

# MVC

## Special Compact Cylinder with Vacuum Suction

ø6, ø10



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Special

MVC

STK

MCP

GLC

BBS

NHS

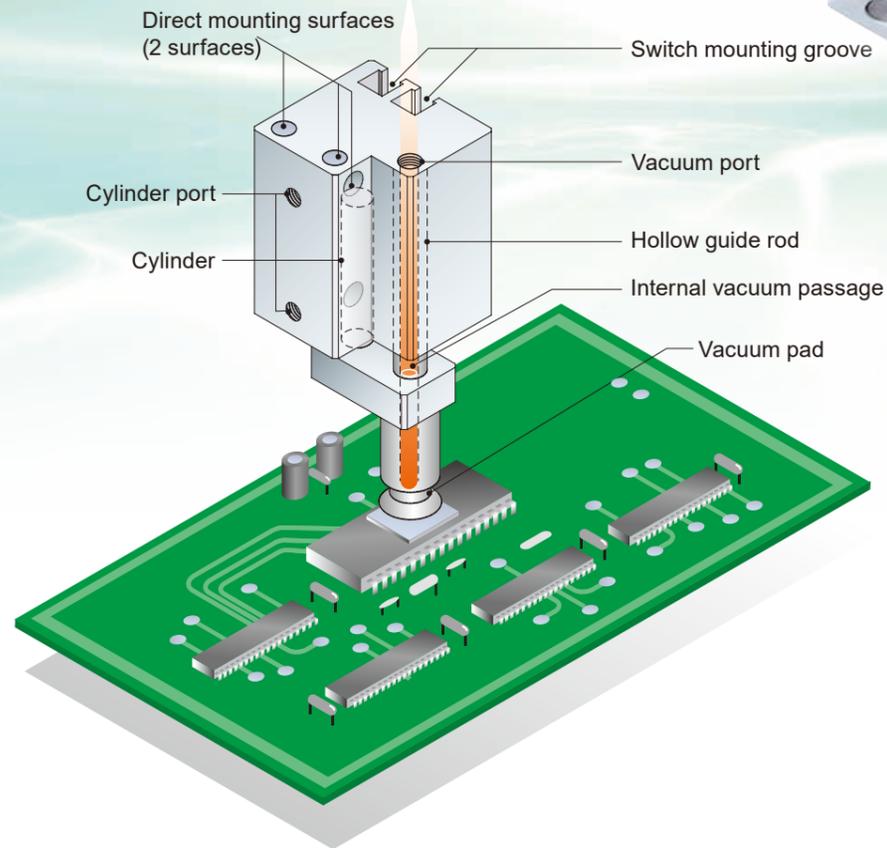
HR

LN

Cylinder  
Switch

Ending

Cylinder and vacuum suction pad are compactly integrated.  
Ideal for suction conveyance of electronic parts and precision parts.



### No pulling of piping

Since the vacuum port is on the Cylinder Body, there is no pulling of the tube even when the cylinder operates.

### Man-hour reduction

Cylinder, suction pad, non-rotating mechanism, and buffer (option) integrated. Significantly reduces the number of purchased parts and assembly man-hours.

### Space-saving design

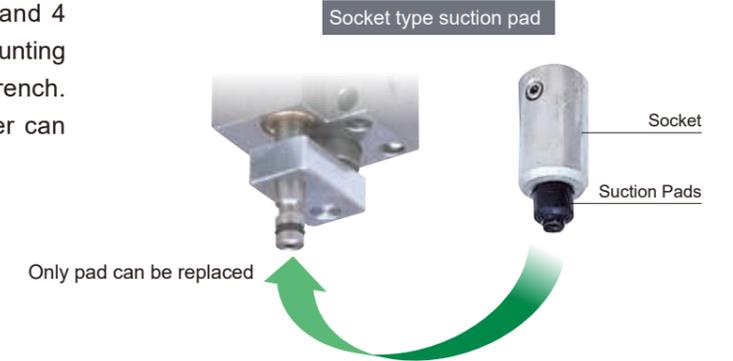
Cylinder and guide rod integrated. Significant space saving has been achieved because the vacuum flow path is inside the hollow structure guide rod.

### High-precision non-rotating mechanism

Equipped with a guide rod for non-rotation, preventing workpiece rotation with excellent non-rotation accuracy.

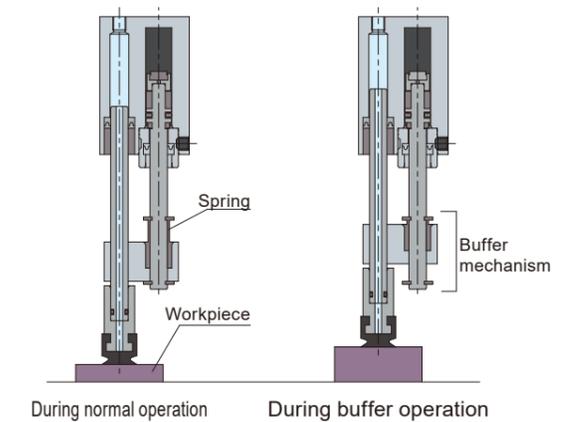
### Wide selection of suction pads

Selectable from pad diameters  $\phi 2$  to  $\phi 10$  and 4 types of materials. It is a socket type, and mounting to the rod is easy with a single hexagon wrench. Nozzles, etc. manufactured by the customer can also be easily included.



### Selectable with buffer

Buffer function is also compactly integrated. (When buffer option is selected) Absorbs impact during suction and protects delicate workpieces.

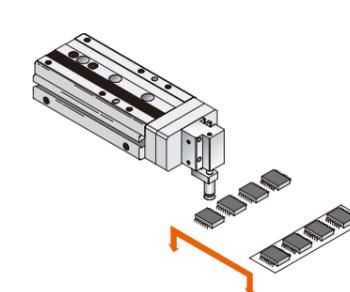


### Variation

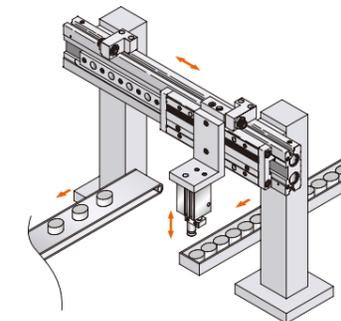
Bore Size		Stroke (mm)			Pad Diameter			Pad type	
$\phi 6$	$\phi 10$	5	10	15	$\phi 2$	$\phi 3.5$	$\phi 5$	Nitrile Rubber	Urethane Rubber
		20	25	30	$\phi 6$	$\phi 8$	$\phi 10$	Silicone Rubber	Fluoro Rubber

### Application Example

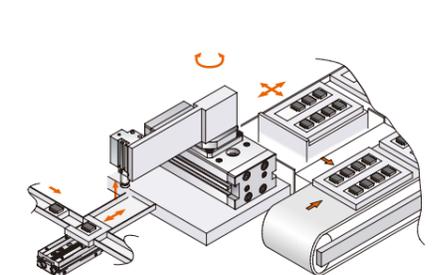
Suction/transport of electronic parts



Transport system of small parts



Transport system of electronic parts



# Variation Table

## Compact Cylinder with Vacuum Suction MVC Series

MEMO

●: Standard, ○: Option

Variation	Model No. Circuit Diagram Code	Bore Size (mm)	Standard Stroke (mm)						Min Stroke (mm)	Max Stroke (mm)	Pad type				Option	Switch	Page
			5	10	15	20	25	30			Nitrile Rubber Material	Urethane Rubber Material	Silicone Rubber Material	Fluoro Rubber Material			
			5	10	15	20	25	30			PCA	PCAU	PCAS	PCAF			
Double Acting, Single Rod Type	MVC 	ø6, ø10	●	●	●	●	●	●	5	30	○	○	○	○	○	○	908

Special

MVC

STK

MCP

GLC

BBS

NHS

HR

LN

Cylinder Switch

Ending

907

Special

MVC

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MCP

GLC

BBS

NHS

HR

LN

Cylinder Switch

Ending

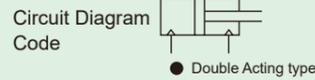
906



Compact vacuum suction cylinder Double Acting, single rod type

# MVC Series

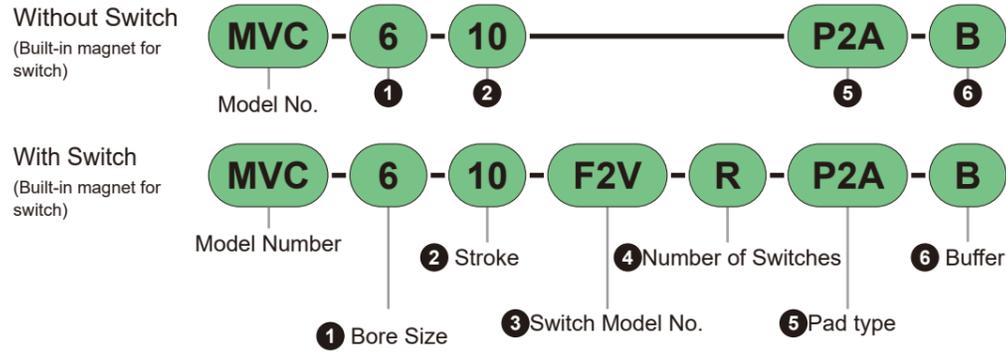
● Bore Size:  $\phi 6$ ,  $\phi 10$



## MVC Series

Model No. Notation

### Model No. Notation



#### 1 Bore Size (mm)

Code	Content
6	$\phi 6$
10	$\phi 10$

#### 2 Stroke (mm)

Code	Content
5	5
10	10
15	15
20	20
25	25
30	30

#### 3 Switch Model No.

For switch details, refer to P. 1457. Switches are shipped with the product.

Contact	Indicator LED Special Function	Wiring (Output)	Load Voltage (V)		Load Current (mA)		Lead Wire *1		Image
			AC	DC	AC	DC	Straight	L-shape	
Reed	1-Color	2-wire	—	24 $\pm$ 10%	—	5 to 20	F0H	F0V	
		3-wire (NPN)	—	30 or less	—	50 or less	—	F3S	
Solid State	1-Color	2-wire	—	10 to 30	—	5 to 20	—	F2S	
		3-wire (NPN)	—	30 or less	—	50 or less	—	F3S	
		2-wire	—	10 to 30	—	5 to 20 *2	F2H	F2V	
		3-wire (NPN)	—	30 or less	—	50 or less	F3H	F3V	
		3-wire (PNP)	—	30 or less	—	50 or less	F3PH	F3PV	
		2-Color	2-wire	—	24 $\pm$ 10%	—	5 to 20	F2YH	F2YV
	3-wire (NPN)	—	30 or less	—	50 or less	F3YH	F3YV		

#### \* Lead wire length

Code	Content
Blank	1 m (Standard)
3	3 m (Option)

Example) Lead wire length  
1 m F0H  
3 m F0H<sup>3</sup>

#### 4 Number of Switches

Code	Content
R	With 1 pc on rod side
H	With 1 pc on head side
D	With 2 pcs

#### 5 Pad type

Code	Content	
Blank	Without pad	
P2A	Material: Nitrile Rubber	
P3.5A		
P5A		
P6A		
P8A		
P10A		
P2AU		
P3.5AU		
P5AU		
P6AU		Material: Urethane Rubber
P8AU	Material: Silicone Rubber	
P10AU		
P2AS		
P3.5AS		
P5AS		
P6AS		
P8AS		
P10AS		
P2AF		Material: Fluoro Rubber
P3.5AF		
P5AF		
P6AF		
P8AF		
P10AF		

#### 6 Buffer

Code	Content
Blank	Without buffer
B	With buffer

#### Rechargeable Battery Compatible Specification (Catalog No. CC-1226AA)

● Design compatible with rechargeable battery manufacturing process

MVC- . . . . - P4\*

\*Please contact us for details.

#### Switch Single Unit Model No. Notation

SW - F0H

3 Switch Model No.

#### Socket & Pad Assembly Part Model No. Notation

(Assembly parts: Socket + Pad + Hexagon Socket Set Screw)

MVC - P2A

5 Pad type

#### Pad Single Unit Model No. Notation

MVC - P2A - PAD

5 Pad type

Note: The socket differs depending on the pad size. If changing pads, please contact our sales department.

\*1: Insert the code selected in the "Lead wire length" table into "□" of the switch model number.

\*2: The maximum load current value above, 20 mA, is at 25°C. If the switch operating Ambient Temperature is higher than 25°C, it will be lower than 20 mA. (At 60°C, it will be 5 to 10 mA.)

\*3: Switches other than the above models are also available. (Custom Product) For details, refer to P. 1457.

Specifications

Item	MVC	
Bore Size mm	ø6	ø10
Actuation method	Double Acting Type	
Operating Fluid	Compressed Air	
Max Operating Pressure MPa	0.7	
Min Operating Pressure MPa	0.15	0.1
Proof Pressure MPa	1.05	
Vacuum port pressure	-101 KPa to 0.6 MPa *1	
Ambient Temperature °C	0 to 60 (however, no freezing) *2	
Port Size	M3	M5
Stroke tolerance mm	+1.0 0	
Operating Piston Speed mm/s	50 to 500	
Cushion	Rubber Cushion	
Non-rotating accuracy degrees	±0.5 (*3)	
Lubrication	Not Required (When lubricating, use Turbine Oil ISO VG32)	
Applicable pad	For details, please refer to P. 909, 916.	
Allowable Absorbed Energy J	0.0046	0.035

\*1: Pressurization from the vacuum port should only be done during vacuum break. Also, use a breaking pressure at that time that is below the cylinder Operating Pressure.  
 \*2: When using MVC with solid state switch, please use at an Ambient Temperature of 40°C or less. This will cause switch detection failure.  
 \*3: This is the initial value at the retraction end.

With buffer specification Specifications other than those listed below are the same as above.

Item	MVC-□□-B
Buffer Stroke mm	4
Buffer portion spring load N	At setting: 1.3 At operation: 1.62 (At buffer stroke 4 mm operation)
Non-rotation accuracy (Reference value) Degrees	±2.6 (ø6), ±2.0 (ø10) (*2)

\*1: Do not use with a buffer stroke of 4 mm or more. It causes malfunction.  
 \*2: Initial value at retracted end.

Stroke

Bore Size (mm)	Standard Stroke (mm)	Minimum stroke with 1 switch (mm)		Minimum stroke with 2 switches (mm)	
		Reed switch	Solid state switch	Reed switch	Solid state switch
ø6	5, 10, 15, 20, 25, 30	5	5	10	5 (10)
ø10	5, 10, 15, 20, 25, 30	5	5	10	5 (10)

\*1: Only Standard Strokes can be manufactured.  
 \*2: For F2Y, F3Y, F3P, the minimum stroke is the dimension in ( ).

Cylinder Weight Table

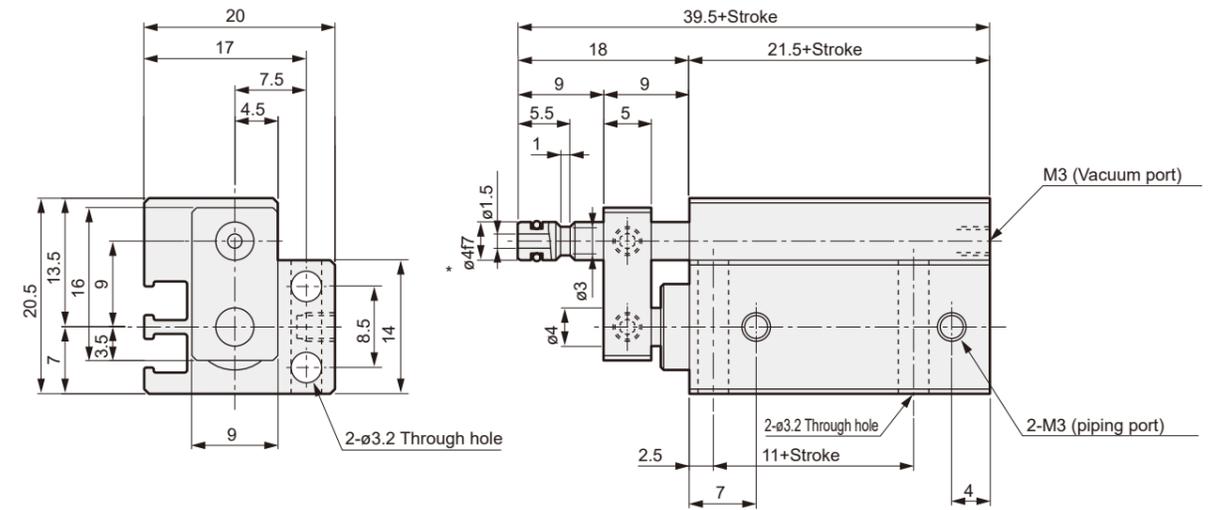
Stroke (mm)	5	10	15	20	25	30	1 switch Weight per
ø6	30.8	35.6	40.4	45.2	50	54.8	10
ø10	43.8	50	54.7	59.4	64.1	68.8	10

Theoretical Thrust Table

Bore Size (mm)	Operating Direction	Operating Pressure MPa							
		0.1	0.15	0.2	0.3	0.4	0.5	0.6	0.7
ø6	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
ø10	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

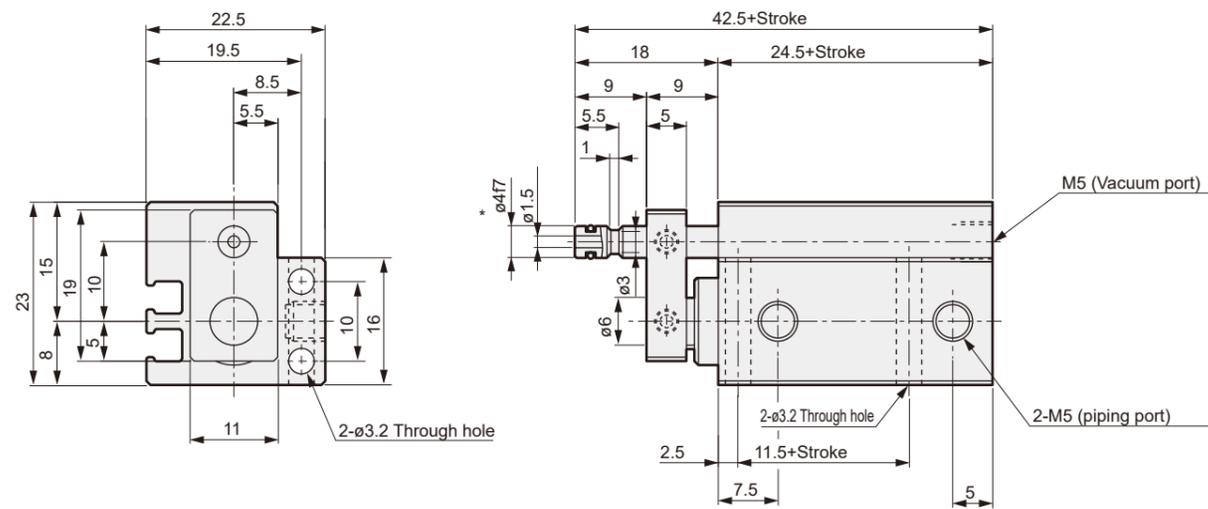
Dimensional Drawings

● MVC-6 (without pad)



\*Recommended inner diameter tolerance of mating socket: H8

● MVC-10 (without pad)

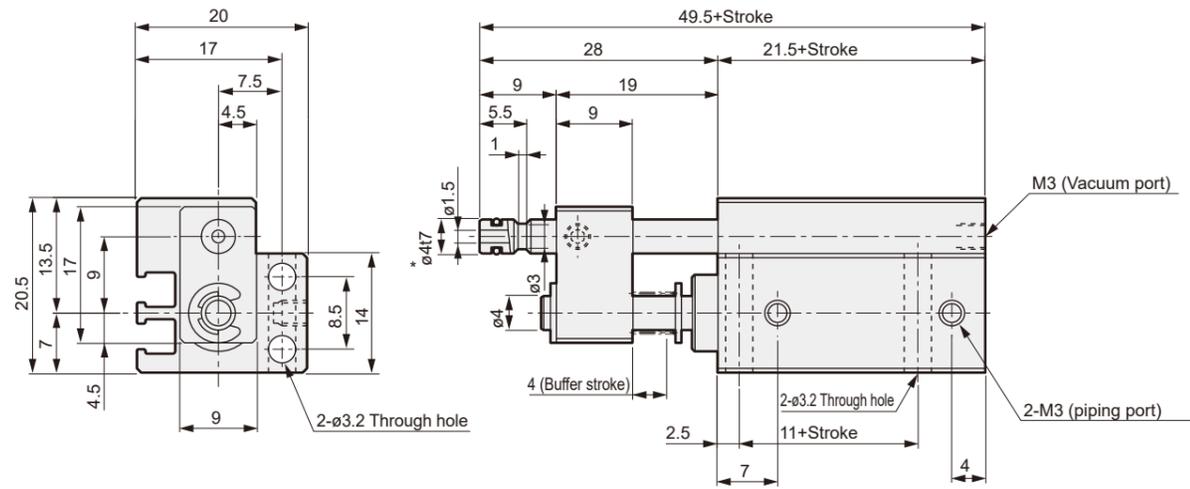


\*Recommended inner diameter tolerance of mating socket: H8

Note: For dimensions with each switch, please refer to P. 915.

Dimensional Drawings with Option

● MVC-6-□-B (with buffer)



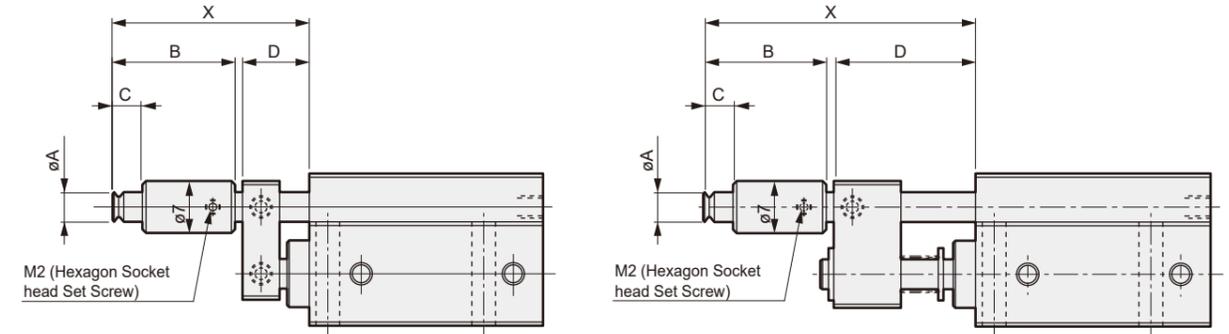
\*Recommended inner diameter tolerance of mating socket: H8

Dimensional Drawings with Option

Dimensional Drawings with Option

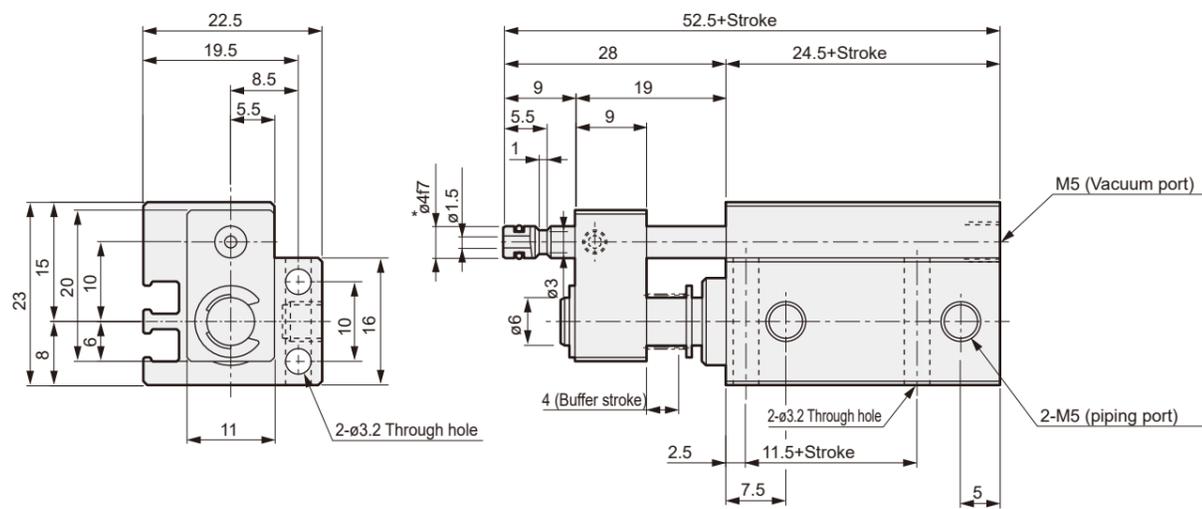
● MVC-6/10 (with pad)

● MVC-6/10-B (with pad with buffer)



Code	Common Dimensions			Dimensions without buffer		Dimensions with buffer	
Pad type	A	B	C	X	D	X	D
P2A	ø2	16.5	4	26.5	9	36.5	19
P3.5A	ø3.5	16.5	4	26.5	9	36.5	19
P5A	ø5	17.5	6.5	27.5	9	37.5	19
P6A	ø6	17.5	6.5	27.5	9	37.5	19
P8A	ø8	18	7	28	9	38	19
P10A	ø10	18.5	7.5	28.5	9	38.5	19

● MVC-10-□-B (with buffer)



\*Recommended inner diameter tolerance of mating socket: H8

Special

MVC

STK

MCP

GLC

BBS

NHS

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LN

Cylinder Switch

Ending

Special

MVC

STK

MCP

GLC

BBS

NHS

HR

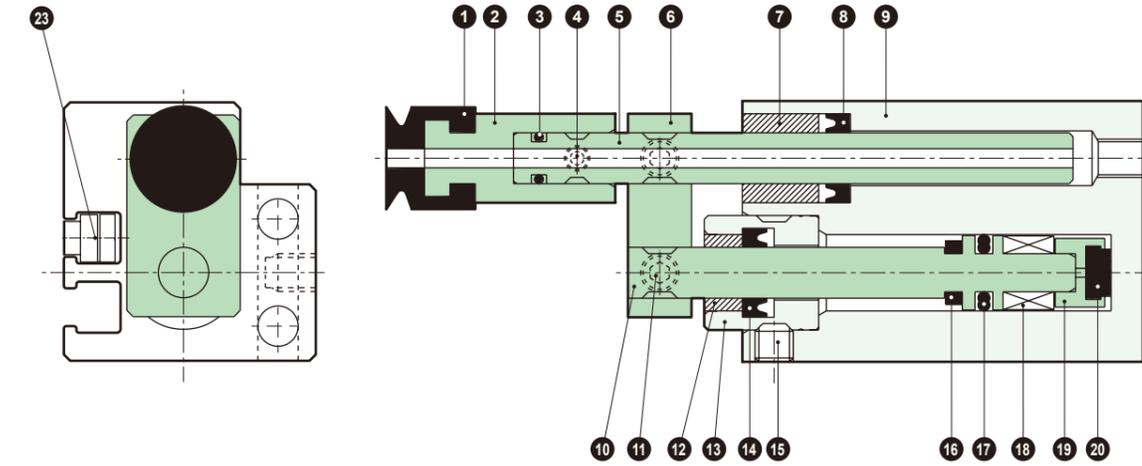
LN

Cylinder Switch

Ending

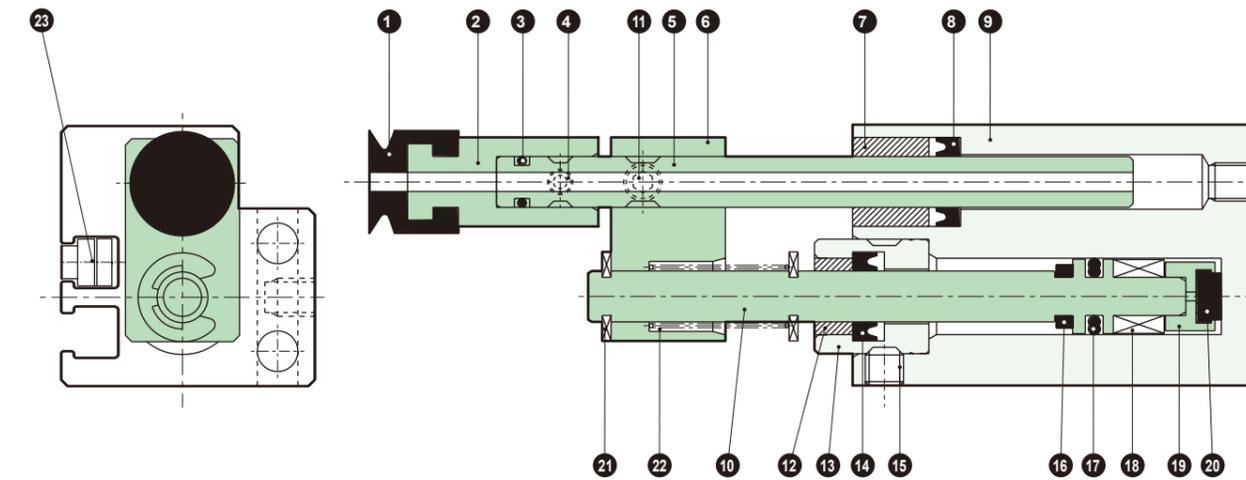
Internal Structure / Materials

● MVC-6, 10



\* The diagram above shows the internal structure diagram when a pad is included. But no 1 2 4 when without the pad.

● MVC-6,10-B (with buffer)



\* The diagram above shows the internal structure diagram when a pad is included. But no 1 2 4 when without the pad.

**Do not disassemble**

Part No.	Part Name	Material	Remarks	Part No.	Part Name	Material	Remarks
1	Pad			13	Rod metal	Stainless Steel	
2	Socket	Aluminum Alloy	Chromate	14	Rod Packing	Nitrile Rubber	
3	O-ring	Nitrile Rubber		15	Hexagon Socket Set Screw	Stainless Steel	
4	Hexagon Socket Set Screw	Stainless Steel		16	Cushion rubber R	Urethane Rubber	
5	Guide Rod	Stainless Steel		17	Piston Packing	Nitrile Rubber	
6	Plate	Aluminum Alloy	Chromate	18	Magnet	Plastic	
7	Guide bush	Copper Alloy		19	Adapter	Aluminum Alloy	
8	Guide packing	Nitrile Rubber		20	Cushion rubber H	Urethane Rubber	
9	Cylinder Body	Aluminum Alloy	Hard Anodized	21	E-type ring	Stainless Steel	
10	Piston	Stainless Steel		22	Spring	Piano Wire	Electrodeposition Coating
11	Hexagon Socket head Set Screw	Stainless Steel					With Switch
12	Bushing	Oil-impregnated Bearing Alloy		23	Switch		

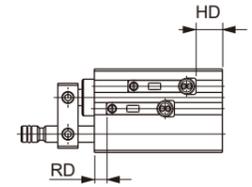
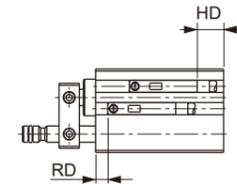
External Dimensions Diagram with Switch

MVC Series External Dimensions Diagram with Switch

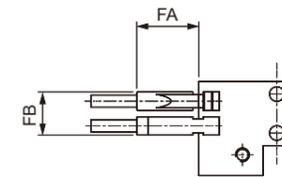
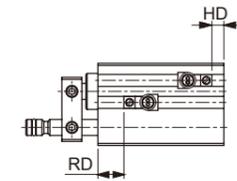
● F0H/V

• Lead wire straight type (H)

• Lead wire L-shaped type (V)



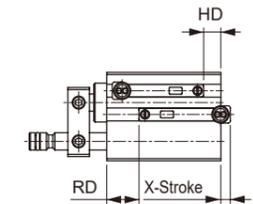
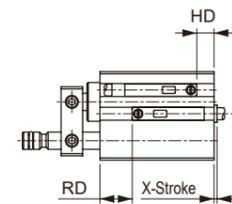
● F2S, F3S



● F2H/V, F3H/V, F2YH/V, F3YH/V, F3PH/V

• Lead wire straight type (H)

• Lead wire L-shaped type (V)



Code	MVC											
	F0H/V		F2S, F3S				F2H/V, F3H/V			F3PH/V, F2YH/V, F3YH/V		
Bore Size (mm)	RD	HD	RD	HD	FA	FB	RD	HD	X (*3)	RD	HD	X (*3)
ø6	3	1.5	6.5	3	13.5	7.5	7.5	4	5.7 (2.7)	7.5	4	10.2 (7.2)
ø10	4.5	3	8	4.5	13.5	8	9	5.5	4.2 (1.2)	9	5.5	8.7 (5.7)

\*1: The minimum stroke with 2 reed switches is 10 mm.

\*2: X-stroke dimension indicates the protrusion dimension from the switch body end face. (If the calculated value is negative, there is no protrusion from the body end face.)

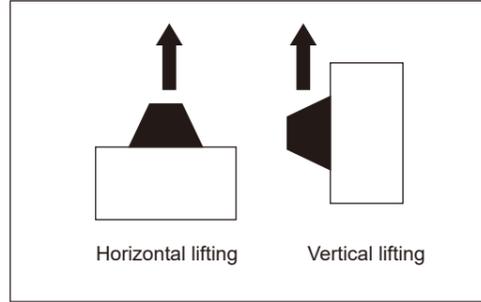
\*3: The X dimension for L-shaped lead wire type is the dimension in ( ).

Technical Data

Formula for lifting capacity

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

- The value obtained by this equation is a theoretical value. For actual design, please consider a safety factor of 4 times for horizontal lifting and 6 to 8 times or more for vertical lifting.
- 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 tilts, the suction force will be significantly weakened.



Theoretical lifting force

● Circular pad (N)

Pad Diameter (ømm)	2	3.5	5	6	8	10
Suction Area (cm <sup>2</sup> )	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

The values in the table are calculated values.

Pad material and characteristics

Item	Hardness HS	Tensile Strength N/cm <sup>2</sup>	Tear Strength N/cm <sup>2</sup>	Elongation %	Heat Resistant Temperature °C	Oil Resistance	Sunlight Resistance	Ozone Resistance	Acid Resistance	Alkali Resistance	Abrasion Resistance	Electrical Insulation	Gas Permeability Resistance
Nitrile Rubber (NBR)	50° to 90°	686 to 1961	313 to 490	150 to 620	-26 to 120	○	x	x	△	○	○	x	○
Silicone Rubber (SI)	54° to 80°	441 to 784	117 to 411	100 to 300	-60 to 250	△	○	○	△	○	x	○	x
Urethane Rubber (U)	50° to 80°	686 to 4315	588 to 1961	310 to 750	-20 to 75	△	○	○	x	x	○	○	○
Fluororubber (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 that we can handle.  
 ○: Good for use ○: Suitable for use △: Durable depending on conditions x: Unsuitable

- Refer to "Precision Components/Vacuum Components (catalog No.RJ-010AA)" for vacuum components selection.



To Use This Product Safely

Be sure to read this before use. For general cylinder information, see Intro 41, and for cylinder switches, see P. 1512.

Individual Precautions: Compact vacuum suction cylinder MVC Series

Design / Selection

Warning

- In the case of a system incorporating a vacuum ejector, etc., if a suctioned workpiece (suctioned object) is thought to be dangerous in the event of it falling, provide a mechanical fall prevention measure for safety.

CAUTION

- Select a vacuum ejector, etc., that has an appropriate suction flow rate. Low suction flow rate will cause suction failure.
- When using the product with MVC cylinder buffer, the buffer stroke must be within 4 mm. Do not use beyond 4 mm.

During Use

CAUTION

- Perform piping with a sufficient effective cross-sectional area. For the vacuum piping side, select piping with a sufficient effective cross-sectional area that allows the maximum suction flow rate of the ejector to flow.

- When using MVC with reed switch, the cylinder cannot be mounted on a magnetic substance (iron plate, etc.). This will cause switch detection failure.

Special

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Cylinder Switch

Cylinder Switch

Ending

Ending

For precautions during mounting, installation, adjustment, use, and maintenance, refer to "During Use" in this catalog and the CKD Components Product website (<https://www.ckd.co.jp/kiki/en/>) -> "Model No." -> [Instruction Manual].