

Leading to compact and space saving

- SCP*2
- CMK2
- CMA2
- SCM
- SCG
- SCA2
- SCS
- CKV2
- CA/OV2
- SSD
- CAT
- MDC2
- MVC**
- SMD2
- MSD*
- FC*
- STK
- ULK*
- JSK/M2
- JSG
- JSC3
- USSD
- USC
- JSB3
- LMB
- STG
- STS/L
- LCS
- LCG
- LCM
- LCT
- LCY
- STR2
- UCA2
- HCM
- HCA
- SRL2
- SRG
- SRM
- SRT
- MRL2
- MRG2
- SM-25
- CAC3
- UCAC
- RCC2
- MFC
- SHC
- GLC
- Ending

Overall length of axial cylinder is reduced.

New compact, space saving small vacuum suction cylinders, MVC series.

This is optimum for suction or transfer process of electric parts and precise parts.

● Direct mount surface (2 surfaces)

High precision non-rotating structure

Non-rotating guide rod equipped.

Rotation of a rod (sucked part) is prevented at the outstanding revolvable angle tolerance.

Space saving design

Work piece sucking section and vacuum passage are provided at guide rod. This enables overall length of cylinder and results in dramatic space saving.

Direct 2 surfaces mount

Using square shaped body, can be made installation direct from 2 direction.

Variety of sucking pad available

Installation onto the rod end can be performed by just one piece of wrench.

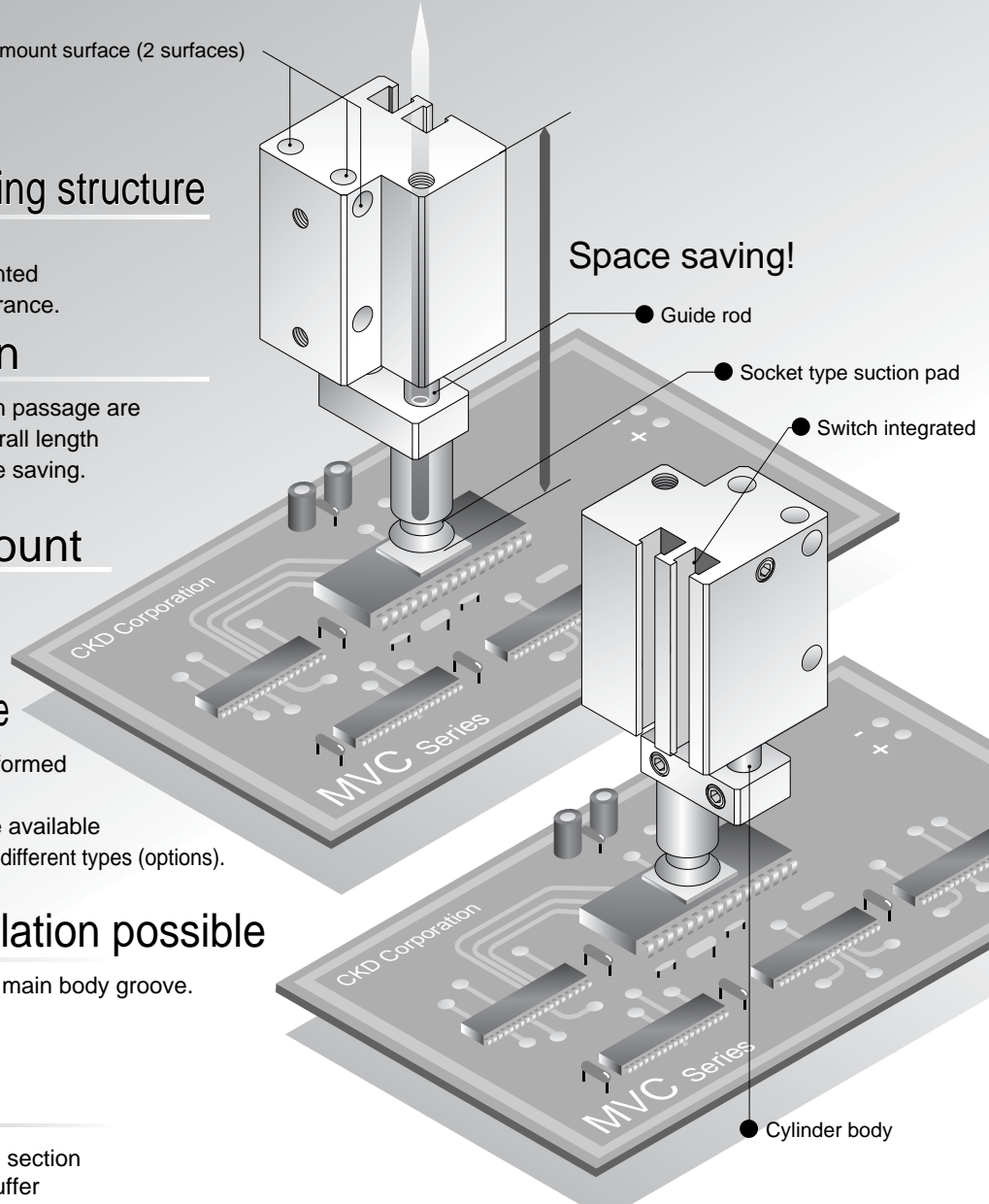
A variety of socket type sucking pad are available including 2 to 10 mm outer diameter and 24 different types (options).

Miniature switch installation possible

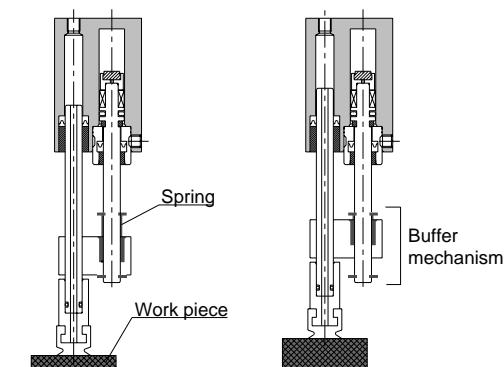
F type switch can be integrated into the main body groove.

Buffering function

When cylinder advances, even if driving section (sucking part) and work piece collide, buffer function protects a work piece and the cylinder.

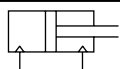


6, 10 mm ultra compact size!
Optimum for sucking and transfer process of precise parts!



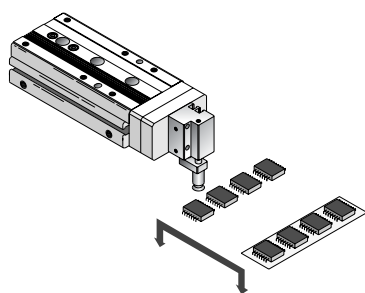
During normal use Buffering function during operation

●: Standard, ○: Option

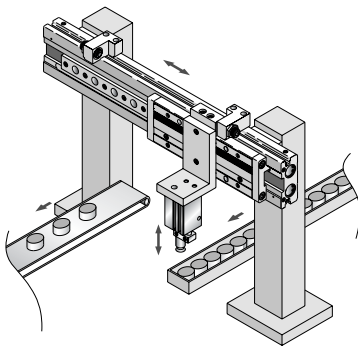
Variation	Model no. JIS symbol	Bore size (mm)	Standard stroke length (mm)						Min. stroke length (mm)	Max. stroke length (mm)	Pad type				Option		Page
			5	10	15	20	25	30			Material Nitrile rubber	Material Urethane rubber	Material Silicon rubber	Material Fluoro rubber	Buffer	Switch	
											P*A	P*A-U	P*A-SI	P*A-FKM	B		
Double acting, single rod type	MVC 	φ6, φ10	●	●	●	●	●	●	5	30	○	○	○	○	○	○	990

Applications

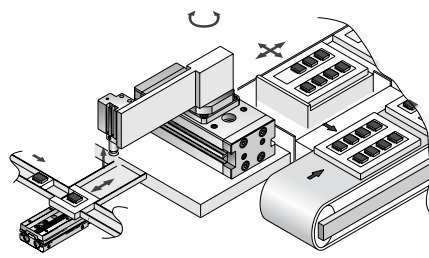
● Suction of electric part, transfer



● Transfer system of compact part



● Transfer system of electric part



- SCP*2
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Small cylinder with vacuum pad
Space saving structure



Pneumatic components

Safety precautions

Always read this section before starting use.

Refer to Intro 71 for general details on the cylinder, and to Intro 78 for details on the cylinder switch.

Small cylinder with vacuum pad MVC Series

Design & Selection

⚠ WARNING

- If a hazardous situation may occur when using a system with a vacuum generator and the suctioned work piece is dropped, provide a mechanical position locking measure for safety.

⚠ CAUTION

- Select the vacuum generator with an appropriate suction flow. A low suction flow may result in a suction fault.
- When using the MVC cylinder with buffer, the stroke is 4mm maximum. Do not use in applications exceeding 4mm.

Installation & Adjustment

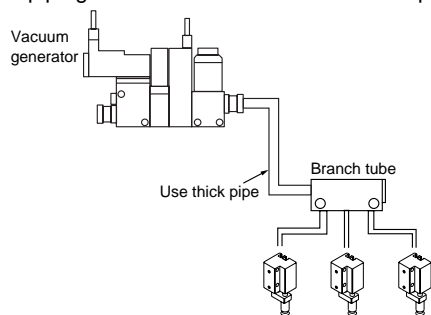
⚠ CAUTION

- Do not use a spiral hose. If used on the vacuum side, the following faults may occur because of piping resistance:

- (1) Delay in vacuum attainment time
- (2) Drop in degree of vacuum at suction end due to drop in flow
- (3) Unstable operation of vacuum switch

- Note the following when using more than 2 MVC cylinder for 1 vacuum.

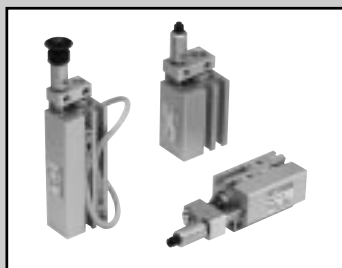
- (1) If air leaks from 1 vacuum pad, the degree of vacuum drops and a suction fault occurs.
- (2) Piping between the vacuum and branch must be thicker than piping between the branch and suction pad.



- Use piping with a sufficient effective sectional area. Select pipes for the vacuum side having a sufficient effective section area so that the generator's maximum suction flow can pass.

- MVC with reed switch cannot be installed on magnetic substance (iron plate, etc.). Failure to observe this may cause switch detection defective.

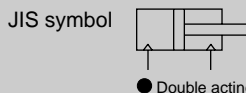
SCP*2
CMK2
CMA2
SCM
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SCA2
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CKV2
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GLC
Ending



Small cylinder with vacuum pad, double acting single rod type

MVC Series

● Bore size: $\phi 6$, $\phi 10$



Specifications

Descriptions	MVC	
Bore size mm	$\phi 6$	$\phi 10$
Actuation	Double acting single rod type	
Working fluid	Compressed air	
Max. working pressure MPa	0.7	
Min. working pressure MPa	0.15	0.1
Withstanding pressure MPa	1.05	
Vacuum port pressure	-101KPa to 0.6MPa Note 1	
Ambient temperature °C	0 to 60 (no freezing) Note 2	
Port size	M3	M5
Stroke tolerance mm	+1.0	
	0	
Working piston speed mm/s	50 to 500	
Cushion	Rubber cushion	
Revolvable angle tolerance Degree	± 0.5	
Lubrication	Not required (when lubricating, use turbine oil ISO VG32.)	
Applicable pad	Refer to Page 992,997 for the details.	
Allowable energy absorption J	0.0046	0.035

Note 1: Pressurize vacuum port only when vacuum break. The burst pressure should not be greater than the working pressure of cylinder.

Note 2: MVC with proximity switch should be used at ambient temperature 40°C or less. Failure to observe this may cause switch detection defective.

Specifications with buffer The specifications other than following are the same as above.

Descriptions	MVC-**-B
Buffer stroke mm	4
Buffer section spring load N	When set: 1.3
	During operation: 1.62 (buffer stroke 4mm during operation)
Revolvable angle tolerance (reference value) Degree	$\pm 2.6 (\phi 6), \pm 2.0 (\phi 10)$

Note 1: Do not use this with more than 4mm buffer stroke length. Failure to observe this may cause malfunctions.

Note 2: Revolvable angle tolerance of types with a buffer is the value at retracted end (Pull). The value at extended end (Push) may vary depending on stroke.

Stroke length

Bore size (mm)	Standard stroke length (mm)	Max. stroke length (mm)	Min. stroke length with 2 switches (mm)		Min. stroke length with 1 switch (mm)	
			Reed switch	Proximity switch	Reed switch	Proximity switch
$\phi 6$	5, 10, 15, 20, 25, 30	30	10	5	5	5
$\phi 10$	5, 10, 15, 20, 25, 30	30	10	5	5	5

Note: Other than standard stroke length is not available.

SCP*2
CMK2
CMA2
SCM
SCG
SCA2
SCS
CKV2
CA/OV2
SSD
CAT
MDC2
MVC
SMD2
MSD*
FC*
STK
ULK*
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GLC
Ending

Switch specifications

Descriptions	Reed 2 wire	Proximity 2 wire	Proximity 3 wire
	F0H/V	F2H/V	F3H/V
Applications	Programmable controller		Programmable controller, relay
Output method	-		NPN output
Power voltage V	-	-	10 to 28 DC
Load voltage V	24DC	10 to 30 DC	30 or less DC
Load current mA	5 to 20 (Note 1)	5 to 20 (Note 1)	50 or less
Current consumption mA	-	-	10mA or less (at ON state) at 24 VDC
Internal voltage drop V	4 or less		0.5 or less
Light	Yellow LED (ON lighting)		
Leakage current	1mA or less		10 μ A or less
Lead wire length (standard)	Standard 1m (oil resistant vinyl cabtire cord 2 conductor 0.15mm ²)		Standard 1m (oil resistant vinyl cabtire cord 3 conductor 0.15 mm ²)
Max. shock resistance m/s ²	294	980	
Insulation resistance	20M Ω and over with 500 VDC megger		
Withstand voltage	No failure at 1000 VAC for one minute.		
Ambient temperature $^{\circ}$ C	-10 to + 60		
Protective structure	IEC standards IP67, JIS C 0920 (water tight type), oil resistance		

Note 1: The maximum load current 20mA is applied at 25 $^{\circ}$ C. When ambient temperature around switch is higher than 25 $^{\circ}$ C, the value is lower than 20mA. (5 to 10mA at 60 $^{\circ}$ C)

Cylinder weight table

Stroke length (mm)	5	10	15	20	25	30	Weight per 1 switch
Bore size (mm)							
ϕ 6	30.8	35.6	40.4	45.2	50	54.8	10
ϕ 10	43.8	50	54.7	59.4	64.1	68.8	10

(g)

SCP*2
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Ending
Small cylinder with vacuum pad
Space saving structure

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How to order

● Without switch



● With switch



Model no.

A Bore size

B Stroke length

C Switch model no.

D Switch quantity

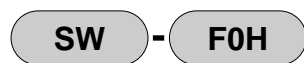
E Pad type

<Example of model number>

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

- A Bore size : ϕ 6mm
- B Stroke length : 10mm
- C Switch model no. : F0H reed, lead wire 1m
- D Switch quantity : 2
- E Pad type : PFG-2A
- F Buffer : Buffer

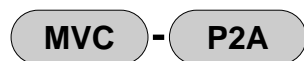
How to order switch



Switch model no.
(Item C above)

How to order socket and pad assembly

(Assembly part: socket + pad + hexagon socket head set screw)



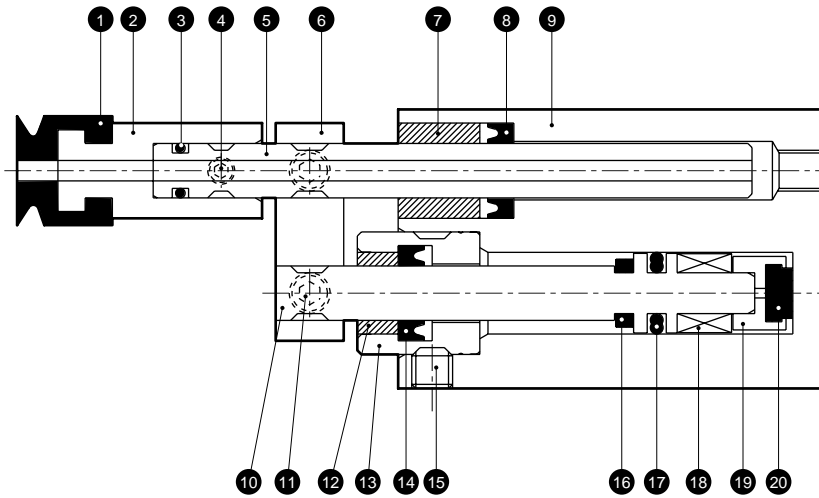
Pad type
(Item E above)

Symbol	Descriptions				
A Bore size (mm)					
6	ϕ 6				
10	ϕ 10				
B Stroke length (mm)					
5, 10, 15, 20, 25, 30					
C Switch model no.					
Axial lead wire	Radial lead wire	Contact	Indicator	Lead wire	
F0H*	F0V*	Reed	1 color indicator type	2-wire	
F2H*	F2V*	Proximity		3-wire	
F3H*	F3V*				
*Lead wire length					
Blank	1m (standard)				
3	3m (option)				
D Switch quantity					
R	1 on rod end				
H	1 on head end				
D	Two				
E Pad type					
Blank	Without pad				
P2A	Material: Nitrile rubber				
P3.5A					
P5A					
P6A					
P8A					
P10A					
P2AU	Material: Urethane rubber				
P3.5AU					
P5AU					
P6AU					
P8AU					
P10AU					
P2AS	Material: Silicon rubber				
P3.5AS					
P5AS					
P6AS					
P8AS					
P10AS					
P2AF	Material: Fluoro rubber				
P3.5AF					
P5AF					
P6AF					
P8AF					
P10AF					
F Buffer					
Blank	Without buffer				
B	Buffer				

*Pad types other than above are available. Consult with CKD.

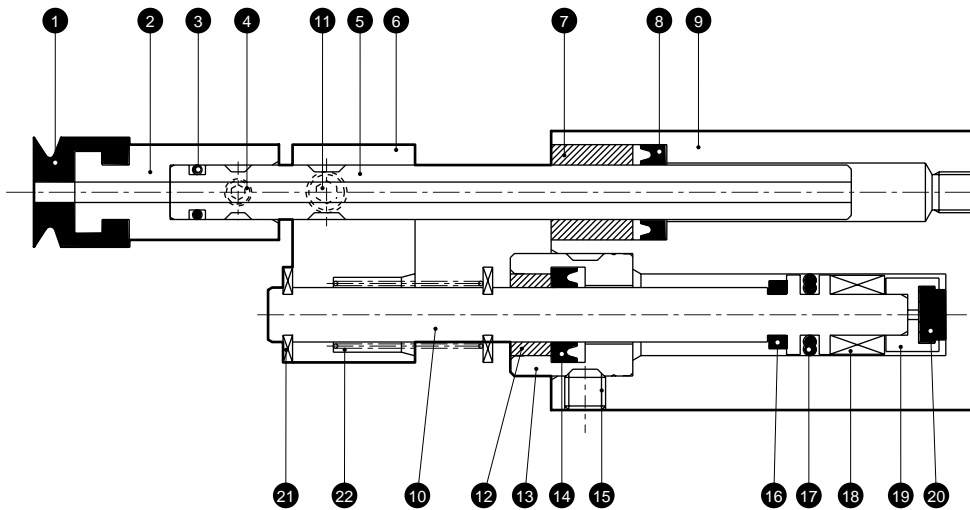
Internal structure and parts list

● MVC-6, 10



*The drawing above shows the internal structure of pad.
When no pad, 1, 2 and 4 are not provided.

● MVC-6, 10-B (with buffer)



*The drawing above shows the internal structure of pad.
When no pad, 1, 2 and 4 are not provided.

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

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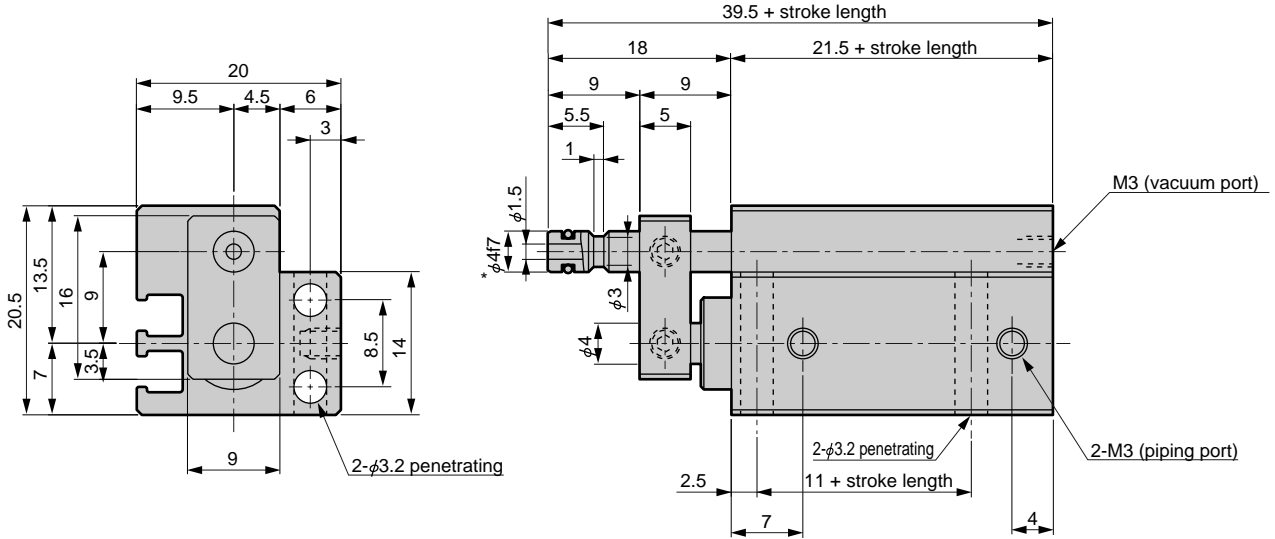
Small cylinder with vacuum pad
Space saving structure

Dimensions



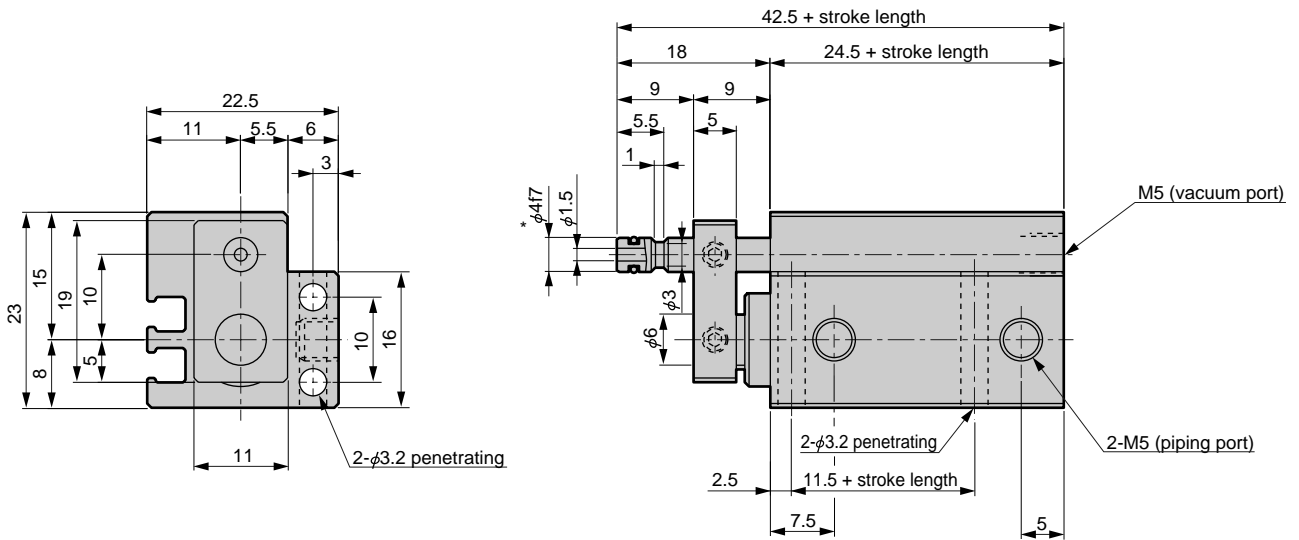
- SCP*2
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● MVC-6 (without pad)



*Recommended inner diameter tolerance of counterpart socket: H8

● MVC-10 (without pad)

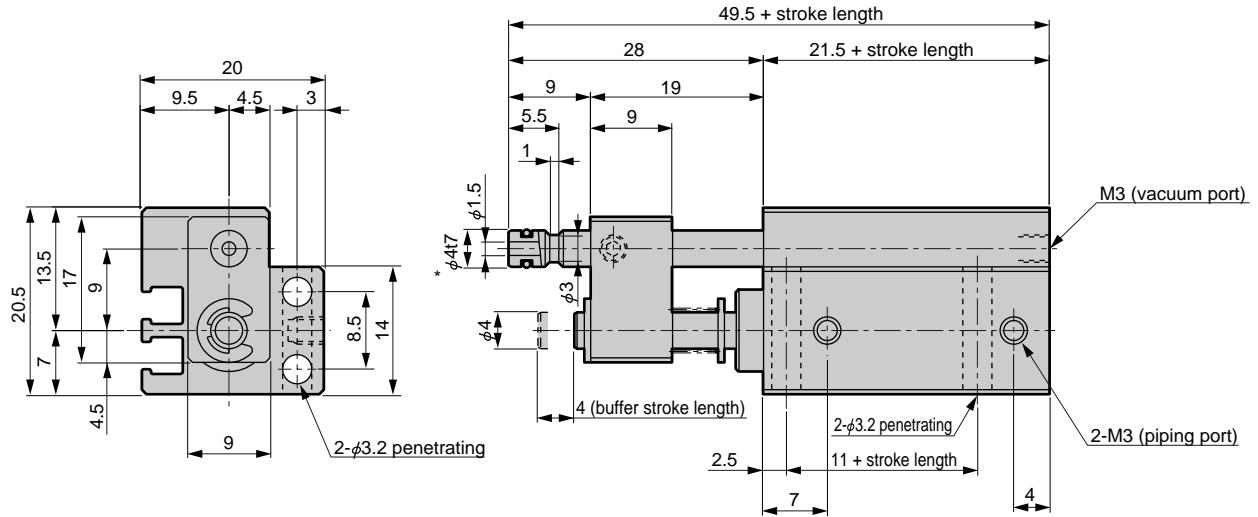


*Recommended inner diameter tolerance of counterpart socket: H8

Dimensions

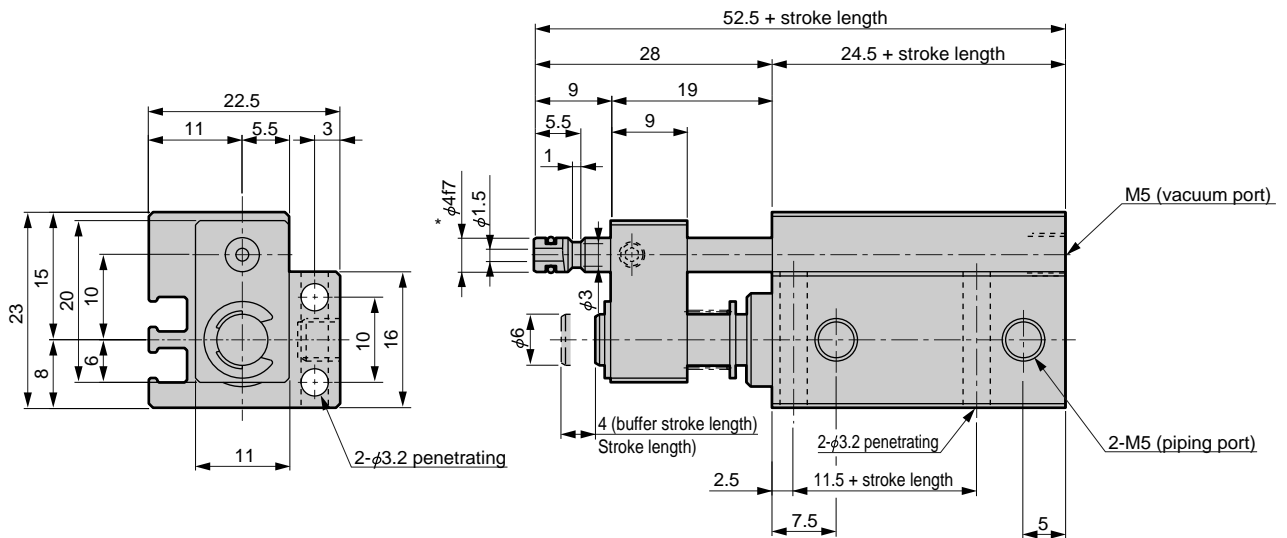


● MVC-6-*-B (with buffer)



*Recommended inner diameter tolerance of counterpart socket: H8

● MVC-10-*-B (with buffer)



*Recommended inner diameter tolerance of counterpart socket: H8

SCP*2
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Ending

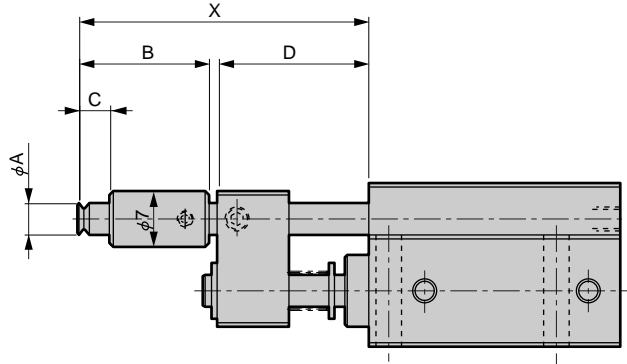
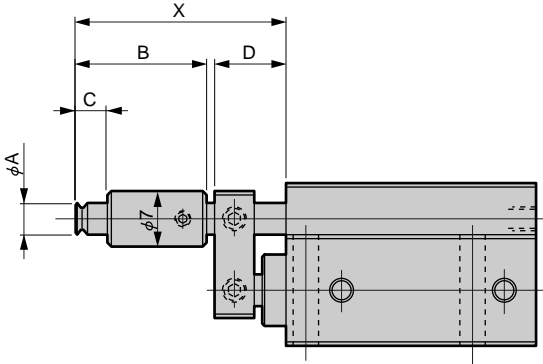
Small cylinder with vacuum pad
Space saving structure

Dimensions



● MVC-6, 10 (with pad)

● MVC-6, 10-B (with pad, with buffer)



Symbol	Without buffer					With buffer	
	A	B	C	X	D	X	D
Pad type							
P2A	$\phi 2$	16.5	4	26.5	9	36.5	19
P3.5A	$\phi 3.5$	16.5	4	26.5	9	36.5	19
P5A	$\phi 5$	17.5	6.5	27.5	9	37.5	19
P6A	$\phi 6$	17.5	6.5	27.5	9	37.5	19
P8A	$\phi 8$	18	7	28	9	38	19
P10A	$\phi 10$	18.5	7.5	28.5	9	38.5	19

● Switch installation position

Reed switch (F0)		Proximity switch (F2, F3)	
Axial lead wire (H)	Radial lead wire (V)	Axial lead wire (H)	Radial lead wire (V)

Note: This indicates switch installation position at shipment.

● Switch installation position dimension

Switch installation position dimensions	Reed switch		Proximity switch	
	$F0_H^V$		$F2_H^V$ and $F3_H^V$	
Bore size	RD	HD	RD	HD
$\phi 6$	3	1.5	7.5	4
$\phi 10$	4.5	3	9	5.5

Note 1: Min. stroke length of the type with two reed switch is 10mm.

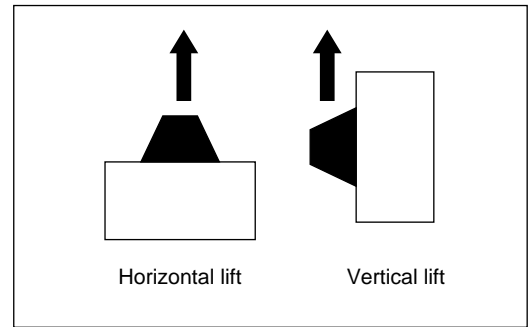
Note 2: MVC with reed switch cannot be installed on magnetic substance (iron plate, etc.). Failure to observe this may cause switch detection defective.

Note 3: MVC with proximity switch should be used at ambient temperature 40°C or less. Failure to observe this may cause switch detection defective.

Formula of lifting capacity

$$W = \frac{P \times A}{-101.3} \times \frac{1}{0.102} \quad \text{Note that } \begin{cases} W = \text{lifting capacity} & (\text{N}) \\ P = \text{vacuum} & \text{KPa} \\ \text{Area of A = pad} & \text{cm}^2 \end{cases}$$

- The value calculated by this formula is the average static lifting capacity without sideslips. This is a just theoretical value. When the actual design stage, use a safety factor such as 4 times for horizontal lifting, while 6 to 8 times for vertical lifting.
- When lifting up a work piece, consider a weighting by acceleration, and decide a sufficient safety factor.
- Pad diameter during sucking is approximate 10% larger.
- Be careful for center of gravity of a work piece. If a work piece leans, the suction force is remarkably reduced.



Theoretical lift force

- Round pad

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

A table value is calculated value.

Pad material and characteristics

Descriptions	Hardness	Tensile strength	Tearing strength	Elongation	Heat resistance	Oil resistant	Sunlight	Ozone	Acid	Alkaline	Abrasion	Insulation	Gas permeability
Material	HS	N/cm ²	N/cm ²	%	temperature °C		resistance	resistance	resistance	resistance	resistance		proof
Nitrile rubber (NBR)	50° to 90°	686 to 1961	313 to 490	150 to 620	-26 to 120	◎	X	X	△	○	◎	X	○
Silicon 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	◎	○	○
Fluoro rubber (FKM)	58° to 90°	931 to 1765	166 to 470	100 to 350	-10 to 230	◎	◎	◎	◎	△	◎	◎	◎

This table shows characteristics of synthetic rubber that CKD handles.

◎: Possible to use ○: Normally possible to use △: Possible to use depending on conditions X: Impossible to use

- Refer to the catalog of "Pneumatic, vacuum and auxiliary components (SELVACS)" about selection of vacuum components.

- SCP*2
- CMK2
- CMA2
- SCM
- SCG
- SCA2
- SCS
- CKV2
- CA/OV2
- SSD
- CAT
- MDC2
- MVC**
- SMD2
- MSD*
- FC*
- STK
- ULK*
- JSK/M2
- JSG
- JSC3
- USSD
- USC
- JSB3
- LMB
- STG
- STS/L
- LCS
- LCG
- LCM
- LCT
- LCY
- STR2
- UCA2
- HCM
- HCA
- SRL2
- SRG
- SRM
- SRT
- MRL2
- MRG2
- SM-25
- CAC3
- UCAC
- RCC2
- MFC
- SHC
- GLC
- Ending

Small cylinder with vacuum pad
Space saving structure