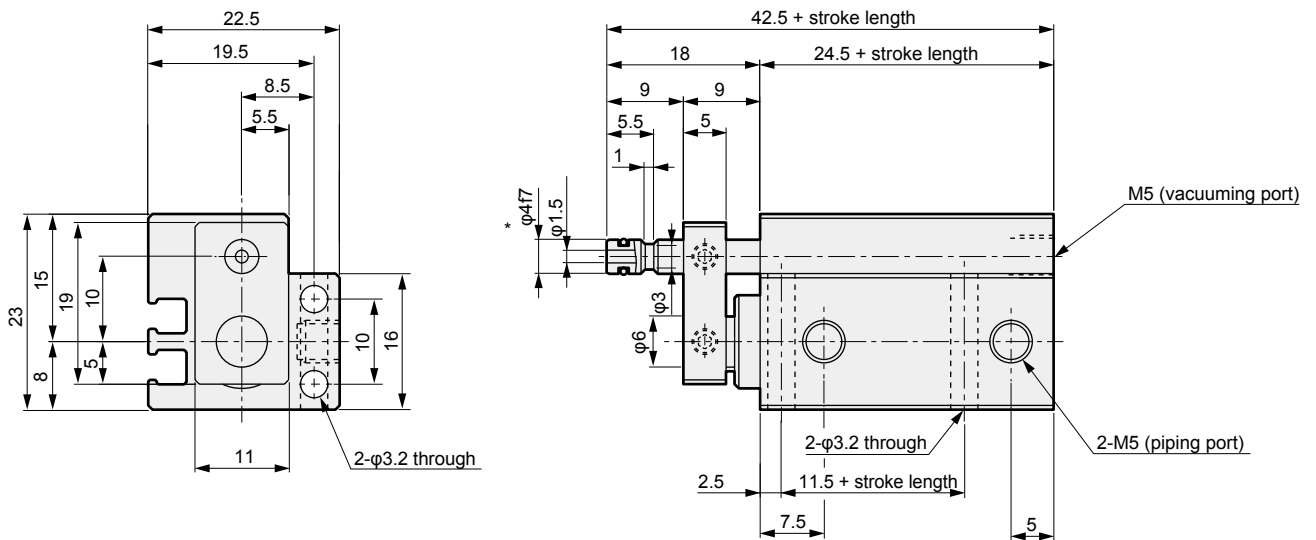
- SCP*3
- CMK2
- CMA2
- SCM
- SCG
- SCA2
- SCS2
- CKV2
- CAV2/
COVPIN2
- SSD2
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- SSD
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- MSD/
MSDG
- FC*
- STK
- SRL3
- SRG3
- SRM3
- SRT3
- MRL2
- MRG2
- SM-25
- ShkAbs
- FJ
- FK
- Spd
Contr
- Ending

● MVC-6 (without pad)



* Recommended inner diameter tolerance of the mating side's socket: H8

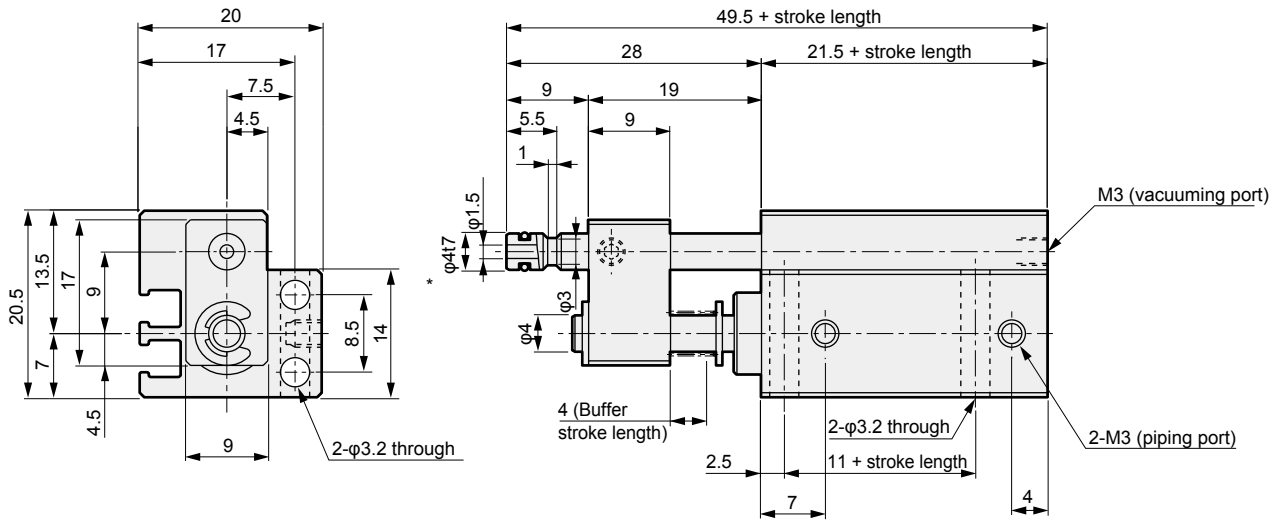
● MVC-10 (without pad)



* Recommended inner diameter tolerance of the mating side's socket: H8

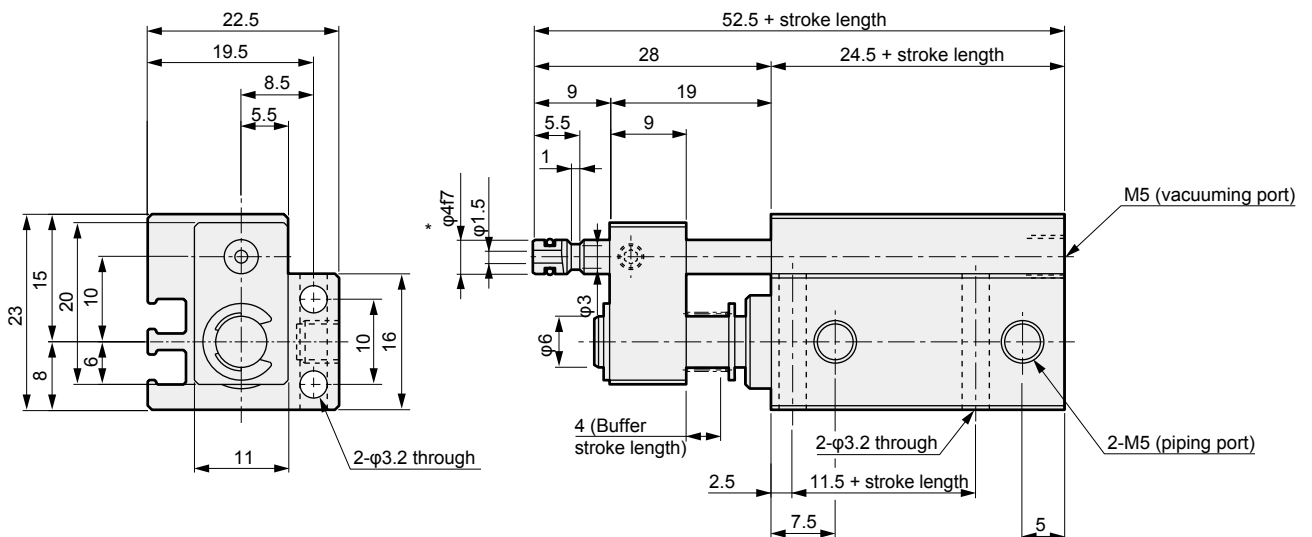
Dimensions

● MVC-6-*-B (with buffer)



* Recommended inner diameter tolerance of the mating side's socket: H8

● MVC-10-*-B (with buffer)



* Recommended inner diameter tolerance of the mating side's socket: H8

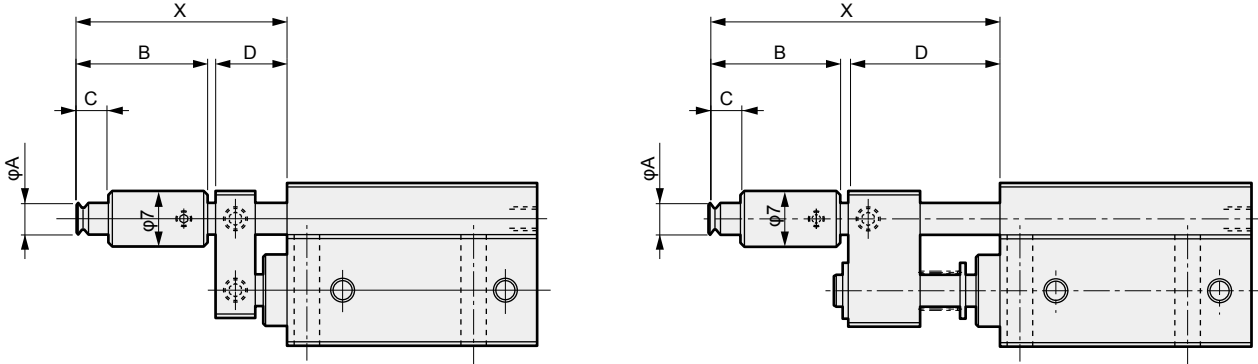
SCP*3
CMK2
CMA2
SCM
SCG
SCA2
SCS2
CKV2
CAV2/ COVP/N2
SSD2
SSG
SSD
CAT
MDC2
MVC
SMG
MSD/ MSDG
FC*
STK
SRL3
SRG3
SRM3
SRT3
MRL2
MRG2
SM-25
ShkAbs
FJ
FK
Spd Contr
Ending

Dimensions



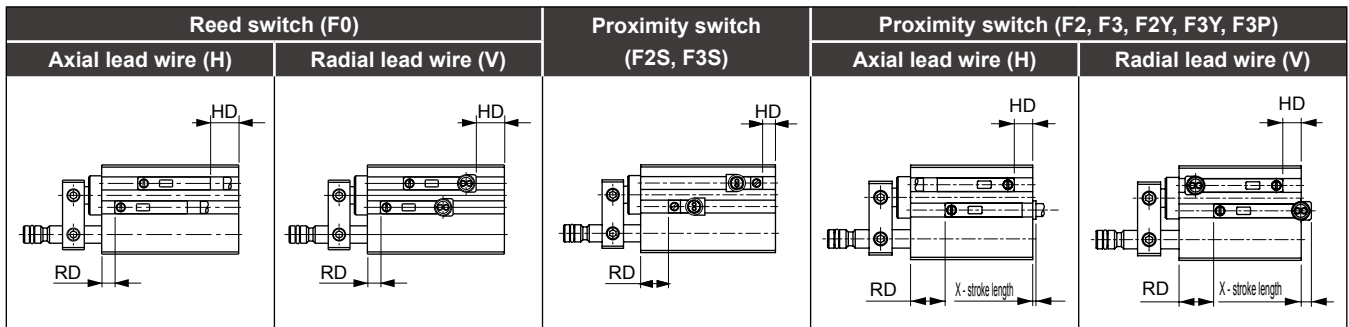
● MVC-6/10 (with pad)

● MVC-6/10-B (with pad/with buffer)



Code	Without buffer					With buffer	
	A	B	C	X	D	X	D
P2A	φ2	16.5	4	26.5	9	36.5	19
P3.5A	φ3.5	16.5	4	26.5	9	36.5	19
P5A	φ5	17.5	6.5	27.5	9	37.5	19
P6A	φ6	17.5	6.5	27.5	9	37.5	19
P8A	φ8	18	7	28	9	38	19
P10A	φ10	18.5	7.5	28.5	9	38.5	19

● Switch mounting position



● Switch mounting position dimensions

(mm)

Switch installation dimensions	Reed switch		Proximity switch				
	F0 _H ^V		F2S, F3S		F2 _H ^V , F3 _H ^V , F2Y _H ^V , F3Y _H ^V , F3P _H ^V		
Bore size	RD	HD	RD	HD	RD	HD	X (*4, *5)
φ6	3	1.5	6.5	3	7.5	4	5.7(10.2) 2.7(7.2)
φ10	4.5	3	8	4.5	9	5.5	4.2(8.7) 1.2(5.7)

*1: Min. stroke length with two reed switches is 10 mm.

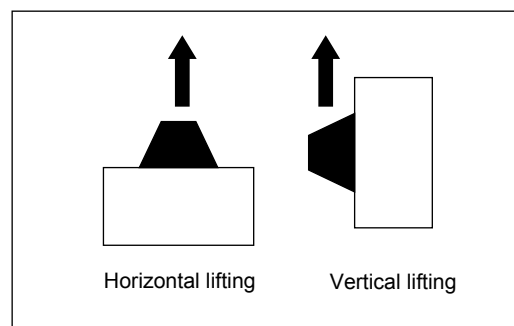
*2: X-stroke dimensions indicate the protruding dimensions from the end surface of the switch body. (When the calculated value is negative, there is no protrusion from the end surface of body.) The upper column indicates X dimensions when axial lead wire is used and the lower column indicates X dimensions when radial lead wire is used.

*3: For F2Y, F3Y or F3P, X dimensions will be the dimensions in ().

Formula for lifting capacity

$$W = \frac{P \times A}{-101.3} \times \frac{1}{0.102} \quad \text{where} \quad \begin{cases} W = \text{Suspension capacity (N)} \\ P = \text{Vacuum pressure (KPa)} \\ A = \text{Pad area (cm}^2\text{)} \end{cases}$$

- The value obtained by this equation is a theoretical value. Calculate the value for the actual design with 4 times this value for horizontal suspension or 6 to 8 times or more for vertical suspension, as a safety factor.
- When lifting and then moving, ensure an adequate safety factor by considering the weight due to acceleration.
- Diameter of the pad under suction increases by approx. 10%.
- Pay attention to the position of center of gravity for the workpiece. If the workpiece inclines, the suction force will be extremely weakened.



Theoretical lifting force

- Circular pad

Pad diameter (φmm)	2	3.5	5	6	8	10
Suction area (cm ²)	0.031	0.096	0.196	0.282	0.502	0.785
Vacuum pressure						
-93.3 KPa	0.284	0.873	1.765	2.550	4.511	7.061
-80.8 KPa	0.245	0.745	1.569	2.158	3.923	6.080
-66.7 KPa	0.206	0.618	1.275	1.863	3.236	5.099
-53.4 KPa	0.167	0.500	0.981	1.471	2.550	4.021
-40.0 KPa	0.118	0.373	0.785	1.079	1.961	3.040

Values in table are calculated values.

Pad material and characteristics

Descriptions	Hardness HS	Tensile strength N/cm ²	Tearing strength N/cm ²	Stretch %	Heat resist temp °C	Oil resistance	Sunlight resistance	Ozone resistance	Acid resistance	Alkali resistance	Abrasion resistance	Electrical insulation property	Gas permeation resistance
Nitrile rubber (NBR)	50° to 90°	686 to 1961	313 to 490	150 to 620	-26 to 120	○	×	×	△	○	◎	×	○
Silicone rubber (SI)	54° to 80°	441 to 784	117 to 411	100 to 300	-60 to 250	△	◎	◎	△	○	×	◎	×
Urethane rubber (U)	50° to 80°	686 to 4315	588 to 1961	310 to 750	-20 to 75	△	◎	◎	×	×	◎	○	○
Fluoro rubber (FKM)	58° to 90°	931 to 1765	166 to 470	100 to 350	-10 to 230	◎	◎	◎	◎	△	◎	◎	◎

This table shows the general characteristics of synthetic rubber available from CKD.

◎: Ideal for use ○: Suitable for use △: Suitable for use under some conditions ×: Unsuitable for use

- Refer to "Vacuum system equipment SELVACS" for selection of vacuum equipment.

SCP*3

CMK2

CMA2

SCM

SCG

SCA2

SCS2

CKV2

CAV2/
COVP/N2

SSD2

SSG

SSD

CAT

MDC2

MVC

SMG

MSD/
MSDG

FC*

STK

SRL3

SRG3

SRM3

SRT3

MRL2

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Ending