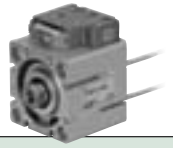
Valve Mounted Cylinders

Series Variations

Series	Action		Standard variations: Built-in magnet	With air cushion	Built-in One-touch fitting	With auto switch	With strong scraper	Bore size (mm)	Page
Series CVQ 	Double acting		●			●		32 40	1527
Series CVJ5 	Double acting		●			●		10 16	1542
Series CVJ3 	Single acting (Spring return) (Spring extend)		●			●		10 16	1552
Series CVM5/ CVM5K 	Double acting	Standard	●		●	●	●	20 25 32 40	1563 1573
		Non-rotating rod	●		●	●			
Series CVM3/ CVM3K 	Single acting (Spring return) (Spring extend)	Standard	●		●	●	●	20 25 32 40	1582 1595
		Non-rotating rod	●		●	●			
Series CV3/CV3K 	Double acting	Standard	●	●		●	●	40, 50 63, 80 100	1604
		Non-rotating rod	●	●		●		40, 50 63	1614
Series CVS1/ CVS1K 	Double acting	Standard	●	●		●	●	40, 50 63, 80 100	1624
		Non-rotating rod	●	●		●		40, 50 63	1632
Series MVGQ 	Double acting		●			●		12, 16 20, 25 32, 40 50, 63 80, 100	1643

Series CV
Precautions 1

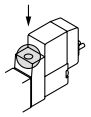
Be sure to read before handling.
Applicable Series: CVJ5, CVJ3

Manual Operation

⚠Warning

1. Since the devices in connection are operated by manual override, make sure that there is no danger.

■ **Non-locking push type (Standard type)**
Push in the direction the arrow indicates.



Solenoid Valve for 200/220 VAC Specifications

⚠Warning

1. Grommet-type and L/M plug connector-type solenoid valves for AC specifications have built-in rectifier circuits in the pilot valves and drive the DC coil.

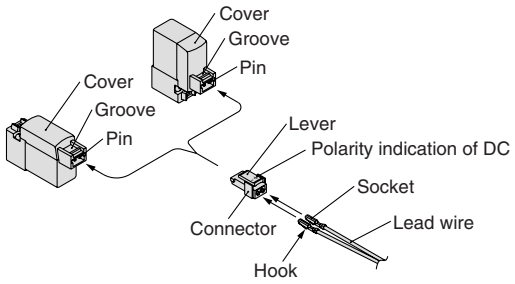
The rectifier circuit in the pilot valve for 200/220 VAC specifications generates heat when the valve is energized. The outside surface may, depending on the energizing conditions, become very hot, so please do not touch the valve, as this may result in burns.

Plug Connector

⚠Caution

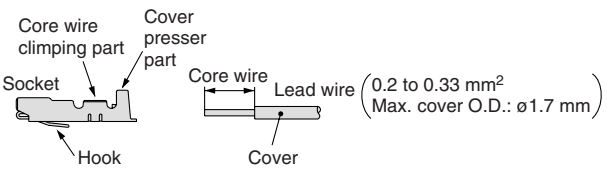
1. Connector installation and removal

- To install the connector, squeeze the lever and the connector body with your fingers, slide the connector straight over the pin, and lock it in place by pushing the tab of the lever into the groove in the cover.
- To remove the connector, press the lever with your thumb to disengage the tab from the groove, and pull the connector straight out.



2. Crimping the lead wire into the socket

Peel approximately 3.2 to 3.7 mm of insulation from the tip of the lead wire, make sure that the ends of the core wire are even, insert the wire into the socket, and crimp it with a crimping tool. At this time, make sure that the insulation of the lead wire does not enter the area in which the core wire is crimped. Use a special crimping tool.
(Please contact SMC for details on the special crimping tool.)

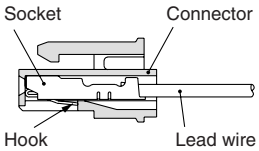


Plug Connector

⚠Caution

3. Installation and removal of the sockets containing lead wires

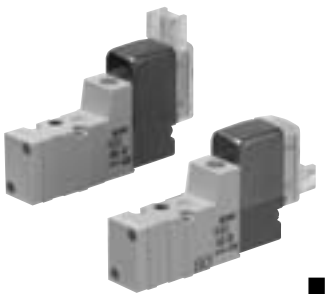
- **Installation:**
  Insert the sockets into the square holes of the connector (marked + and –, respectively), pinch the lead wires to push them in entirely, allowing the hook on each socket to engage with the seat of the connector, thus locking the socket in place. (Because the hook is open, it locks automatically when the socket is pushed in.) Then, lightly pull on the lead wires to verify that the sockets have been properly locked.
- **Removal:**
  To pull the sockets out of the connector, use a rod with a small tip (approximately 1 mm) to press the hook of the socket and pull the lead wire out. To reuse the socket, expand the hook outward.



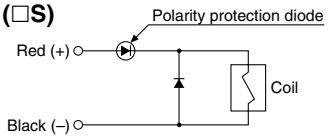
Surge Voltage Suppressor

⚠Caution

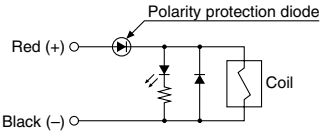
For DC:
Grommet type, L/M plug connector type



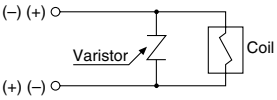
■ **Standard type (With polarity)**
With surge voltage suppressor (□S)



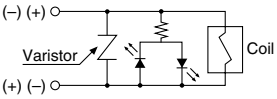
With light/surge voltage suppressor (□Z)



■ **Non-polar type**
With surge voltage suppressor (□R)



With light/surge voltage suppressor (□U)



- Please correctly connect the lead wires to the + (positive) and – (negative) points on the connector when using the standard type. (For non-polar types, the lead wires can be connected in any order.)
- Because standard types with voltage specifications other than 24 and 12 VDC do not have polarity protection diodes, be careful not to mistake the polarity when connecting lead wires.
- If the lead wires are connected beforehand, the red wire is +, and the black wire is –.

Series CV
Precautions 2

Be sure to read before handling.
Applicable Series: CVM5, CVM3, MVGQ

Surge Voltage Suppressor

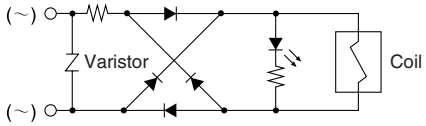
⚠Caution

For AC:

(S option is not available since the voltage surge is suppressed by the rectifier.)

Grommet, L/M plug connector

With indicator light (□Z)



Selection

⚠Warning

1. Please confirm product specifications

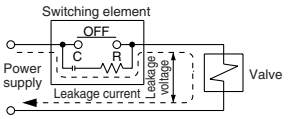
The products in this catalog are designed to be used with compressed air systems. Do not use them if pressure or temperature exceed specifications, since this may cause damage and/or malfunctions. (Refer to the specifications.)

2. Long-term continuous energization

- When valves are energized continuously for a long time, it may cause performance deterioration of solenoid valves and service life shortage, and adversely affect peripheral devices, due to temperature rise caused by the heat generation of coil.

3. Voltage leaking

When a resistor is used along with the switching element and a C-R element is used for protecting the switching element (surge voltage protector), be aware that there is an increase in leaked voltage when the leakage current flows through the resistor or the C-R element. Residual leaked voltage must be kept as follows.



For DC coil

3% of the rated voltage or below.

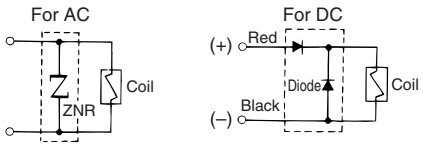
For AC coil

8% of the rated voltage or below.

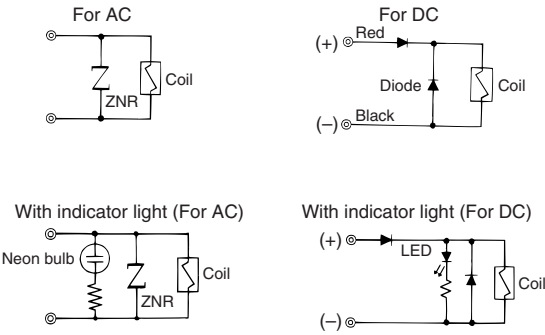
Light/Surge Voltage Suppressor

⚠Caution

Grommet type

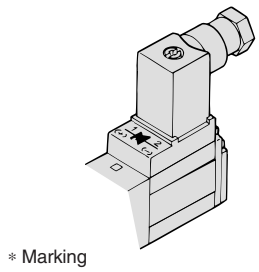


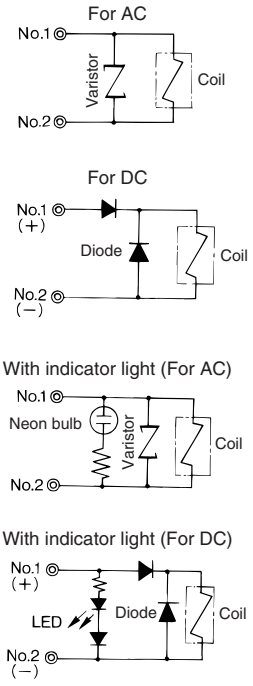
L/M plug connector type



In the case of DC wiring, connect the wires by matching their polarities to the + and – marks. If the lead wires are connected beforehand, the red wire is +, and the black wire is –.

DIN terminal





In the case of DC wiring, connect terminal no. 1 of the connector to the positive + side, and terminal no. 2 to the negative – side. (Refer to the marks on the terminal board.)

Series CV
Precautions 3

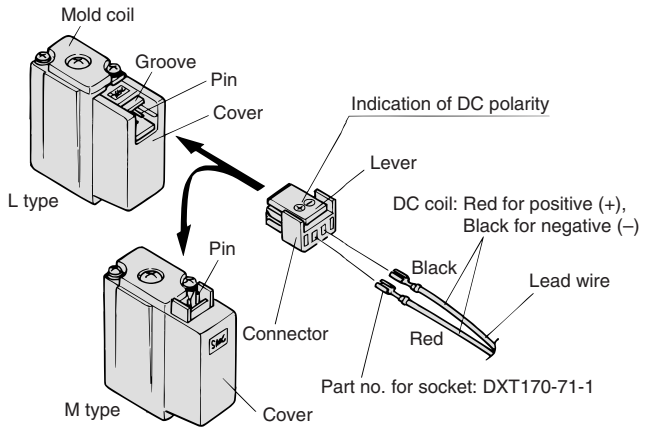
Be sure to read before handling.
Applicable Series: CVM5, CVM3, MVGQ

Plug Connector

⚠Caution

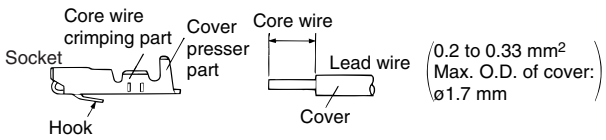
1. Connector installation and removal

- To install the connector, squeeze the lever and the connector body with your fingers, slide the connector straight over the pin, and lock it in place by pushing the tab of the lever into the groove in the cover.
- To remove the connector, press the lever with your thumb to disengage the tab from the groove, and pull the connector straight out.



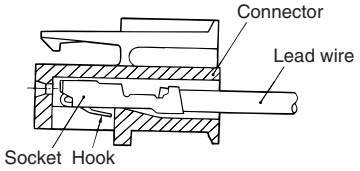
2. Crimping the lead wire into the socket

- Peel approximately 3.2 to 3.7 mm of insulation from the tip of the lead wire, make sure that the ends of the core wire are even, insert the wire into the socket, and crimp it with a crimping tool. At this time, make sure that the insulation of the lead wire does not enter the area in which the core wire is crimped.
  Use a special crimping tool. (Crimping tool: model no. DX170-75-1)



3. Installation and removal of the sockets containing lead wires

- **Installation:**
  Insert the sockets into the square holes of the connector (marked + and –, respectively), then pinch the lead wires to push them in entirely, allowing the hook on each socket to engage with the seat of the connector, thus locking the socket in place. (Because the hook is open, it locks automatically when the socket is pushed in.) Then, lightly pull on the lead wires to verily that the sockets have been properly locked.
- **Removal:**
  To pull the sockets out of the connector, use a rod with a small end (approximately 1 mm) to press the hook of the socket and pull the lead wire out. To reuse the socket, expand the hook outward.



Selection

⚠Warning

1. Please confirm product specifications

The products in this catalog are designed to be used with compressed air systems. Do not use them if pressure or temperature exceed specifications, since this may cause damage and/or malfunctions. (Refer to the specifications.)

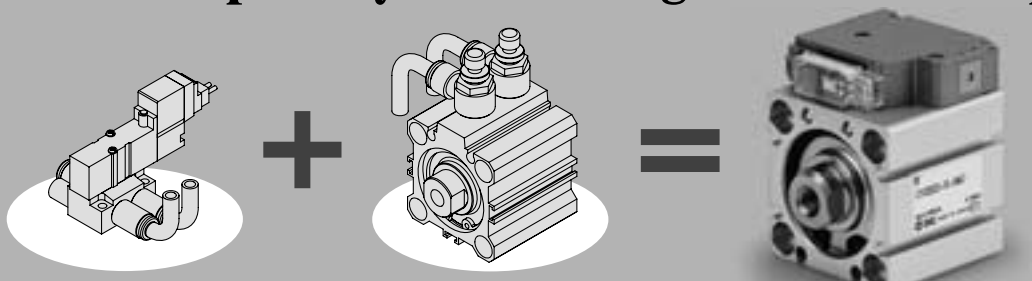
2. Long-term continuous energization

- When valves are energized continuously for a long time, it may cause performance deterioration of solenoid valves and service life shortage, and adversely affect peripheral devices, due to temperature rise caused by the heat generation of coil.

Valve Mounted Compact Cylinder

Series CVQ

Valve and compact cylinder integrated for compactness



Solenoid valve | Compact cylinder

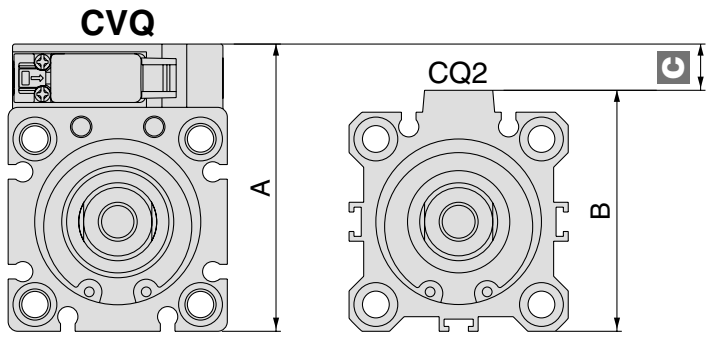
Labor saving
- No need to select size of valve
- Less piping work

Space saving
Small mounting space with valve integrated structure

Energy saving
Low air consumption between the valve and cylinder

Easy Mounting

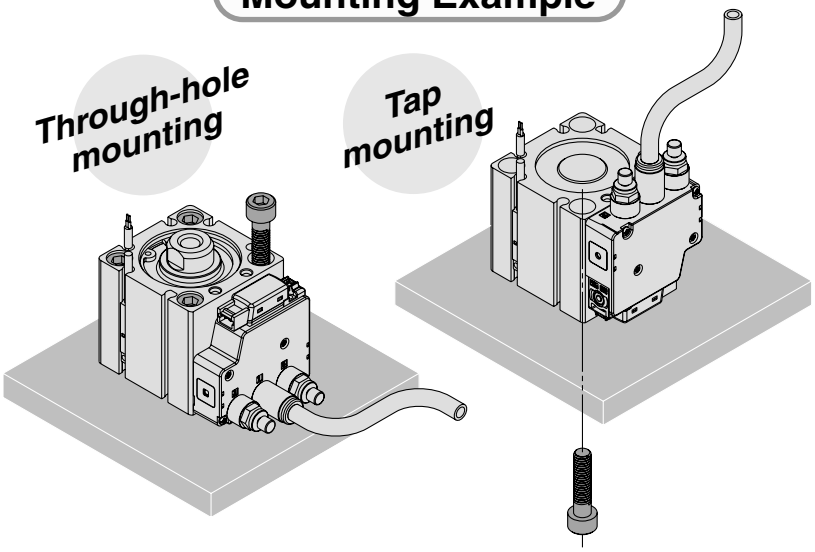
Height Comparison (Dimensional difference: C)



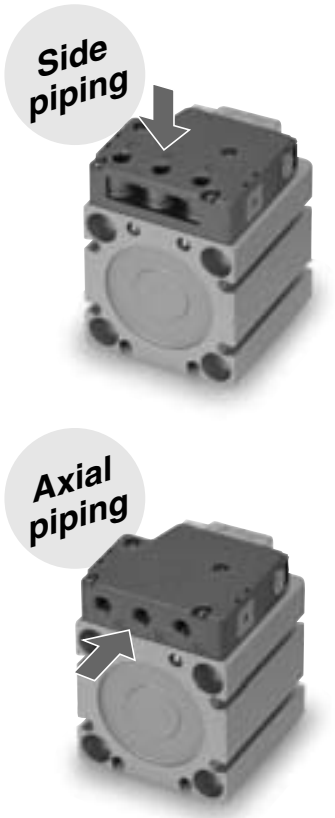
(mm)

Bore size	A	B	C
32	59	49.5	**9.5**
40	67	57	**10**

Mounting Example



Selectable Piping Direction



Low Air Consumption

Approx. 50% reduction in air consumption by reducing the piping between the valve and cylinder

- Cylinder bore size: ø32 mm
- Cylinder stroke: 30 mm
- Piping: I.D. ø4 mm
  Length 2 m

Variation

Bore size (mm)	Standard stroke (mm)											
	5	10	15	20	25	30	35	40	45	50	75	100
32	●	●	●	●	●	●	●	●	●	●	●	●
40	●	●	●	●	●	●	●	●	●	●	●	●

Valve Mounted Compact Cylinder

Series CVQ

ø32, ø40

CE

How to Order

CVQ B 32 – 30 □ – M9BW □ – 5 M □ □ □

Mounting

B	Through-hole, Both ends tapped (Standard)
L	Foot
F	Rod flange
G	Head flange
D	Double clevis

∗ Mounting brackets are included, (but not assembled).

Bore size

32	32 mm
40	40 mm

Cylinder stroke (mm)

Please refer to the next page for "Standard Stroke" and "Intermediate Stroke".

Body option

Nil	Standard (Rod end female thread)
F	With boss in head end
M	Rod end male thread

The combination of body options is available.
Example) FM

Auto switch

Nil	Without auto switch (Built-in magnet)

∗ For applicable auto switch models, refer to the below table.

Number of auto switches

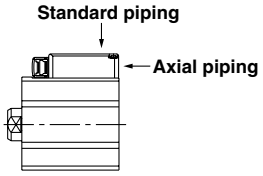
Nil	2 pcs.
S	1 pc.
N	"n" pcs.

Rated voltage

5	24 VDC
6	12 VDC

Piping

Nil	Standard
P	Axial



Manual override

Nil	Non-locking push type
B	Locking slotted type

Surge voltage suppressor

Nil	Without light/surge voltage suppressor
S	With surge voltage suppressor
Z	With light/surge voltage suppressor
R	With surge voltage suppressor (Non-polar type)
U	With light/surge voltage suppressor (Non-polar type)

Electrical entry

M	**MO**
M-type plug connector with lead wire (300 mm)	M-type plug connector without connector
	

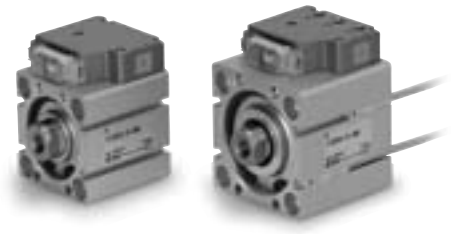
∗ For lead wire lengths other than 300 mm, refer to the plug connector lead wire (page 1533).

Applicable Auto Switches / Refer to pages 1719 to 1827 for detailed auto switch specifications.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC		Load voltage AC	Auto switch model: Electrical entry Perpendicular	Auto switch model: Electrical entry In-line	Lead wire length (m)∗ 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	Pre-wired connector	Applicable load	
Solid state 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 indication)			3-wire (NPN)		5 V, 12 V		**M9NWV**	**M9NW**	●	●	●	○	○	IC circuit	
				3-wire (PNP)				**M9PWV**	**M9PW**	●	●	●	○	○		
				2-wire		12 V		**M9BWV**	**M9BW**	●	●	●	○	○	—	
Reed switch	—	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	**A96V**	**A96**	●	—	●	—	—	IC circuit	—
			—	2-wire	24 V	12 V	100 V	**A93V**	**A93**	●	—	●	—	—	—	Relay, PLC
						5 V, 12 V	100 V or less	**A90V**	**A90**	●	—	●	—	—	IC circuit	

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

∗ Solid state auto switches marked with "○" are produced upon receipt of order.
∗ For details about auto switches with pre-wired connector, refer to pages 1784 and 1785.
∗ Auto switches are shipped together (not assembled).

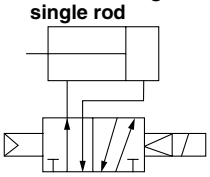


⚠Caution

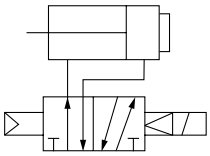
Do not separate the cylinder from the valve.

JIS Symbol

Double acting: single rod



With boss in head end



Standard Stroke

(mm)

Bore size (mm)	Standard stroke
32∗	5, 10, 15, 20, 25, 30, 35 40, 45, 50, 75, 100
40	5, 10, 15, 20, 25, 30, 35 40, 45, 50, 75, 100

∗ The outline dimensions for 5 mm stroke will be the same as those for 10 mm stroke.

Intermediate Stroke

Part no.		Refer to "How to Order" for standard model numbers (previous page).	
Description		Intermediate strokes by the 1 mm increment are available by using spacers with standard stroke cylinders.	
Stroke range (mm)	Bore size	**32**	**40**
	Stroke range	6 to 99	6 to 99
Applicable example		Part no.: CVQB32-47 A spacer 3 mm in width is installed in standard cylinder CVQB32-50. The outline dimensions will be the same as those for 50 mm stroke.	

Mounting Bracket Part No.

Bore size (mm)	Foot Note)	Flange	Double clevis
32	CVQ-L032	CVQ-F032	CVQ-D032
40	CVQ-L040	CVQ-F040	CVQ-D040

Note) Order two foot brackets per cylinder.

∗ Parts belonging to each bracket are as follows.
Foot, Flange: Body mounting screws
Double clevis: Clevis pin, C-type retaining ring for shaft, Body mounting screws

Cylinder Specifications

Bore size	**32**	**40**
Action	Double acting, single rod	
Fluid	Air (Non-lube)	
Proof pressure	1.0 MPa	
Maximum operating pressure	0.7 MPa	
Minimum operating pressure	0.15 MPa	
Ambient and fluid temperature	–10 to 50°C (No freezing)	
Stroke tolerance	0 to +1.0 mm	
Mounting method	Through-hole / Both ends tapped	
Piston speed	50 to 500 mm/s	
Cushion	Rubber bumper	

Valve Specifications

Type of actuation	2 position single
Manual override	Non-locking push type / Locking slotted type
Pilot exhaust	Main/Pilot valve common exhaust type
Mounting orientation	Unrestricted (based on cylinder mounting orientation)
Enclosure	Dustproof

Solenoid Specifications

Electrical entry		M-type plug connector
Coil rated voltage	**DC**	24/12 (V)
Allowable voltage fluctuation Note)		±10% of the rated voltage
Power consumption	**DC**	0.35 (With light: 0.4) W
Surge voltage suppressor		Diode (Non-polar type: Varistor)
Indicator light		LED

Note) The S and Z types of surge voltage suppressor have an internal circuit allowing voltage drop, so use within the following allowable voltage fluctuation range.
S, Z type 24 VDC: –7% to +10%
12 VDC: –4% to +10%

Theoretical Output

Unit: N

Bore size (mm)	Operating direction	Operating pressure (MPa)		
		0.3	0.5	0.7
32	IN	181	302	422
	OUT	241	402	563
40	IN	317	528	739
	OUT	377	628	880

Mass

Mass

Unit (g)

Bore size (mm)	Stroke											
	5	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**	**75**	**100**
32	295	288	310	332	354	376	398	420	442	464	575	686
40	365	391	417	443	469	495	521	547	573	599	726	853

Calculation: (Example) **CVQB32-20M**
- Basic moving part mass: CVQB32-20 ····· 88 g
- Additional mass: Rod end male thread ····· 43 g

131 g

Additional Mass

Unit (g)

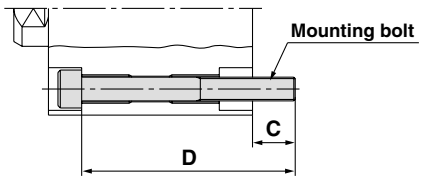
Bore size (mm)		**32**	**40**
Axial piping		5	5
Connector (300 mm)		3	3
Rod end male thread	Male thread	26	27
	Nut	17	17
With boss in head end		5	7
Foot (including mounting bolt)		148	160
Rod flange (including mounting bolt)		185	219
Head flange (including mounting bolt)		170	203
Double clevis (including pin, retaining ring, bolt)		156	201

Mounting Bolt for CVQ

Mounting: Be sure to use it as through-hole when mounting.

Ordering: Add the word, "Bolt" in front of the bolts to be used.

Example) Bolt M5 x 40 L: 4 pcs.

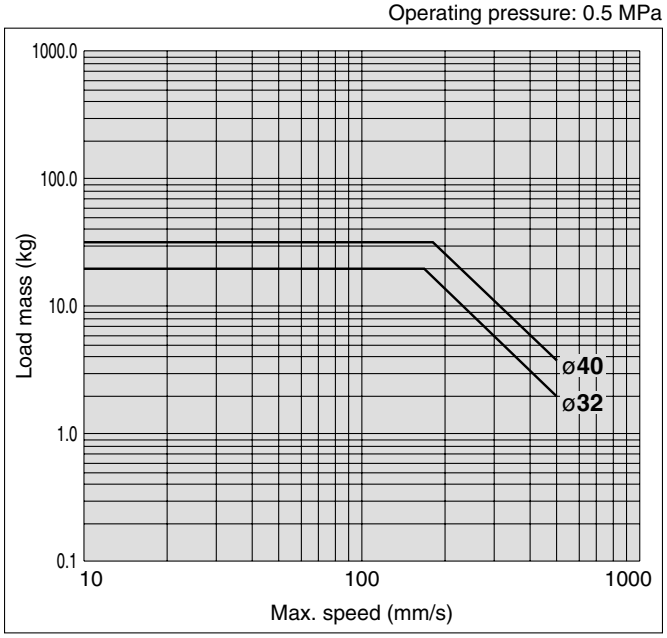


(mm)

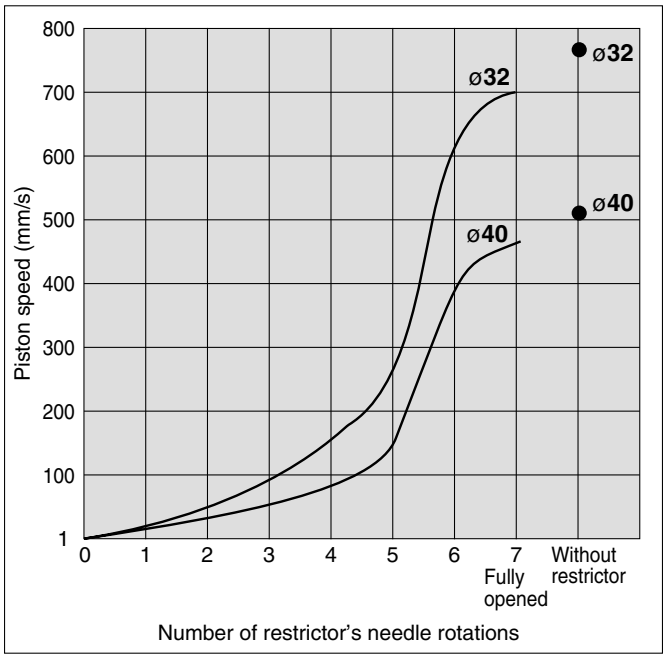
Cylinder model	C	D	Mounting bolt size
CVQB32- 5	9	45	M5 x 45L
- 10		45	x 45L
- 15		50	x 50L
- 20		55	x 55L
- 25		60	x 60L
- 30		65	x 65L
- 35		70	x 70L
- 40		75	x 75L
- 45		80	x 80L
- 50		85	x 85L
- 75		110	x 110L
-100		135	x 135L
CVQB40- 5	7.5	45	M5 x 45L
- 10		50	x 50L
- 15		55	x 55L
- 20		60	x 60L
- 25		65	x 65L
- 30		70	x 70L
- 35		75	x 75L
- 40		80	x 80L
- 45		85	x 85L
- 50		90	x 90L
- 75		115	x 115L
-100		140	x 140L

Allowable Kinetic Energy

Operating pressure: 0.5 MPa



Relationship between Number of Needle Rotations and Piston Speed

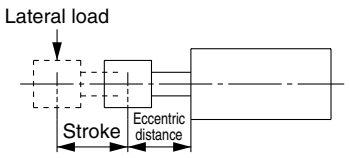


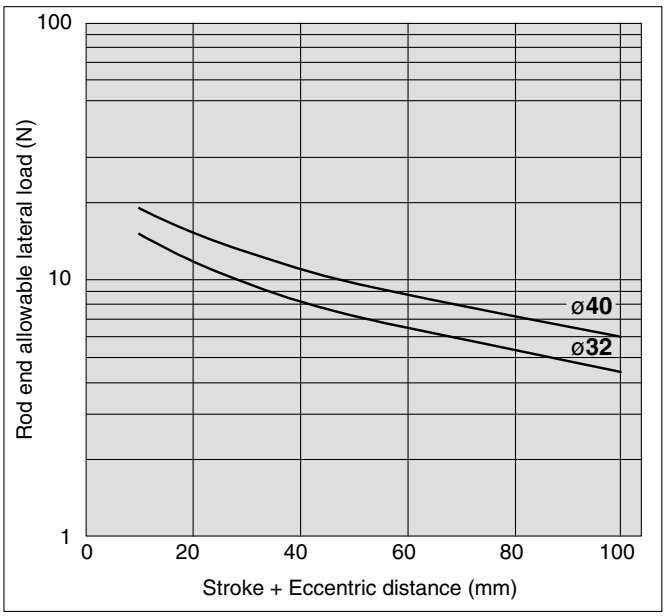
Restrictor: ASN2-M5
Pressure: 0.5 MPa
Mounting orientation: Horizontal, with no load, piston extended
∗ The above piston speed is for reference purpose only.

<Exhaust restrictor with silencer>

Model	Port size	Effective area (mm²)	Mass (g)
ASN2-M5	M5 x 0.8	1.8	5

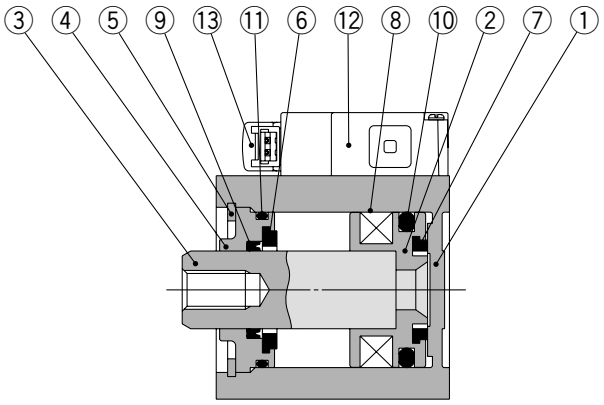
Rod End Allowable Lateral Load



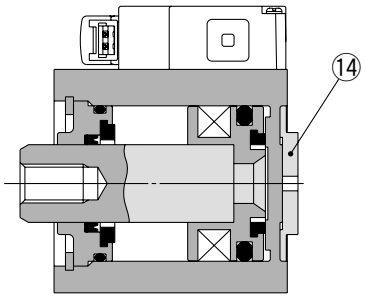


The allowable lateral load applied to the rod end is as shown above. Do not use exceeding the value shown by the graph.

Construction



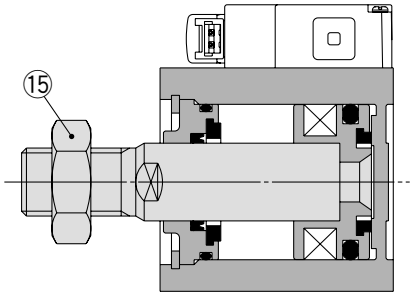
With boss in head end

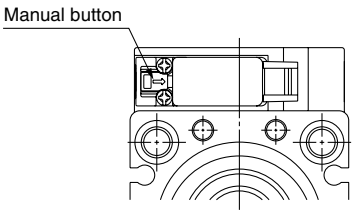


Component Parts

No.	Description	Material	Note
1	**Cylinder tube**	Aluminum alloy	Hard anodized
2	**Piston**	Aluminum alloy	Chromated
3	**Piston rod**	Carbon steel	Hard chrome plated
4	**Collar**	Aluminum alloy	Anodized
5	**Retaining ring**	Carbon tool steel	Phosphate coated
6	**Bumper A**	Urethane	
7	**Bumper B**	Urethane	
8	**Magnet**	—	
9	**Rod seal**	NBR	
10	**Piston seal**	NBR	
11	**Gasket**	NBR	
12	**Solenoid valve**	—	
13	**Pilot valve**	—	
14	**Boss ring**	Aluminum alloy	Hard anodized
15	**Rod end nut**	Carbon steel	Nickel plated

Rod end male thread





Replacement parts/Seal Kit

Bore size (mm)	Order no.	Set contents
32	CQ2B32-PS	Parts list no. ⑥⑦⑧
40	CQ2B40-PS	

∗ Seal kit includes ⑥, ⑦, ⑧. Order the seal kit, based on each bore size.
∗ Since the seal kit does not include a grease pack, order it separately.
Grease pack part no.: GR-S-010 (10 g)

Length of plug connector lead wire

The standard length of the plug connector with a lead wire is 300 mm, but other lengths are available as follows.

How to Order Pilot Valve Assembly

V111M- □ □ □ □

Rated voltage

5	24 VDC
6	12 VDC

Manual override

Nil	Non-locking push type
B	Locking slotted type

Surge voltage suppressor

Nil	Without light/surge voltage suppressor
S	With surge voltage suppressor
Z	With light/surge voltage suppressor
R	With surge voltage suppressor (Non-polar type)
U	With light/surge voltage suppressor (Non-polar type)

Electrical entry

M	M-type plug connector with lead wire (Lead wire length 300 mm)
MO	M-type plug connector without connector

How to Order Connector Assembly

With lead wire: **SY100-30-4A-** □

Lead wire length

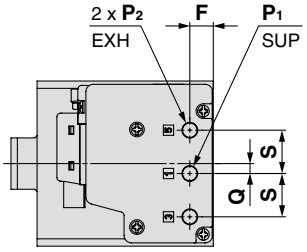
Nil	300 mm
6	600 mm
10	1000 mm
15	1500 mm
20	2000 mm
25	2500 mm
30	3000 mm
50	5000 mm

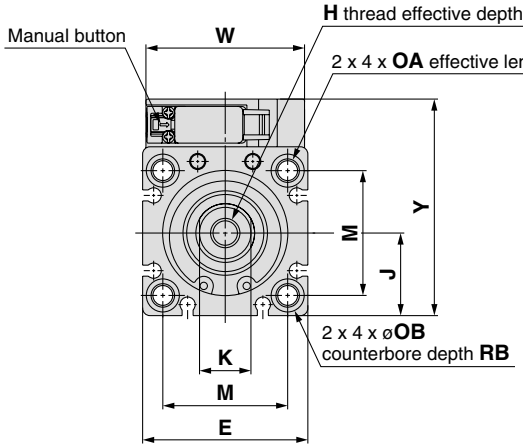
How to Order
Indicate the part number of the connector assembly in addition to the part number of the solenoid valve without the connector for the plug connector.
Example) Lead wire length 2000 mm

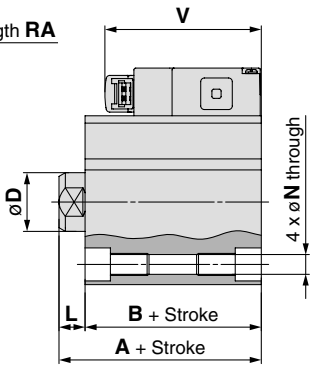
When ordering cylinder with valve
CVQB32-30-M9B-5MOZ
SY100-30-4A-20

Dimensions: ø32, ø40

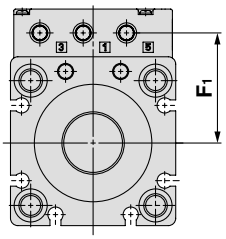
Basic: CVQB







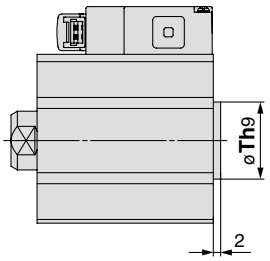
Axial piping



(mm)

Bore size (mm)	F_1
32	30
40	34

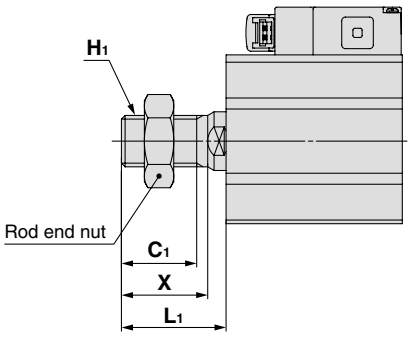
With boss in head end



(mm)

Bore size (mm)	Th9
32	$21^{\ 0}_{-0.052}$
40	$28^{\ 0}_{-0.052}$

Rod end male thread



(mm)

Bore size (mm)	C_1	X	H_1	L_1
32	20.5	23.5	M14 x 1.5	28.5
40	20.5	23.5	M14 x 1.5	28.5

(mm)

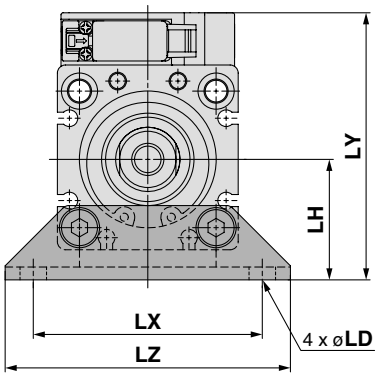
Bore size (mm)	Stroke range (mm)	A	B	C	D	E	F	H	J	K	L	M	N	OA	OB	P_1	P_2	Q	RA	RB
32	5 to 100	40 Note)	33 Note)	13	16	45	6.5	M8 x 1.25	22.5	14	7	34	5.4	M6 x 1	9	M5 x 0.8	M5 x 0.8	2.5	10	7
40	5 to 100	46.5	39.5	13	16	52	7	M8 x 1.25	26	14	7	40	5.4	M6 x 1	9	M5 x 0.8	M5 x 0.8	2.5	10	7

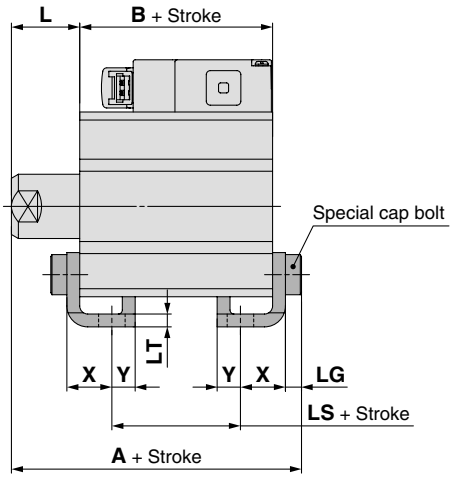
Bore size (mm)	Stroke range (mm)	S	V	W	Y
32	5 to 100	12	42.5	43.5	59
40	5 to 100	12	43	43.5	67

Note) The dimensions (A + stroke) and (B + stroke) for 5 mm stroke will be the same as those for 10 mm stroke.

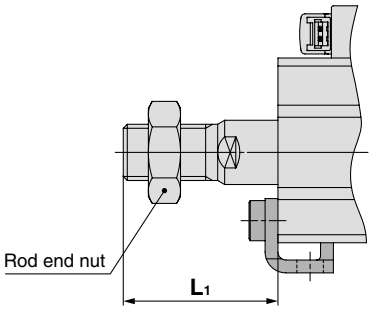
Dimensions: ø32, ø40

Foot: CVQL





Rod end male thread

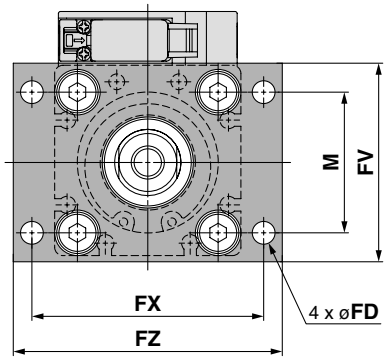


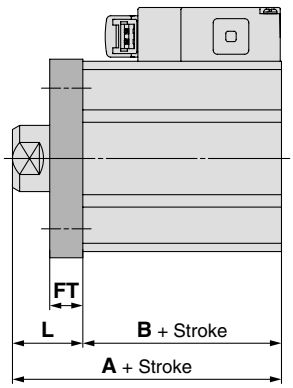
(mm)

Bore size (mm)	Stroke range (mm)	A	B	LS	L	L_1	LD	LG	LH	LT	LX	LY	LZ	X	Y
32	5 to 100	57.2 Note)	33 Note)	17 Note)	17	38.5	6.6	4	30	3.2	57	66.5	71	11.2	5.8
40	5 to 100	63.7	39.5	23.5	17	38.5	6.6	4	33	3.2	64	74	78	11.2	7

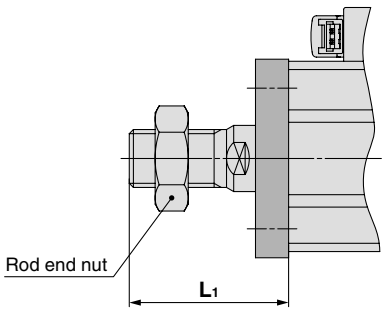
Note) The dimensions (A + stroke), (B + stroke) and (LS + stroke) for 5 mm stroke will be the same as those for 10 mm stroke.

Rod flange: CVQF





Rod end male thread



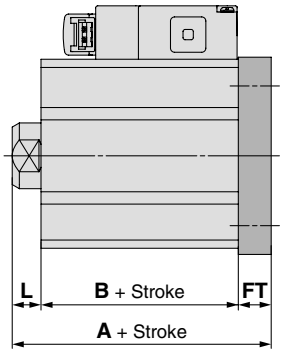
(mm)

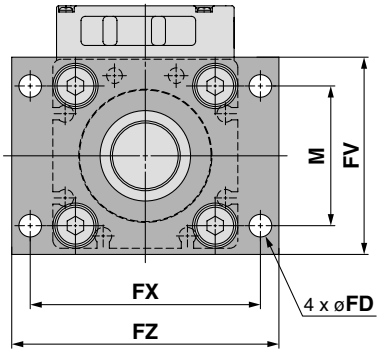
Bore size (mm)	Stroke range (mm)	A	B	FD	FT	FV	FX	FZ	L	L_1	M
32	5 to 100	50 Note)	33 Note)	5.5	8	48	56	65	17	38.5	34
40	5 to 100	56.5	39.5	5.5	8	54	62	72	17	38.5	40

Note) The dimensions (A + stroke) and (B + stroke) for 5 mm stroke will be the same as those for 10 mm stroke.

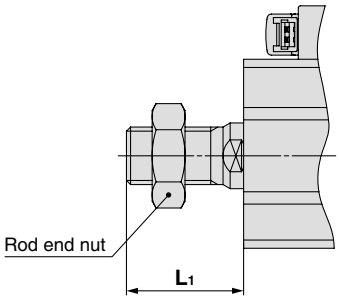
Dimensions: ø32, ø40

Head flange: CVQG





Rod end male thread

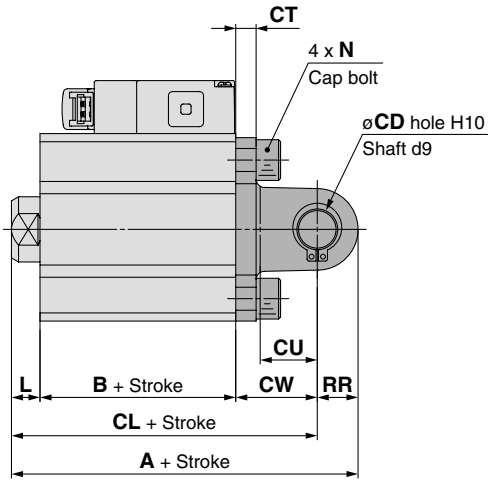


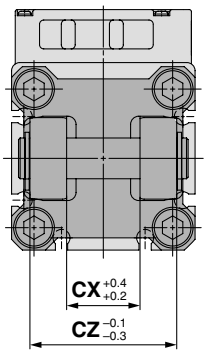
(mm)

Bore size (mm)	Stroke range (mm)	A	B	FD	FT	FV	FX	FZ	L	L_1	M
32	5 to 100	48 Note)	33 Note)	5.5	8	48	56	65	7	28.5	34
40	5 to 100	54.5	39.5	5.5	8	54	62	72	7	28.5	40

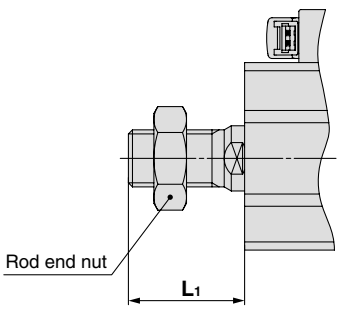
Note) The dimensions (A + stroke) and (B + stroke) for 5 mm stroke will be the same as those for 10 mm stroke.

Double clevis: CVQD





Rod end male thread



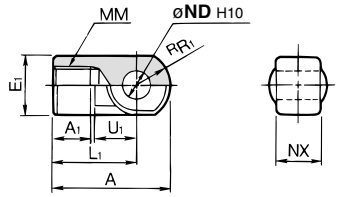
(mm)

Bore size (mm)	Stroke range (mm)	A	B	CL	CD	CT	CU	CW	CX	CZ	L	L_1	N	RR
32	5 to 100	70 Note)	33 Note)	60	10	5	14	20	18	36	7	28.5	M6 x 1	10
40	5 to 100	78.5	39.5	68.5	10	6	14	22	18	36	7	28.5	M6 x 1	10

Note) The dimensions (A + stroke), (B + stroke) and (CL + stroke) for 5 mm stroke will be the same as those for 10 mm stroke.

Accessory Bracket

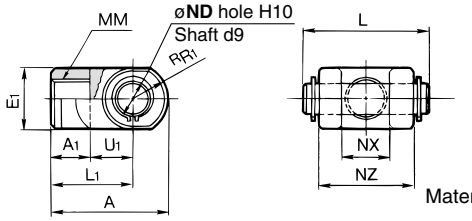
Single knuckle joint



Material: Cast iron
(mm)

Part no.	Applicable bore size (mm)	A	A_1	E_1	L_1	MM	$^{R}R_1$	U_1	ND_{H10}	NX
I-G04	**32, 40**	42	14	ø22	30	M14 x 1.5	12	14	$10^{+0.058}_{0}$	$18^{-0.3}_{-0.5}$

Double knuckle joint

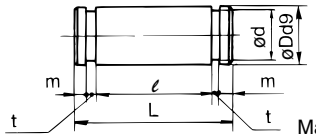


Material: Cast iron
(mm)

Part no.	Applicable bore size (mm)	A	A_1	E_1	L_1	MM	$^{R}R_1$	U_1	ND_{H10}	NX	NZ	L	Applicable pin part no.
Y-G04	**32, 40**	42	16	ø22	30	M14 x 1.5	12	14	$10^{+0.058}_{0}$	$18^{+0.5}_{+0.3}$	36	41.6	IY-G04

∗ Knuckle pin and retaining ring are included.

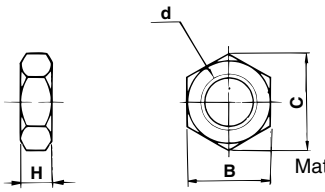
Knuckle pin (Common with double clevis pin)



Material: Carbon steel
(mm)

Part no.	Applicable bore size (mm)	Dd9	L	d	ℓ	m	t	Retaining ring
IY-G04	**32, 40**	$10^{-0.040}_{-0.076}$	41.6	9.6	36.2	1.55	1.15	10 C-type for shaft

Rod end nut



Material: Carbon steel
(mm)

Part no.	Applicable bore size (mm)	d	H	B	C
NT-04	**32, 40**	M14 x 1.5	8	22	25.4

Simple Joint: ø32, ø40

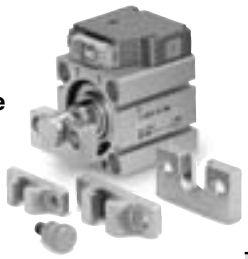
Joint and mounting bracket (A/B-type) part no.

YA – **03**

- **YA**: Mounting bracket
- **03**: Applicable air cylinder bore size

YA	A-type mounting bracket
YB	B-type mounting bracket
YU	Joint

03	For ø32, ø40



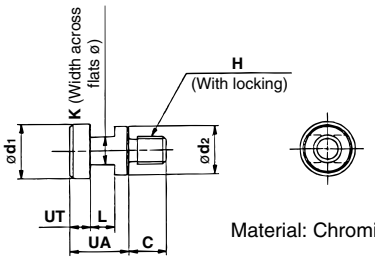
Allowable Eccentricity (mm)

Bore size	ø32	ø40
Eccentricity tolerance	±1	
Backlash	0.5	

<Ordering>
• Joints are not included with the A- or B-type mounting brackets. Order them separately.
(Example)
• Bore size for ø40 — Order number
• A-type mounting bracket part number ····· YA-03
• Joint ····· YU-03

Joint Part No.

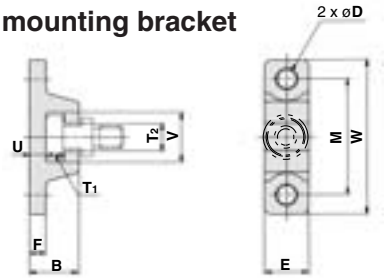
Bore size (mm)	Joint part no.	Applicable mounting bracket		Mass (g)
		A-type mounting bracket	B-type mounting bracket	
32, 40	**YU-03**	**YA-03**	**YB-03**	25



Material: Chromium molybdenum steel
(Nickel plated)
(mm)

Part no.	Applicable bore size (mm)	UA	C	d_1	d_2	H	K	L	UT	Weight (g)
YU-03	**32, 40**	17	11	15.8	14	M8 x 1.25	8	7	6	25

A-type mounting bracket

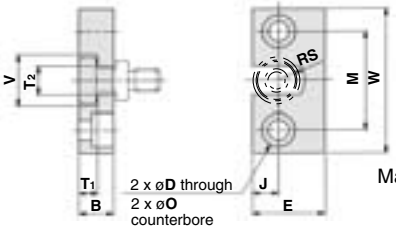


Material: Chromium molybdenum steel
(Nickel plated)
(mm)

Part no.	Bore size (mm)	B	D	E	F	M	T_1	T_2
YA-03	**32, 40**	18	6.8	16	6	42	6.5	10

Part no.	Bore size (mm)	U	V	W	Weight (g)
YA-03	**32, 40**	6	18	56	55

B-type mounting bracket



Material: Carbon steel
(Nickel plated)
(mm)

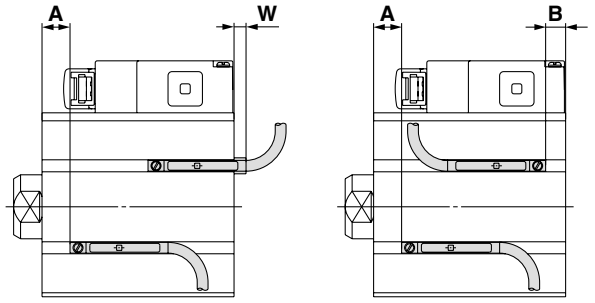
Part no.	Bore size (mm)	B	D	E	J	M	øO
YB-03	**32, 40**	12	7	25	9	34	11.5 depth 7.5

Part no.	Bore size (mm)	T_1	T_2	V	W	RS	Weight (g)
YB-03	**32, 40**	6.5	10	18	50	9	80

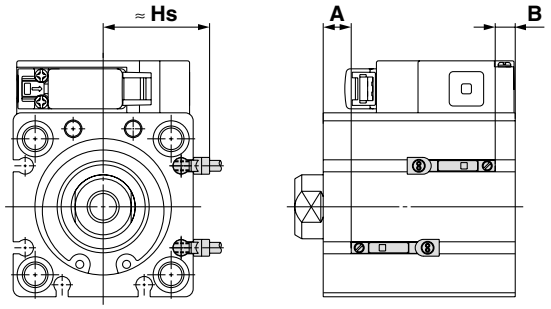
Auto Switch Proper Mounting Position (Detection at Stroke End) and Its Mounting Height

ø32, ø40

D-A9□ type
D-M9□ type
D-M9□W type



D-A9□V type
D-M9□V type
D-M9□WV type



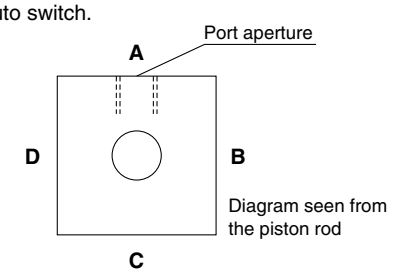
(mm)

Bore size (mm)	D-A9□			D-A9□V			D-M9□ D-M9□W			D-M9□V D-M9□WV		
	A	B	W	A	B	Hs	A	B	W	A	B	Hs
32	8 [13]	5	–3 (–0.5)	8 [13]	5	27	12 [17]	9	1	12 [17]	9	29
40	12	7.5	–5.5 (–3)	12	7.5	30.5	16	11.5	–1.5	16	11.5	32.5

The value in parentheses [ ] is for 5 mm stroke with ø32.
( ): Denotes the values for D-A93.
∗ The negative indication in the table for W shows the mounting inside the cylinder body.
∗ For the actual setting, check the operating condition of the auto switch and adjust.

Auto Switch Mountable Surface, Mounting Groove Number (Direct Mounting)

The below table shows which surfaces of the cylinder an auto switch can be mounted on, and the number of slots for the direct mounting type auto switch.



Auto switch model	D-A9□(V), M9□(V), M9□W(V)			
Bore size (mm)	A (Mounting groove number)	B (Mounting groove number)	C (Mounting groove number)	D (Mounting groove number)
32	—	○ (2)	○ (2)	○ (2)
40	—	○ (2)	○ (2)	○ (2)

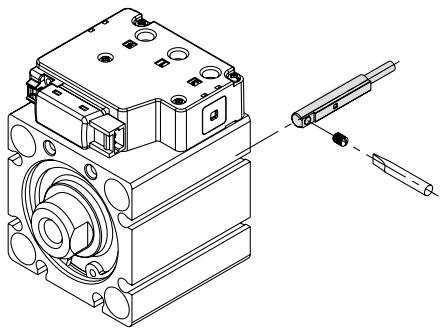
Operating Range

(mm)

Auto switch model	Bore size	
	32	**40**
D-A9□, D-A9□V	9.5	9.5
D-M9□, D-M9□V D-M9□W, D-M9□WV	6	6

∗ Since this is a guideline including hysteresis, not meant to be guaranteed. (Assuming approximately ±30% dispersion.)
There may be the case it will vary substantially depending on an ambient environment.

Auto Switch Mounting



Minimum Stroke for Auto Switch Mounting

(mm)

No. of auto switch mounted	Bore size (mm)	D-A9□	D-A9□V	D-M9□	D-M9□V	D-M9□W	D-M9□WV
With 1 pc.	**32**∗	10	5	5	5	15	15
	40	10	5	5	5	15	15
With 2 pcs.	**32**∗	10	10	10	5	15	15
	40	10	10	10	5	15	15

∗ The outline dimensions for 5 mm stroke will be the same as those for 10 mm stroke.

Series CVQ
Specific Product Precautions 1

Be sure to read before handling. Refer to front matters 42 and 43 for Safety Instructions, pages 3 to 11 for Actuator and Auto Switch Precautions and 3/4/5 Port Solenoid Valve Precautions in Best Pneumatics No. 1.

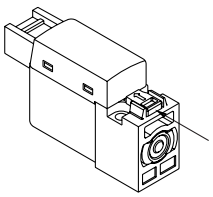
Manual Override

⚠Warning

Connected actuator is started by manual operation. Use the manual override after confirming that there is no danger.

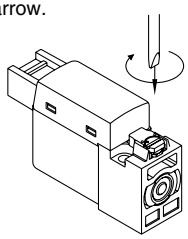
■ **Non-locking push type**
[Standard]

Press in the direction of the arrow



■ **Locking slotted type**
[B type]

Turn 90° in the direction of arrow.



⚠ Caution

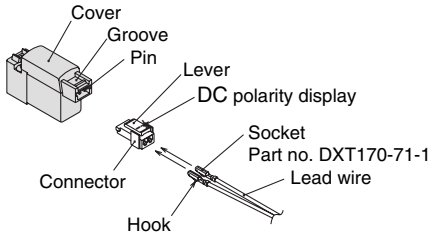
When operating with a screwdriver, turn it gently using a watchmaker's screwdriver. (Torque: Less than 0.1 N•m)

How to Use Plug Connector

⚠Caution

1. Attaching and detaching connectors

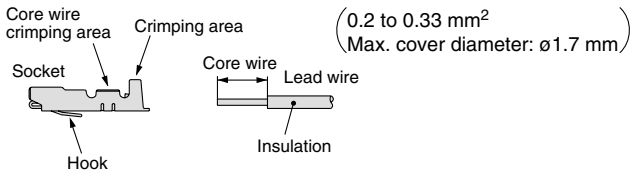
- To attach a connector, hold the lever and connector unit between your fingers and insert straight onto the pins of the solenoid valve so that the lever's pawl is pushed into groove and locks.
- To detach a connector, remove the pawl from the groove by pushing the lever downward with your thumb, and pull the connector straight out.



2. Crimping of lead wires and sockets

Strip 3.2 to 3.7 mm at the end of the lead wires, insert the ends of the core wires evenly into the sockets, and then crimp with a crimping tool. When this is done, take care that the coverings of the lead wires do not enter the core wire crimping area.

For crimping, use a specific tool. (For special crimping tool, please contact SMC.)



How to Use Plug Connector

⚠Caution

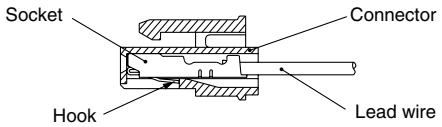
3. Attaching and detaching sockets with lead wires

• Attaching

Insert the sockets into the square holes of the connector (⊕, ⊖ indication), and continue to push the sockets all the way in until they lock by hooking into the seats in the connector. (When they are pushed in, their hooks open and they are locked automatically.) Then confirm that they are locked by pulling lightly on the lead wires.

• Detaching

To detach a socket from a connector, pull out the lead wire while pressing the socket's hook with a stick having a thin tip (approx. 1 mm). If the socket will be used again, first spread the hook outward.



4. Do not apply bending force or tensile force repeatedly to the lead wire.

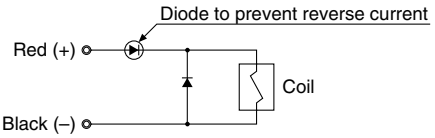
This can cause disconnection of the connector and breakage of the lead wire. If this is unavoidable due to the application, keep the bending radius of the lead wire R8 mm at least.

Surge Voltage Suppressor

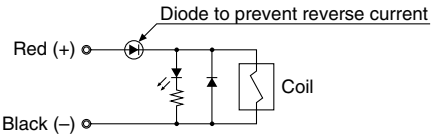
⚠Caution

■ **Standard (with polarity)**

With surge voltage suppressor (□S)

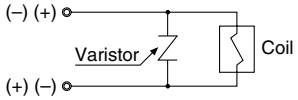


With light/surge voltage suppressor (□Z)

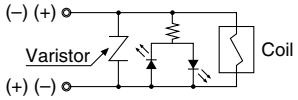


■ **Non-polar type**

With surge voltage suppressor (□R)



With light/surge voltage suppressor (□U)



- For standard type, connect so that polarity is matched to the connector's (+), (–). (For non-polar type, the lead wires can be connected to either one.)
- Solenoids, whose lead wires have been pre-wired: positive side red and negative side black.

Series CVQ
Specific Product Precautions 2

Be sure to read before handling. Refer to front matters 42 and 43 for Safety Instructions, pages 3 to 11 for Actuator and Auto Switch Precautions and 3/4/5 Port Solenoid Valve Precautions in Best Pneumatics No. 1.

Snap Ring Installation/Removal

⚠Caution

1. **To remove and install the snap ring, use an appropriate pair of pliers (tool for installing C-type retaining ring).**
2. **Even if a proper plier (tool for installing C-type retaining ring) is used, it is likely to inflict damage to a human body or peripheral equipment, as a retaining ring may be flown out of the tip of a plier (tool for installing C-type retaining ring). Be much careful with the popping of a retaining ring. Besides, be certain that a retaining ring is placed firmly into the groove of rod cover before supplying air at the time of installment.**

Other

⚠Caution

1. **Do not separate the cylinder from the valve.**

Valve Mounted Cylinder
Double Acting, Single Rod
Series CVJ5
ø10, ø16

How to Order

Stroke (mm)

ø10	15, 30, 45, 60
ø16	15, 30, 45, 60

Electrical entry

G	Grommet
L	L plug connector
M	M plug connector

Light/Surge voltage suppressor

Nil	Without light/surge voltage suppressor
S	With surge voltage suppressor
Z	With light/surge voltage suppressor
R	With surge voltage suppressor (No polarity)
U	With light/surge voltage suppressor (No polarity)

∗ Type "R", "U": DC only
∗ In the case of AC, since the rectifier prevents the production of surge voltage, there is no type "S".

Mounting style

B	Basic style
L	Axial foot style
F	Rod side flange style

Bore size

10	10 mm
16	16 mm

CVJ5 **L** **16** – **60** □ – **5** **L** □ – □

With auto switch **CDVJ5** **L** **16** – **60** □ – **5** **L** □ – **M9BW** □ – □

With auto switch
(Built-in magnet)

Rod extended/retracted when energized

Nil	Rod extended when energized
B	Rod retracted when energized

Solenoid valve voltage

DC specifications		AC specifications (50/60 Hz)	
5	24 VDC	**1**	100 VAC
6	12 VDC	**2**	200 VAC
V	6 VDC	**3**	110 VAC (115 VAC)
S	5 VDC	**4**	220 VAC (230 VAC)
R	3 VDC		

Auto switch
Magnet installed even without auto switch

Symbol	Auto switch mounting
A	Rail mounting style
B	Band mounting style

∗ For the applicable auto switch model, refer to the table below.

Number of auto switches

Nil	2 pcs.
S	1 pc.
n	"n" pcs.

Made to Order
Refer to page 1543 for details.

Built-in Magnet Cylinder Model

Suffix the symbol "-A" (Rail mounting style) or "-B" (Band mounting style) to the end of the w/ auto switch cylinder part number.

Example	Rail mounting style	CDVJ5B16-60-A
	Band mounting style	CDVJ5B10-45-B

Applicable Auto Switch/Refer to pages 1719 to 1827 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC	Load voltage AC	Auto switch model: Band mounting	Auto switch model: Rail mounting: Perpendicular	Auto switch model: Rail mounting: In-line	Lead wire length (m): 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	None (N)	Pre-wired connector	Applicable load	
Solid state switch	——	Grommet	Yes	3-wire (NPN)	5 V, 12 V	—	**M9N**	—	—	●	●	●	○	—	○	IC circuit	Relay, PLC
							—	**F7NV**	**F79**	●	—	●	○	—	○		
				3-wire (PNP)			**M9P**	—	—	●	●	●	○	—	○		
							—	**F7PV**	**F7P**	●	—	●	○	—	○		
				2-wire	12 V		**M9B**	—	—	●	●	●	○	—	○	—	
							—	**F7BV**	**J79**	●	—	●	○	—	○		
		Connector					**H7C**	**J79C**	—	●	—	●	●	●	—		
	Diagnostic indication (2-color indication)	Grommet		3-wire (NPN)	5 V, 12 V		**M9NW**	—	—	●	●	●	○	—	○	IC circuit	
							—	**F7NWV**	**F79W**	●	—	●	○	—	○		
				3-wire (PNP)			**M9PW**	—	—	●	●	●	○	—	○		
							—	—	**F7PW**	●	—	●	○	—	○		
				2-wire	12 V		**M9BW**	—	—	●	●	●	○	—	○	—	
							—	**F7BWV**	**J79W**	●	—	●	○	—	○		
	With diagnostic output (2-color indication)			4-wire (NPN)	5 V, 12 V		**H7NF**	—	**F79F**	●	—	●	○	—	○	IC circuit	
Reed switch	——	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	**A96**	—	**A76H**	●	—	●	—	—	—	IC circuit	—
				2-wire	24 V	—	—	**A72**	**A72H**	●	—	●	—	—	—	—	Relay, PLC
						200 V	—	**A73**	**A73H**	●	—	●	●	—	—	—	
						100 V	**A93**	—	—	●	—	●	—	—	—		
			No			100 V or less	**A90**	**A80**	**A80H**	●	—	●	—	—	—	IC circuit	
		Connector	Yes			—	**C73C**	**A73C**	—	●	—	●	●	●	—	—	
			No			24 V or less	**C80C**	**A80C**	—	●	—	●	●	●	—	IC circuit	
	Diagnostic indication (2-color indication)	Grommet	Yes		—	—	—	**A79W**	—	●	—	●	—	—	—	—	

∗ 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

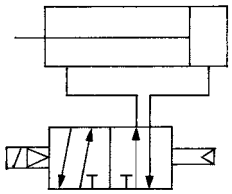
∗ Since there are other applicable auto switches than listed, refer to page 1551 for details.
∗ For details about auto switches with pre-wired connector, refer to pages 1784 and 1785.
∗ D-A9□V□/M9□V□/M9□WV□/M9□A(V)L cannot be mounted on the band mounting type.

∗ Solid state auto switches marked with "○" are produced upon receipt of order.
∗ D-A9□/M9□/M9□W/A7□□/A80□/F7□□/J7□□ auto switches are shipped together (not assembled). (For D-A9□/M9□/M9□W, only auto switch mounting brackets are assembled before shipped.)
∗ D-C7□□/C80□/H7□□ auto switches are assembled at the time of shipment.
∗ Order auto switch mounting brackets separately when D-A9□(V)/M9□(V)/M9□W(V) are mounted on ø10 and ø16 of the rail mounting type. Refer to page 1551 for details.

Operation type can be changed to rod extended when energized or rod retracted when energized.

An auto switch cylinder with the switch installed can also be manufactured.

JIS Symbol
Double acting,
Single rod



Specifications

Bore size (mm)	ø10	ø16
Action	Double acting, Single rod	
Fluid	Air	
Proof pressure	1.05 MPa	
Maximum operating pressure	0.7 MPa	
Minimum operating pressure	0.15 MPa	
Ambient and fluid temperature	–10 to 50°C (No freezing)	
Cushion	Rubber bumper	
Lubrication	Not required (Non-lube)	
Stroke length tolerance	$^{+1.0}_{0}$	
Port size	M5 x 0.8	
Mounting	Basic style, Axial foot style, Rod side flange style	
Piston speed	50 to 750 mm/s	50 to 150 mm/s
Allowable kinetic energy	0.035J	0.090J

Solenoid Valve Specifications

Applicable solenoid valve model			SYJ3190
Electrical entry			Grommet (G)/(H), L plug connector (L), M plug connector (M)
Coil rated voltage (V)	**DC**		24, 12, 6, 5, 3
	AC 50/60 Hz		100, 110, 200, 220
Effective area of valve (Cv factor)			1.8 mm² (0.1)
Allowable voltage			±10% of the rated voltage*
Power consumption (W)	**DC**	**Standard**	0.35 (With indicator light: 0.4)
Apparent power (VA)*	**AC**	**100 V**	0.78 (With indicator light: 0.81)
		110 V [115 V]	0.86 (With indicator light: 0.89) [0.94 (With indicator light: 0.97)]
		200 V	1.18 (With indicator light: 1.22)
		220 V [230 V]	1.30 (With indicator light: 1.34) [1.42 (With indicator light: 1.46)]
Surge voltage suppressor			Diode (Varistor for the non-polar type)
Indicator light			LED

* 110 VAC and 115 VAC types and 220 VAC and 230 VAC types are common respectively.
* For 115 VAC and 230 VAC, allowable voltage fluctuation is –15 to +5 % of the rated voltage.
* For S and Z, the voltage will drop due to the internal circuit. Allowable voltage fluctuation must be in the range below.
  Types S, Z 24 VDC: –7 to 10 %, 12 VDC: –4 to 10 %

Made to Order Specifications
(For details, refer to page 1836.)

Symbol	Specifications
-XA□	Change of rod end shape

Standard Stroke

(mm)

Bore size (mm)	Standard stroke
10	15, 30, 45, 60
16	15, 30, 45, 60

* If types for more than the strokes indicated in the table above (61 strokes) are required, please ask SMC.

Mounting Style and Accessory/For details, refer to page 1547.

Mounting		Basic style	Axial foot style	Rod side flange style
Standard equipment	Mounting nut	●	●	●
	Rod end nut	●	●	●
Option	Single knuckle joint	●	●	●
	Double knuckle joint (With pin)*	●	●	●

* Knuckle pin and retaining ring are shipped together.

Mass

(g)

Bore size (mm)		10	16
Basic mass*		74	107
Additional mass per each 15 mm of stroke		6.5	9.5
Mounting bracket mass	Axial foot style	7	19
	Rod side flange style	5	13

* Mounting nut and rod end nut are included in the basic mass.

Calculation: (Example) **CVJ5L10-45-1G**

- Basic mass·····74 (g) (ø10)
- Additional mass ·····6.5/15 stroke
- Cylinder stroket ·····45 stroke
- Mass of bracket ·····7 (g) (Axial foot style)

74 + 6.5/15 x 45 + 7 = 100.5 g

Mounting Bracket Part No.

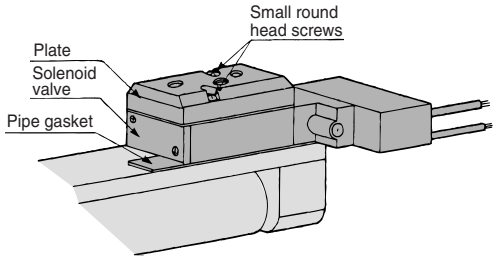
Mounting bracket	Bore size (mm)	
	10	16
Foot	CJ-L010B	CJ-L016B
Flange	CJ-F010B	CJ-F016B

Changing between Rod Extended when Energized and Rod Retracted when Energized

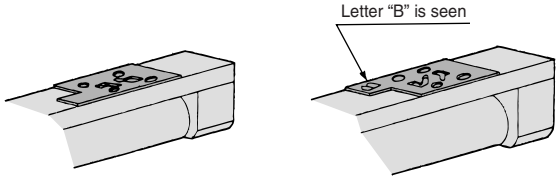
<Step>

This procedure is for changing the rod extended when energized to the rod retracted when energized.

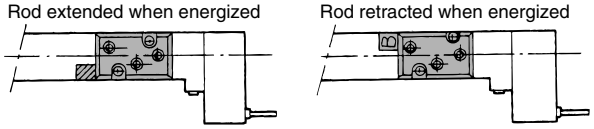
1. Using a screwdriver, loosen the two small round head screws, and remove the plate and the solenoid valve. At this time, instead of removing the plate and the solenoid valve separately, remove them together, with the round head screws remaining inserted.



2. Turn the pipe gasket at 180° and mount, showing the letter "B".

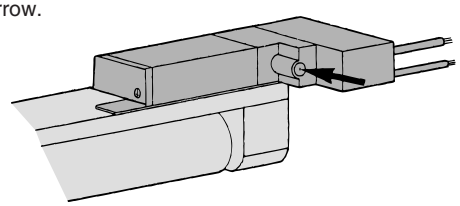


3. Install the solenoid valve and the plate, and tighten the small round head screws, with a screw driver. After tightening, press the manual button on the solenoid valve, check for any air leaks, and verify the operating conditions. When the cylinder is viewed from above, the position of the gasket is as shown in the figure below.



Manual Operation

Manual operation is possible by pushing the manual button indicated with the arrow.



⚠ Specific Product Precautions

Be sure to read before handling. Refer to front matters 42 and 43 for Safety Instructions, pages 3 to 11 for Actuator and Auto Switch Precautions and 3/4/5 Port Solenoid Valve Precautions in Best Pneumatics No. 1.

Handling Precautions

⚠ Caution

1. During installation, secure the rod cover and tighten the mounting nut or the rod cover body by applying an appropriate tightening force.

If the head cover is secured or the head cover is tightened, the cover may rotate, leading to the deviation.

2. Tighten the mounting screws with an appropriate tightening torque within the range given below.

ø6: 2.1 to 2.5 N·m, ø10: 5.9 to 6.4 N·m
ø16: 10.8 to 11.8 N·m

3. To remove and install the retaining ring for the knuckle pin or the clevis pin, use an appropriate pair of pliers (tool for installing a type C retaining ring).

In particular, use a pair of ultra-mini pliers for removing and installing the retaining rings on the ø10 cylinder.

4. For the auto switch mounting rail, do not remove the pre-equipped rail.

Since the mounting thread is drilled through inside the cylinder, it may cause air leakage.

⚠ Warning

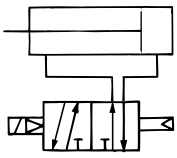
1. Confirm the specifications.

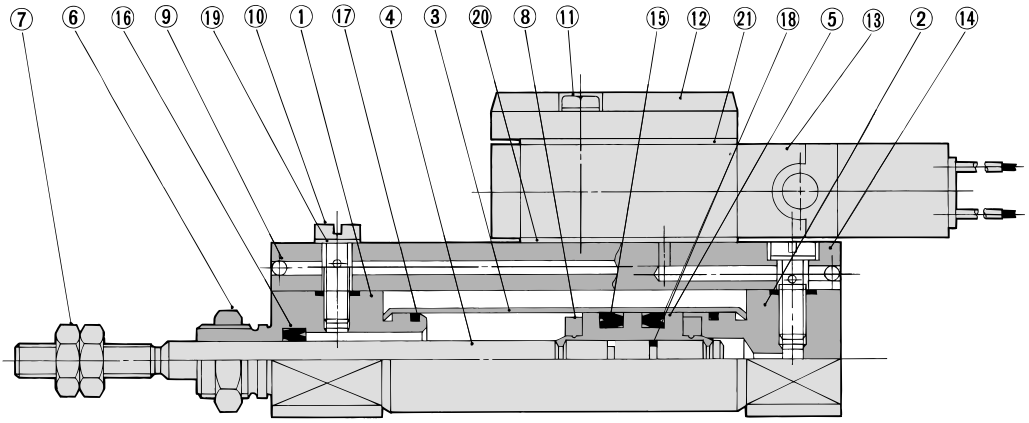
Products in this catalog are designed to be used for compressed air systems. If not operated within the designated pressure or temperature, it may damage the products or cause malfunction. (Refer to specifications.)

2. Energizing continuously for a long period of time

When the valve is continuously energized for a long period of time, the performance may deteriorate, shorten the service life or effect peripheral equipment adversely since temperature rises when coils generate heat.

Construction/(Not able to disassemble.)





Component Parts

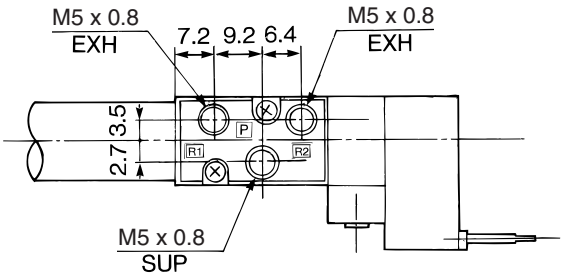
No.	Description	Material	Note
1	**Rod cover**	Aluminum alloy	Clear anodized
2	**Head cover**	Aluminum alloy	Clear anodized
3	**Cylinder tube**	Stainless steel	
4	**Piston rod**	Stainless steel	
5	**Piston**	Brass	
6	**Mounting nut**	Brass	Nickel plated
7	**Rod end nut**	Rolled steel	Nickel plated
8	**Bumper**	Urethane	
9	**Steel ball**	Carbon steel	
10	**Stud**	Brass	Electroless nickel plated
11	**Phillips screw**	Rolled steel	Nickel plated

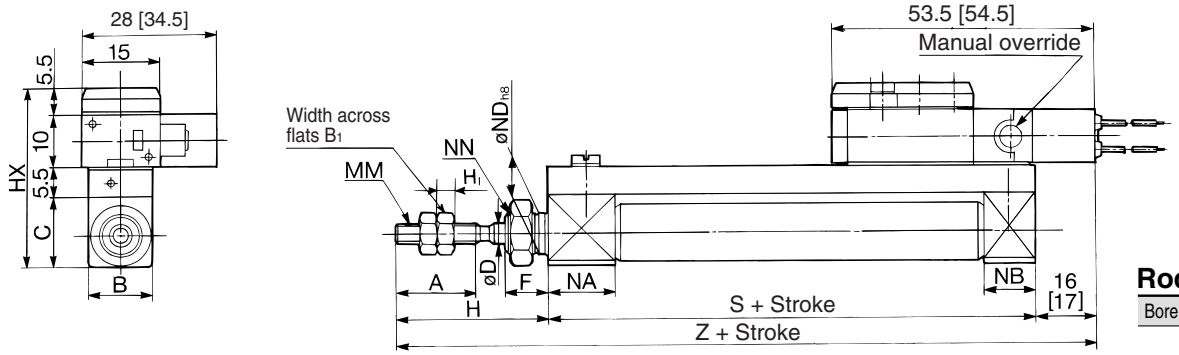
No.	Description	Material	Note
12	**Plate**	Zinc alloy	
13	**Solenoid valve**	—	∗ Refer to the note below.
14	**Pipe**	Aluminum alloy	Clear anodized
15	**Piston seal**	NBR	
16	**Rod seal**	NBR	
17	**Tube gasket**	NBR	
18	**Piston gasket**	NBR	
19	**Gasket**	Resin	
20	**Pipe gasket**	NBR	
21	**Plate gasket**	NBR	

∗ How to order solenoid valves
SYJ3190- Voltage | Electrical entry

Basic Style (B)

CVJ5





Rod End Nut

Bore size (mm)	B_1	H_1
10	7	3.2
16	8	4

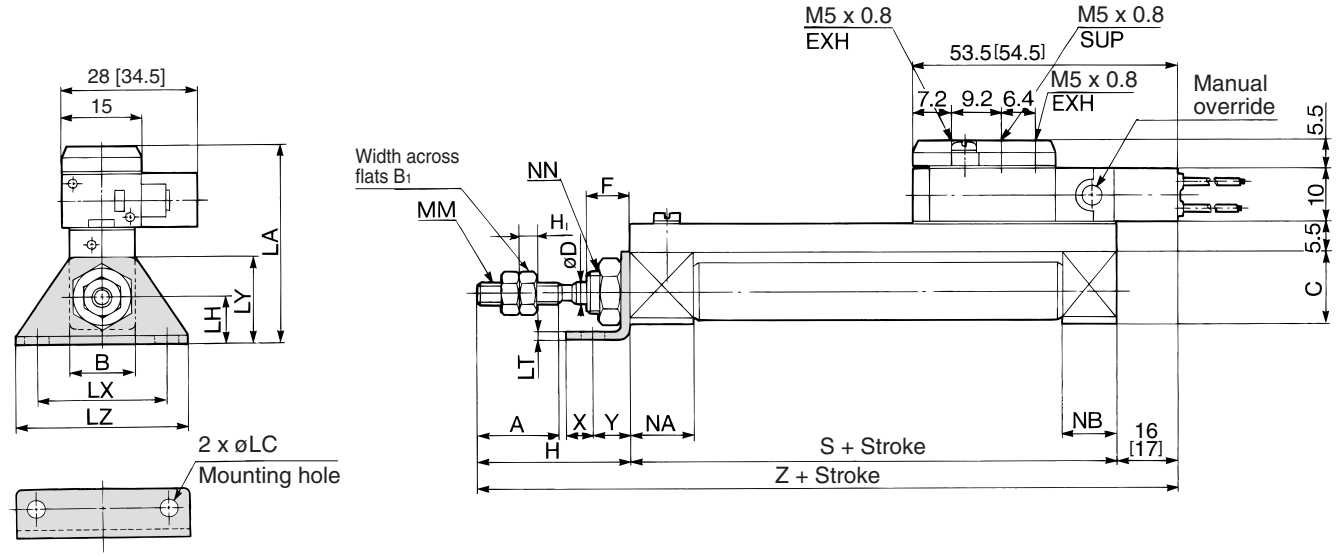
∗ [ ]: Denotes the values of AC.

(mm)

Bore size	A	B	C	D	F	H	HX	MM	NA	NB	ND	NN	S	Z
10	15	12	14	4	8	28	35	M4 x 0.7	12.5	9.5	$8^{\ 0}_{-0.022}$	M8 x 1	46	90 [91]
16	15	18	20	5	8	28	41	M5 x 0.8	12.5	9.5	$10^{\ 0}_{-0.022}$	M10 x 1	47	91 [92]

Axial Foot Style (L)

CVJ5L



Rod End Nut

Bore size (mm)	B_1	H_1
10	7	3.2
16	8	4

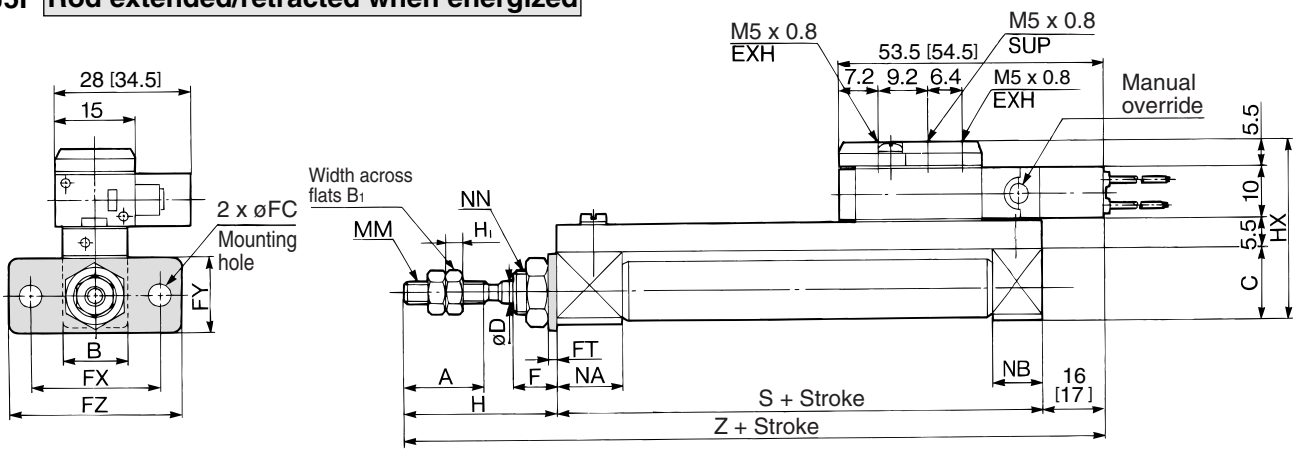
∗[ ]: Denotes the values of AC.

(mm)

Bore size	A	B	C	D	F	H	LA	LC	LH	LT	LX	LY	LZ	MM	NA	NB	NN	S	X	Y	Z
10	15	12	14	4	8	28	38	4.5	9	1.6	24	16.5	32	M4 x 0.7	12.5	9.5	M8 x 1	46	5	7	90 [91]
16	15	18	20	5	8	28	46	5.5	14	2.3	33	25	42	M5 x 0.8	12.5	9.5	M10 x 1	47	6	9	91 [92]

Rod Side Flange Style (F)

CVJ5F **Rod extended/retracted when energized**



Rod End Nut

Bore size (mm)	B_1	H_1
10	7	3.2
16	8	4

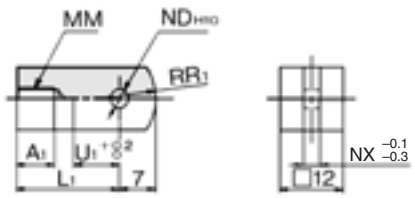
∗[ ]: Denotes the values of AC.

(mm)

Bore size	A	B	C	D	F	FC	FT	FX	FY	FZ	H	HX	MM	NA	NB	NN	S	Z
10	15	12	14	4	8	4.5	1.6	24	14	32	28	35	M4 x 0.7	12.5	9.5	M8 x 1	46	90 [91]
16	15	18	20	5	8	5.5	2.3	33	20	42	28	41	M5 x 0.8	12.5	9.5	M10 x 1	47	91 [92]

Accessory Dimensions

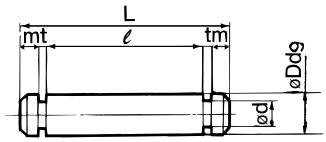
Single Knuckle Joint



Material: Rolled steel

Part no.	Applicable bore size	A_1	L_1	MM	ND^{H10}	NX	R_1	U_1
I-J010B	**10**	8	21	M4 x 0.7	$3.3^{+0.048}_{0}$	3.1	8	9
I-J016B	**16**	8	25	M5 x 0.8	$5^{+0.048}_{0}$	6.4	12	14

Knuckle Pin



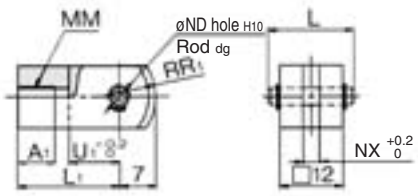
Material: Stainless steel

Part no.	Applicable bore size	Dd9	d	L	ℓ	m	t	Applicable retaining ring
IY-J010	**10**	$3.3^{-0.030}_{-0.060}$	3	16.2	12.2	1.7	0.3	Type C 3.2
IY-J015	**16**	$5^{-0.030}_{-0.060}$	4.8	16.6	12.2	1.5	0.7	Type C 5

∗ Retaining rings are included.

Double Knuckle Joint

∗ Knuckle pin and retaining ring are shipped together.



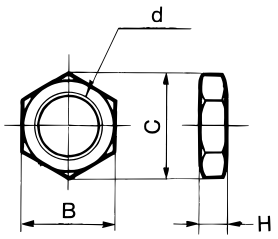
Material: Rolled steel

Part no.	Applicable bore size	A_1	L	L_1	MM
Y-J010B	**10**	8	16.2	21	M4 x 0.7
Y-J016B	**16**	11	16.6	21	M5 x 0.8

Part no.	ND_{d9}	ND_{H10}	NX	R_1	U_1
Y-J010B	$3.3^{-0.030}_{-0.060}$	$3.3^{+0.048}_{0}$	3.2	8	10
Y-J016B	$5^{-0.030}_{-0.060}$	$5^{+0.048}_{0}$	6.5	12	10

∗ Knuckle pin and retaining ring are shipped together.

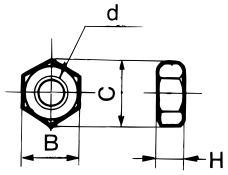
Mounting Nut



Material: Brass

Part no.	Applicable bore size	B	C	d	H
SNJ-010B	**10**	11	12.7	M8 x 1.0	4
SNJ-016B	**16**	14	16.2	M10 x 1.0	4

Rod End Nut



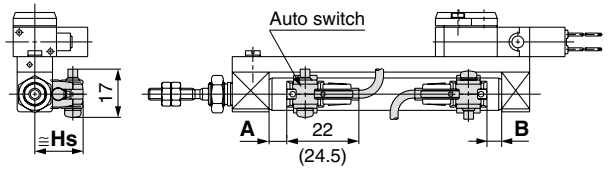
Material: Iron

Part no.	Applicable bore size	B	C	d	H
NTJ-010A	**10**	7	8.1	M4 x 0.7	3.2
NTJ-015A	**16**	8	9.2	M5 x 0.8	4

Auto Switch Proper Mounting Position (Detection at Stroke End) and Its Mounting Height

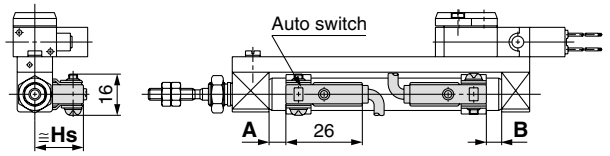
Reed auto switch
<Band mounting>

D-A9□

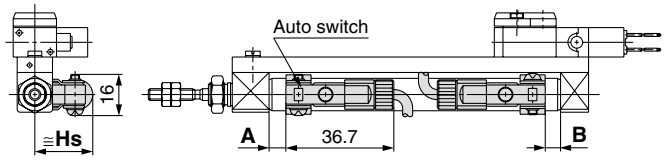


( ): For D-A93 type

D-C7□/C80

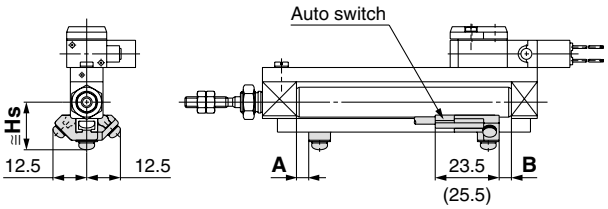


D-C73C□/C80C



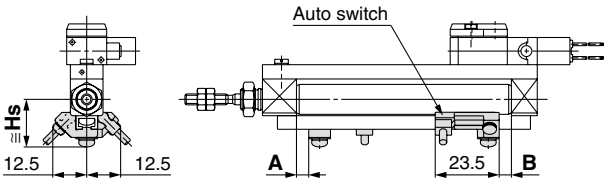
<Rail mounting>

D-A9□

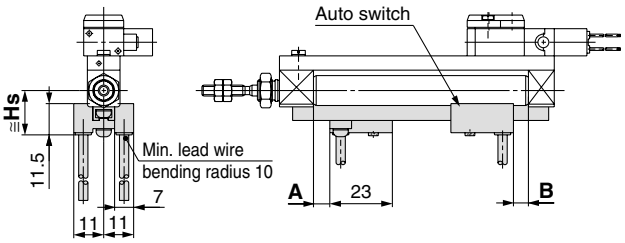


( ): For D-A93 type

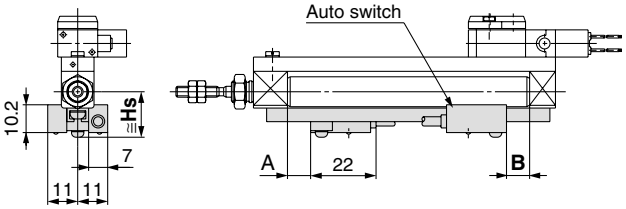
D-A9□V



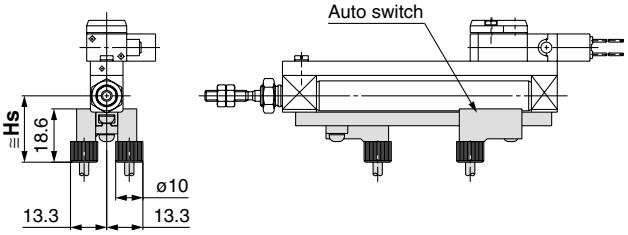
D-A7□/A80



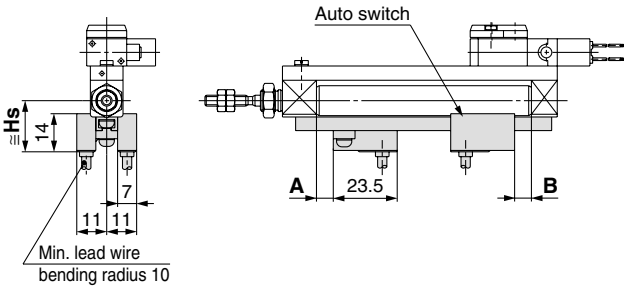
D-A7□H/A80H



D-A73C/A80C



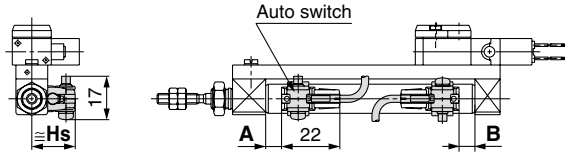
D-A79W



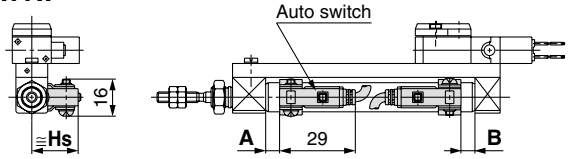
Auto Switch Proper Mounting Position (Detection at Stroke End) and Its Mounting Height

Solid state auto switch
<Band mounting>

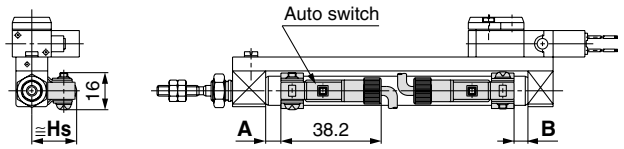
D-M9□
D-M9□W



D-H7□
D-H7□W
D-H7NF

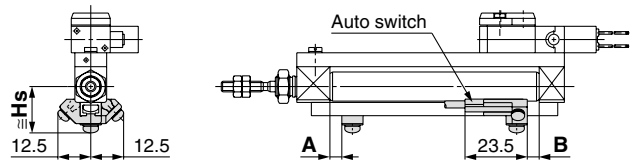


D-H7C

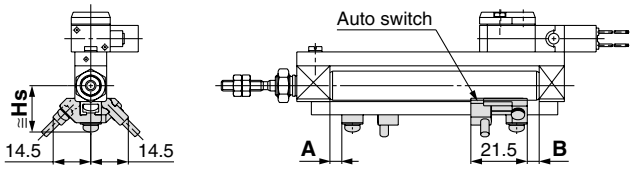


<Rail mounting>

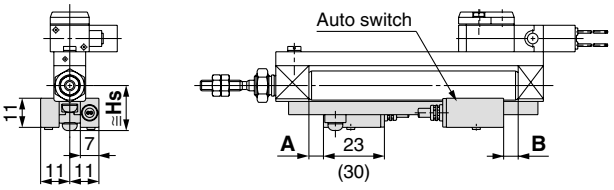
D-M9□
D-M9□W



D-M9□V
D-M9□WV

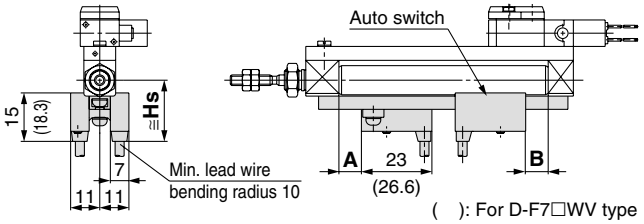


D-F7□/J79
D-F7□W/J79W
D-F79F



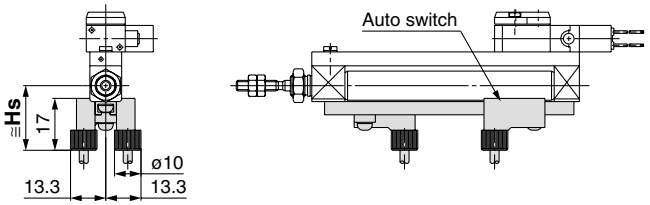
( ): For D-F7LF type

D-F7□V/F7□WV



( ): For D-F7□WV type

D-J79C



Auto Switch Proper Mounting Position

(mm)

Auto switch model / Bore size (mm)	Band mounting								Rail mounting											
	D-A9□		D-M9□ D-M9□W		D-C7□ D-C80 D-C73C D-C80C		D-H7□ D-H7C D-H7NF D-H7□W		D-A9□ D-A9□V		D-M9□ D-M9□V D-M9□W D-M9□WV		D-A7□ D-A80		D-A7□H/A80H D-A73C/A80C D-F7□/J79 D-F7□W/J79W D-F7□V/F7□WV D-F79F/J79C		D-F7NTL		D-A79W	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
10	2	2	6	6	2.5	2.5	1.5	1.5	0.5	0.5	4.5	4.5	3	3	3.5	3.5	8.5	8.5	0.5	0.5
16	2.5	2.5	6.5	6.5	3	3	2	2	1	1	4	4	3.5	3.5	4	4	9	9	1	1

Note) Adjust the auto switch after confirming the operating conditions in the actual setting.

Auto Switch Mounting Height

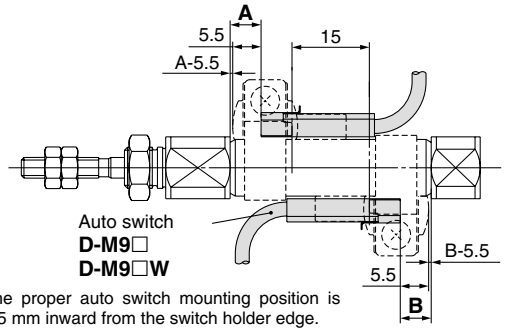
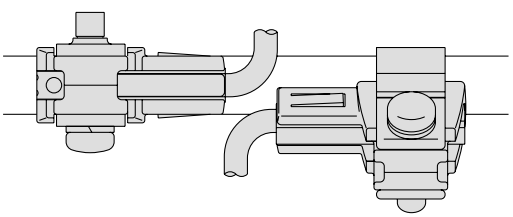
(mm)

Auto switch model / Bore size (mm)	Band mounting				Rail mounting						
	D-A9□ D-M9□ D-M9□W	D-C7□/C80 D-H7□/H7□W D-H7NF	D-C73C D-C80C	D-H7C	D-A9□/A9□V D-M9□/M9□V D-M9□W D-M9□WV	D-A7□ D-A80	D-A7□H/A80H D-F7□/J79 D-F7□W/J79W D-F79F	D-A73C D-A80C	D-F7□V D-F7□WV	D-J79C	D-A79W
	Hs	Hs	Hs	Hs	Hs	Hs	Hs	Hs	Hs	Hs	Hs
10	16.5	17	19.5	20	17.5	16.5	17.5	23.5	20	23	19
16	20	20.5	23	23.5	21	19.5	20.5	26.5	23	26	22

Minimum Auto Switch Mounting Stroke

(mm)

Auto switch mounting	Auto switch model	No. of auto switches mounted				
		1	2		n (n: No. of auto switches)	
			Different surfaces	Same surface	Different surfaces	Same surface
Band mounting	**D-A9□** **D-M9□** **D-M9□W**	10	15 (1)	45 (1)	$15 + 35\frac{(n-2)}{2}$ (n = 2, 4, 6···)	45 + 15 (n-2)
	D-C7□ **D-C80**	10	15	50	$15 + 40\frac{(n-2)}{2}$ (n = 2, 4, 6···)	50 + 20 (n-2)
	D-H7□ **D-H7□W** **D-H7NF**	10	15	60	$15 + 45\frac{(n-2)}{2}$ (n = 2, 4, 6···)	60 + 22.5 (n-2)
	D-C73C **D-C80C** **D-H7C**	10	15	65 (2)	$15 + 50\frac{(n-2)}{2}$ (n = 2, 4, 6···)	50 + 27.5 (n-2)
Rail mounting	**D-A9□**	5	—	10	—	10 + 15 (n-2) (n = 4, 6···)
	D-A9□V	5	—	10	—	5 + 10 (n-2) (n = 4, 6···)
	D-M9□	10	—	10	—	10 + 15 (n-2) (n = 4, 6···)
	D-M9□V	5	—	5	—	5 + 10 (n-2) (n = 4, 6···)
	D-M9□W	10	—	15	—	10 + 15 (n-2) (n = 4, 6···)
	D-M9□WV	10	—	15	—	5 + 10 (n-2) (n = 4, 6···)
	D-A7□ **D-A80** **D-A7□H** **D-A80H** **D-A73C** **D-A80C**	5	—	10	—	15 + 10 (n-2) (n = 4, 6···)
	D-A7□H **D-A80H**	5	—	10	—	15 + 15 (n-2) (n = 4, 6···)
	D-A79W	10	—	15	—	10 + 15 (n-2) (n = 4, 6···)
	D-F7□ **D-J79**	5	—	5	—	15 + 15 (n-2) (n = 4, 6···)
	D-F7□V **D-J79C**	5	—	5	—	10 + 10 (n-2) (n = 4, 6···)
	D-F7□W **D-J79W** **D-F79F** **D-F7NTL**	10	—	15	—	15 + 20 (n-2) (n = 4, 6···)
	D-F7□WV	10	—	15	—	10 + 15 (n-2) (n = 4, 6···)

Auto switch model	With 2 auto switches	
	Different surfaces	Same surface
	 The proper auto switch mounting position is 5.5 mm inward from the switch holder edge.	 The auto switch is mounted by slightly displacing it in a direction (cylinder tube circumferential exterior) so that the auto switch and lead wire do not interfere with each other.
D-A93	—	Less than 50 strokes
D-M9□ **D-M9□W**	Less than 20 strokes	Less than 55 strokes

Note 1) When two D-A93/M9□/M9□W auto switches are mounted
Note 2) For Series CDVJ5, note that 65 strokes cannot be manufactured.

Operating Range

(mm)

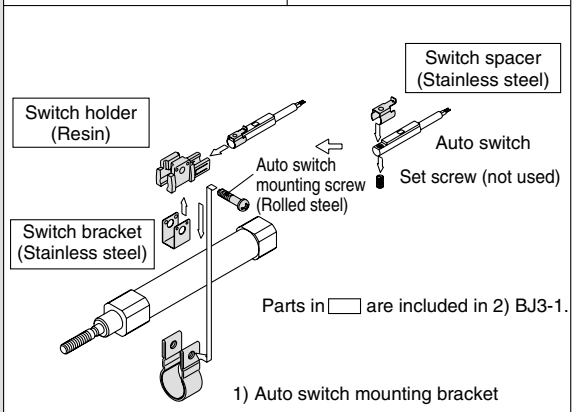
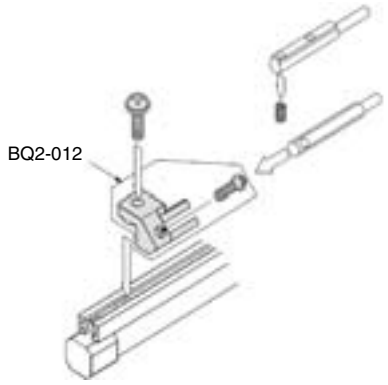
Auto switch model		Bore size (mm)	
		10	**16**
Band mounting	**D-A9□**	6	7
	D-M9□ **D-M9□W**	3	3.5
	D-C7□/C80/C73C/C80C	7	7
	D-H7□/H7□W/H7NF	4	4
	D-H7C	8	9

∗ Since the operating range is provided as a guideline including hysteresis, it cannot be guaranteed (assuming approximately ±30% dispersion). It may vary substantially depending on an ambient environment.

(mm)

Auto switch model		Bore size (mm)	
		10	**16**
Rail mounting	**D-A9□/A9□V**	6	6.5
	D-M9□/M9□V **D-M9□W/M9□WV**	3	3.5
	D-A7□/A80/A7H/A80H/A73C/A80C	8	9
	D-A79W	11	13
	D-F7□/J79/F7□W/J79W **D-F7□V/F7□WV/F79F/J79C** **D-F7NTL**	5	5

Auto Switch Mounting Bracket: Part No.

Auto switch mounting	Auto switch model	Bore size (mm)	
		ø10	**ø16**
Band mounting	**D-A9□** **D-M9□** **D-M9□W**	1) BJ2-010 2) BJ3-1 (1), (2)	1) BJ2-016 2) BJ3-1 (1), (2)
			
	D-C7□/C80 **D-C73C/C80C** **D-H7□/H7□W** **D-H7NF**	BJ2-010	BJ2-016
Rail mounting	**D-A9□** **D-A9□V** **D-M9□** **D-M9□V** **D-M9□W** **D-M9□WV**	BJ2-012 (3)	BJ2-012 (3)
			

Note 1) Two kinds of auto switch mounting brackets are used as a set.
Note 2) Only auto switch mounting brackets are assembled when cylinders are shipped.
Note 3) When a compact auto switch is mounted on ø10 or ø16 of the rail mounting type, the auto switch mounting brackets above are required. Order them separately from cylinders.
Example order: CDJ2B10-60-A ····· 1 unit
D-M9BWV ····· 2 pcs.
BQ2-012 ····· 2 pcs.

Besides the models listed in How to Order, the following auto switches are applicable. Refer to pages 1719 to 1827 for detailed specifications.

Auto switch type	Part no.	Electrical entry (Fetching direction)	Features
Reed	D-C73, C76	Grommet (In-let)	—
	D-C80		Without indicator light
Solid state	D-H7A1, H7A2, H7B		—
	D-H7NW, H7PW, H7BW		Diagnostic indication (2-color)

∗ For solid state auto switches, auto switches with a pre-wired connector are also available. Refer to pages 1784 and 1785 for details.
∗ Normally closed (NC = b contact) solid state auto switches (D-F9G/F9H types) are also available. Refer to page 1746 for details.

Valve Mounted Cylinder
Single Acting, Spring Return/Extend
Series CVJ3
ø10, ø16

How to Order

Stroke (mm)

ø10	15, 30, 45, 60
ø16	15, 30, 45, 60

Electrical entry

G	Grommet
L	L plug connector
M	M plug connector

Light/Surge voltage suppressor

Nil	Without light/surge voltage suppressor
S	With surge voltage suppressor
Z	With light/surge voltage suppressor
R	With surge voltage suppressor (No polarity)
U	With light/surge voltage suppressor (No polarity)

∗ Type "R", "U": DC only
∗ In the case of AC, since the rectifier prevents the production of surge voltage, there is no type "S".

Mounting style

B	Basic style
L	Axial foot style
F	Rod side flange style

Bore size

10	10 mm
16	16 mm

CVJ3 **L** **16** − **60** **S** − **5** **L** □ − □

With auto switch **CDVJ3** **L** **16** − **60** **S** − **5** **L** □ − **M9BW** □ − □

With auto switch
(Built-in magnet)

Action

S	Single acting, Spring return
T	Single acting, Spring extend

Solenoid valve voltage

DC specifications		AC specifications (50/60 Hz)	
5	24 VDC	**1**	100 VAC
6	12 VDC	**2**	200 VAC
V	6 VDC	**3**	110 VAC (115 VAC)
S	5 VDC	**4**	220 VAC (230 VAC)
R	3 VDC		

Auto switch
Magnet installed even without auto switch

Symbol	Auto switch mounting
A	Rail mounting style
B	Band mounting style

∗ For the applicable auto switch model, refer to the table below.

Number of auto switches

Nil	2 pcs.
S	1 pc.
n	"n" pcs.

Made to Order
Refer to page 1553 for details.

Built-in Magnet Cylinder Model

Suffix the symbol "-B" (Band mounting style) or "-A" (Rail mounting style) to the end of the w/ auto switch cylinder part number.

Example	Band mounting style	CDVJ3B10-45-B
	Rail mounting style	CDVJ3B16-60-A

Applicable Auto Switch/Refer to pages 1719 to 1827 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC	Load voltage AC	Auto switch model: Band mounting	Auto switch model: Rail mounting: Perpendicular	Auto switch model: Rail mounting: In-line	Lead wire length (m): 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	None (N)	Pre-wired connector	Applicable load	
Solid state switch	——	Grommet	Yes	3-wire (NPN)	5 V, 12 V	—	**M9N**	—	—	●	●	●	○	—	○	IC circuit	Relay, PLC
							—	**F7NV**	**F79**	●	—	●	○	—	○		
				3-wire (PNP)			**M9P**	—	—	●	●	●	○	—	○		
							—	**F7PV**	**F7P**	●	—	●	○	—	○		
				2-wire	12 V		**M9B**	—	—	●	●	●	○	—	○	—	
							—	**F7BV**	**J79**	●	—	●	○	—	○		
		Connector			24 V		**H7C**	**J79C**	—	●	—	●	●	●	—		
	Diagnostic indication (2-color indication)	Grommet		3-wire (NPN)	5 V, 12 V		**M9NW**	—	—	●	●	●	○	—	○	IC circuit	
							—	**F7NWV**	**F79W**	●	—	●	○	—	○		
				3-wire (PNP)			**M9PW**	—	—	●	●	●	○	—	○		
							—	—	**F7PW**	●	—	●	○	—	○		
				2-wire	12 V		**M9BW**	—	—	●	●	●	○	—	○	—	
							—	**F7BWV**	**J79W**	●	—	●	○	—	○		
	With diagnostic output (2-color indication)			4-wire (NPN)	5 V, 12 V		**H7NF**	—	**F79F**	●	—	●	○	—	○	IC circuit	
Reed switch	——	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	**A96**	—	**A76H**	●	—	●	—	—	—	IC circuit	—
				2-wire		—	200 V	—	**A72**	**A72H**	●	—	●	—	—	—		Relay, PLC
					24 V	12 V	100 V	—	**A73**	**A73H**	●	—	●	●	—	—	—	
								A93	—	—	●	—	●	—	—	—		
			No				100 V or less	**A90**	**A80**	**A80H**	●	—	●	—	—	—	IC circuit	
		Connector	Yes				—	**C73C**	**A73C**	—	●	—	●	●	●	—	—	
			No				24 V or less	**C80C**	**A80C**	—	●	—	●	●	●	—	IC circuit	
	Diagnostic indication (2-color indication)	Grommet	Yes		—	—	—	—	**A79W**	—	●	—	●	—	—	—	—	

∗ 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

∗ Since there are other applicable auto switches than listed, refer to page 1562 for details.
∗ For details about auto switches with pre-wired connector, refer to pages 1784 and 1785.
∗ D-A9□V□/M9□V□/M9□WV□/M9□A(V)L cannot be mounted on the band mounting type.

∗ Solid state auto switches marked with "○" are produced upon receipt of order.
∗ D-A9□/M9□/M9□W/A7□□/A80□/F7□□/J7□□ auto switches are shipped together (not assembled). (For D-A9□/M9□/M9□W, only auto switch mounting brackets are assembled before shipped.)
∗ D-C7□□/C80□/H7□□ auto switches are assembled at the time of shipment.
∗ Order auto switch mounting brackets separately when D-A9□(V)/M9□(V)/M9□W(V) are mounted on ø10 and ø16 of the rail mounting type. Refer to page 1562 for details.

An auto switch cylinder with the switch installed can also be manufactured.

Specifications

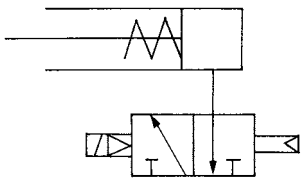
Bore size (mm)	ø10	ø16
Action	Single acting, Single rod, Spring return/Spring extend	
Fluid	Air	
Proof pressure	1.05 MPa	
Maximum operating pressure	0.7 MPa	
Minimum operating pressure	0.15 MPa	
Ambient and fluid temperature	–10 to 50°C (No freezing)	
Cushion	Rubber bumper	
Lubrication	Not required (Non-lube)	
Stroke length tolerance	$^{+1.0}_{0}$	
Port size	M5 x 0.8	
Mounting	Basic style, Axial foot style, Rod side flange style	
Piston speed	50 to 750 mm/s	50 to 350 mm/s
Allowable kinetic energy	0.035 J	0.090 J

Solenoid Valve Specifications

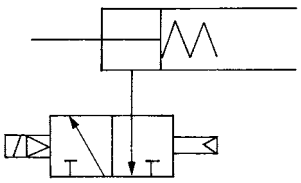
Applicable solenoid valve model			SYJ3190
Electrical entry			Grommet (G)/(H), L plug connector (L), M plug connector (M)
Coil rated voltage (V)	**DC**		24, 12, 6, 5, 3
	AC 50/60 Hz		100, 110, 200, 220
Effective area of valve (Cv factor)			1.8 mm² (0.1)
Allowable voltage			±10% of the rated voltage*
Power consumption (W)	**DC**	**Standard**	0.35 (With indicator light: 0.4)
Apparent power (VA)*	**AC**	**100 V**	0.78 (With indicator light: 0.81)
		110 V [115 V]	0.86 (With indicator light: 0.89) [0.94 (With indicator light: 0.97)]
		200 V	1.18 (With indicator light: 1.22)
		220 V [230 V]	1.30 (With indicator light: 1.34) [1.42 (With indicator light: 1.46)]
Surge voltage suppressor			Diode (Varistor for the non-polar type)
Indicator light			LED

* 110 VAC and 115 VAC types and 220 VAC and 230 VAC types are common respectively.
* For 115 VAC and 230 VAC, allowable voltage fluctuation is –15 to +5 % of the rated voltage.
* For S and Z, the voltage will drop due to the internal circuit. Allowable voltage fluctuation must be in the range below.
Types S, Z 24 VDC: –7 to 10 %, 12 VDC: –4 to 10 %

JIS Symbol
Single acting,
Spring return



Single acting,
Spring extend



Made to Order Specifications (For details, refer to page 1836.)

Symbol	Specifications
-XA□	Change of rod end shape

Standard Stroke

(mm)

Bore size (mm)	Standard stroke
10	15, 30, 45, 60
16	15, 30, 45, 60

Spring Back Force

(N)

Bore size (mm)	Retracted side	Extended side
10	6.9	3.5
16	14.2	6.9

Mounting Style and Accessory/For details, refer to page 1547.

Mounting		Basic style	Axial foot style	Rod side flange style
Standard equipment	Mounting nut	●	●	●
	Rod end nut	●	●	●
Option	Single knuckle joint	●	●	●
	Double knuckle joint (With pin)*	●	●	●

* Knuckle pin and retaining ring are shipped together.

Accessory

Accessories of Series CVJ3 are the same specifications as those of series CVJ5. Refer to page 1547.

Mounting Bracket Part No.

Mounting bracket	Bore size (mm)	
	10	**16**
Foot	CJ-L010B	CJ-L016B
Flange	CJ-F010B	CJ-F016B

Mass

Spring Return

(g)

Bore size (mm)		**10**	**16**
Basic mass*	15 stroke	80	121
	30 stroke	88	140
	45 stroke	98	164
	60 stroke	110	189
Mounting bracket mass	Axial foot style	7	19
	Rod side flange style	5	13

* Mounting nut and rod end nut are included in the basic mass.
Calculation: (Example) **CVJ3L10-45S**
• Basic mass ····· 98 (g) (ø10-45 stroke)
• Mounting bracket mass ····· 7 (g) (Axial foot style)
98 + 7 = 105 g

Spring Extend

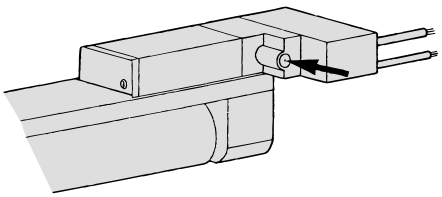
(g)

Bore size (mm)		**10**	**16**
Basic mass*	15 Stroke	76	116
	30 Stroke	83	134
	45 Stroke	94	156
	60 Stroke	104	180
Mounting bracket mass	Axial foot style	7	19
	Rod side flange style	5	13

* Mounting nut and rod end nut are included in the basic mass.
Calculation: (Example) **CVJ3L10-45T**
• Basic mass ····· 94 (g) (ø10-45 stroke)
• Mounting bracket mass ····· 7 (g) (Axial foot style)
94 + 7 = 101 g

Manual Operation

Manual operation is possible by pushing the manual button indicated with the arrow.



⚠ Specific Product Precautions

Be sure to read before handling. Refer to front matters 42 and 43 for Safety Instructions, pages 3 to 11 for Actuator and Auto Switch Precautions and 3/4/5 Port Solenoid Valve Precautions in Best Pneumatics No. 1.

Handling Precautions

⚠Caution

1. During installation, secure the rod cover and tighten the mounting nut or the rod cover body by applying an appropriate tightening force.

If the head cover is secured or the head cover is tightened, the cover may rotate, leading to the deviation.

2. Tighten the mounting screws with an appropriate tightening torque within the range given below.

ø6: 2.1 to 2.5 N·m, ø10: 5.9 to 6.4 N·m
ø16: 10.8 to 11.8 N·m

3. Do not operate the single acting cylinder in such a way that a load would be applied when retracting the piston rod of the spring return style or extending the piston rod of the spring extend style.

The spring that is built into the cylinder provides only enough force to retract the piston rod. If a load is applied, the piston rod will not be able to retract to the stroke end.

4. For the single acting cylinder, a breather hole is provided in the cover surface. Do not block this hole during installation.

This may cause malfunction.

5. To remove and install the retaining ring for the knuckle pin or the clevis pin, use an appropriate pair of pliers (tool for installing a type C retaining ring).

In particular, use a pair of ultra-mini pliers for removing and installing the retaining rings on the ø10 cylinder.

6. For the auto switch mounting rail, do not remove the pre-equipped rail.

Since the mounting thread is drilled through inside the cylinder, it may cause air leakage.

⚠Warning

1. Confirm the specifications.

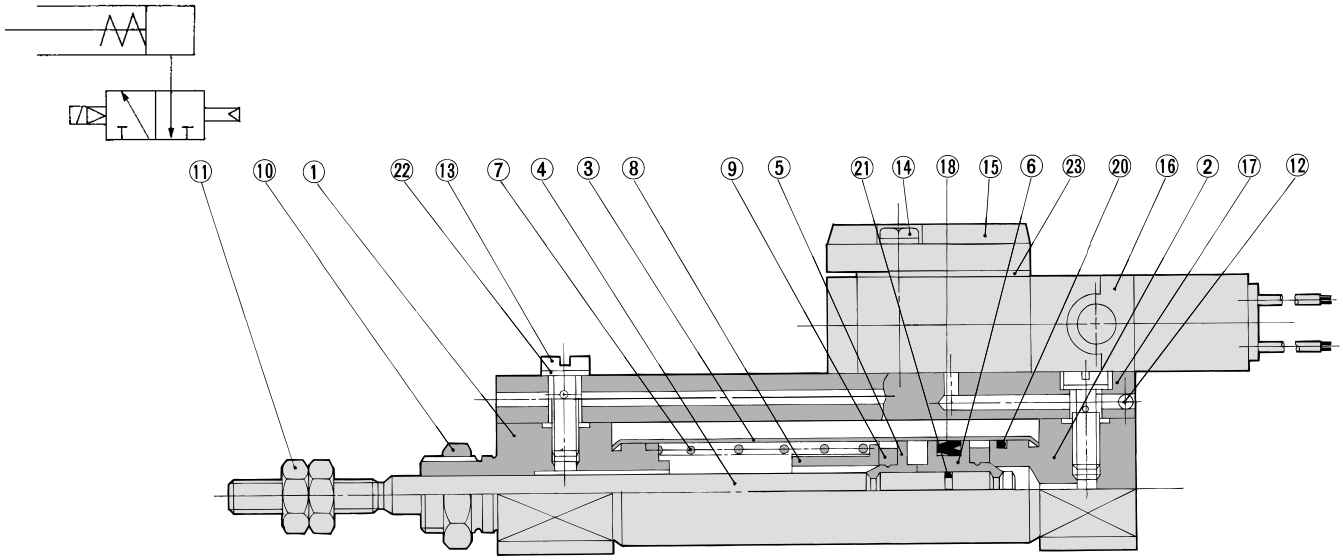
Products in this catalog are designed to be used for compressed air systems. If not operated within the designated pressure or temperature, it may damage the products or cause malfunction. (Refer to specifications.)

2. Energizing continuously for a long period of time

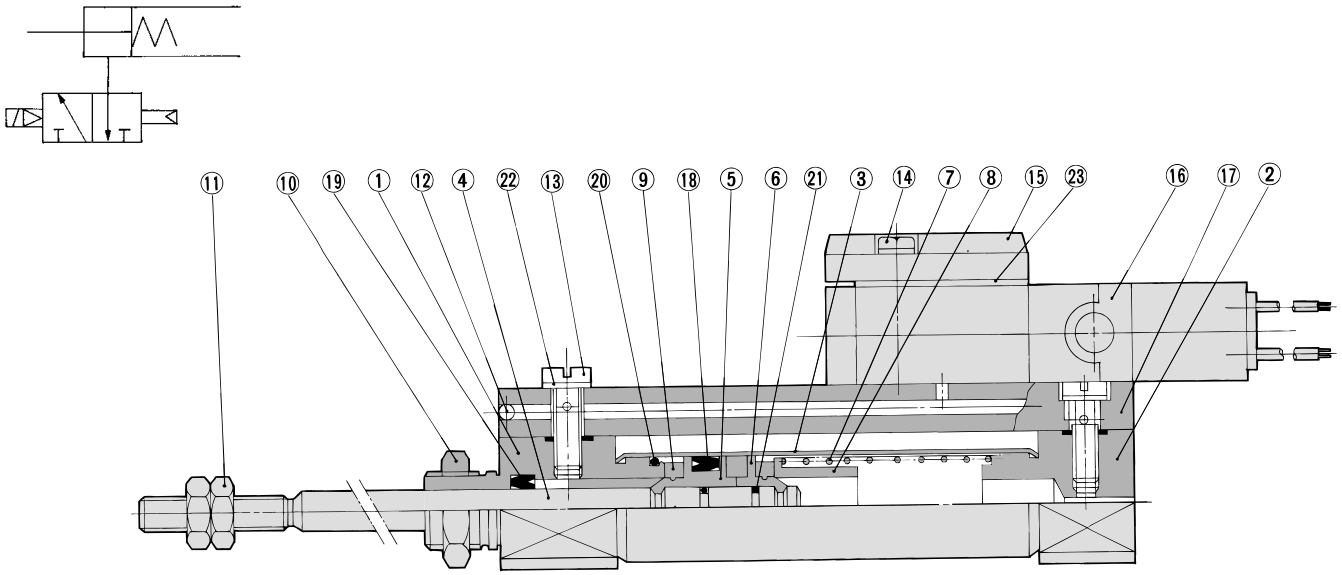
When the valve is continuously energized for a long period of time, the performance may deteriorate, shorten the service life or effect peripheral equipment adversely since temperature rises when coils generate heat.

Construction/Component Parts

Single acting, Spring return



Single acting, Spring extend



Component Parts

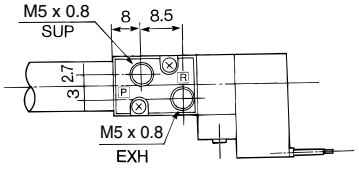
No.	Description	Material	Note
1	**Rod cover**	Aluminum alloy	Clear anodized
2	**Head cover**	Aluminum alloy	Clear anodized
3	**Cylinder tube**	Stainless steel	
4	**Piston rod**	Stainless steel	
5	**Piston A**	Brass	
6	**Piston B**	Brass	
7	**Return spring**	Piano wire	
8	**Spring seat**	Brass	
9	**Bumper**	Urethane	
10	**Mounting nut**	Brass	Nickel plated
11	**Rod end nut**	Rolled steel	Nickel plated
12	**Steel ball**	Carbon steel	

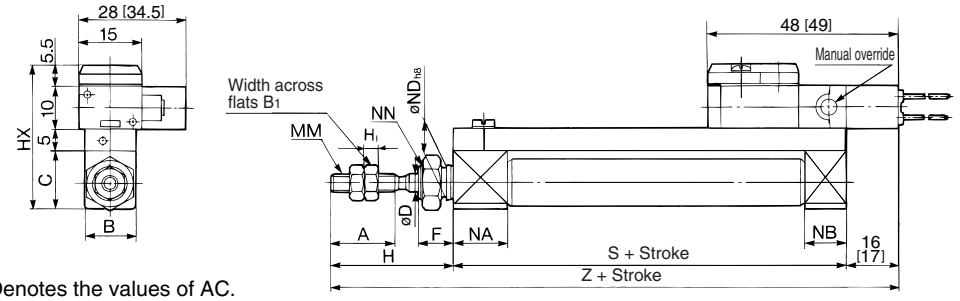
No.	Description	Material	Note
13	**Stud**	Brass	Electroless nickel plated
14	**Phillips screw**	Rolled steel	Nickel plated
15	**Plate**	Zinc alloy	
16	**Solenoid valve**	—	Refer to “How to Order” below.*
17	**Pipe**	Aluminum alloy	Clear anodized
18	**Piston seal**	NBR	
19	**Rod seal**	NBR	
20	**Tube gasket**	NBR	
21	**Piston gasket**	NBR	
22	**Gasket**	Resin	
23	**Plate gasket**	NBR	

* How to Order solenoid valves
SYJ319- Voltage Electrical entry

Single Acting, Spring Return/Basic Style (B)

CVJ3B Bore size – Stroke S





Rod End Nut

Bore size (mm)	B1	H1
10	7	3.2
16	8	4

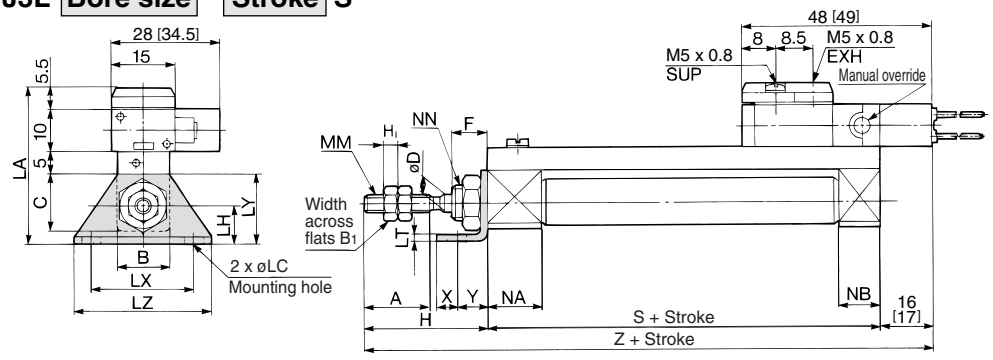
∗ [ ]: Denotes the values of AC.

(mm)

Bore size	A	B	C	D	F	H	HX	MM	NA	NB	ND	NN	5 to 15 st		16 to 30 st		31 to 45 st		46 to 60 st	
													S	Z	S	Z	S	Z	S	Z
10	15	12	14	4	8	28	34.5	M4 x 0.7	12.5	9.5	8 $^{0}_{-0.022}$	M8 x 1	52.5	96.5 [97.5]	60	104 [105]	72	116 [117]	84	128 [129]
16	15	18	20	5	8	28	40.5	M5 x 0.8	12.5	9.5	10 $^{0}_{-0.022}$	M10 x 1	52.5	96.5 [97.5]	61	105 [106]	73	117 [118]	85	129 [130]

Single Acting, Spring Return/Axial Foot Style (L)

CVJ3L Bore size – Stroke S



Rod End Nut

Bore size (mm)	B1	H1
10	7	3.2
16	8	4

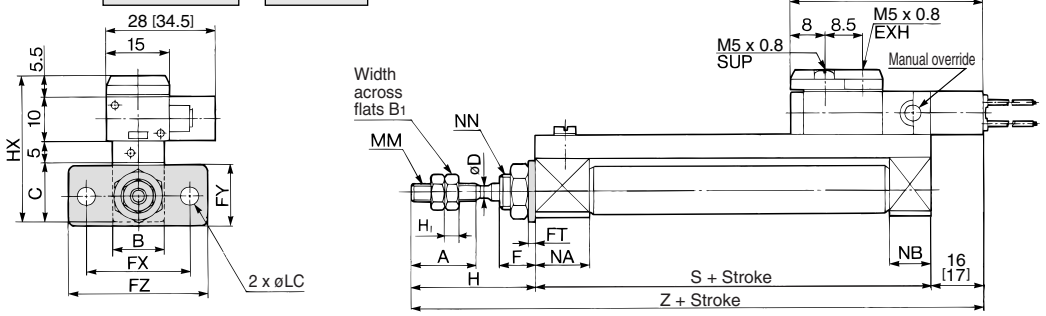
∗ [ ]: Denotes the values of AC.

(mm)

Bore size	A	B	C	D	F	H	LA	LB	LC	LH	LT	LX	LY	LZ	MM	NA	NB	NN	X	Y	5 to 15 st		16 to 30 st		31 to 45 st		46 to 60 st	
																					S	Z	S	Z	S	Z	S	Z
10	15	12	14	4	8	28	37.5	15	4.5	9	1.6	24	16.5	32	M4 x 0.7	12.5	9.5	M8 x 1	5	7	52.5	96.5 [97.5]	60	104 [105]	72	116 [117]	84	128 [129]
16	15	18	20	5	8	28	45.5	23	5.5	14	2.3	33	25	42	M5 x 0.8	12.5	9.5	M10 x 1	6	9	52.5	96.5 [97.5]	61	105 [106]	73	117 [118]	85	129 [130]

Single Acting, Spring Return/Rod Side Flange Style (F)

CVJ3F Bore size – Stroke S



Rod End Nut

Bore size (mm)	B1	H1
10	7	3.2
16	8	4

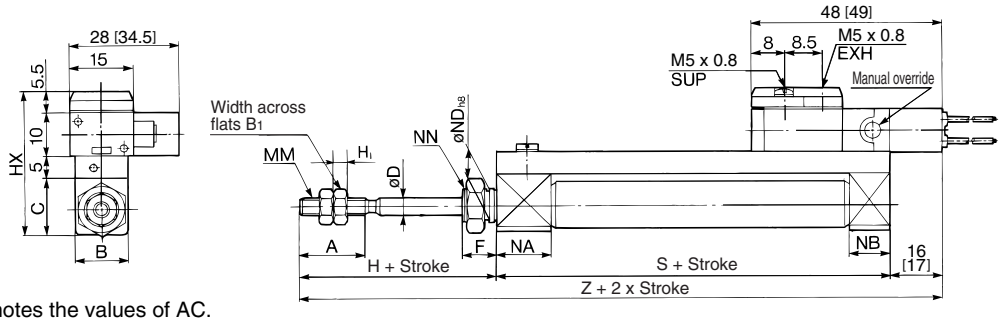
∗ [ ]: Denotes the values of AC.

(mm)

Bore size	A	B	C	D	F	FC	FT	FX	FY	FZ	H	HX	MM	NA	NB	NN	5 to 15 st		16 to 30 st		31 to 45 st		46 to 60 st	
																	S	Z	S	Z	S	Z	S	Z
10	15	12	14	4	8	4.5	1.6	24	14	32	28	34.5	M4 x 0.7	12.5	9.5	M8 x 1	52.5	96.5 [97.5]	60	104 [105]	72	116 [117]	84	128 [129]
16	15	18	20	5	8	5.5	2.3	33	20	42	28	40.5	M5 x 0.8	12.5	9.5	M10 x 1	52.5	96.5 [97.5]	61	105 [106]	73	117 [118]	85	129 [130]

Single Acting, Spring Extend/Basic Style (B)

CVJ3B Bore size – Stroke T



Rod End Nut

Bore size (mm)	B1	H1
10	7	3.2
16	8	4

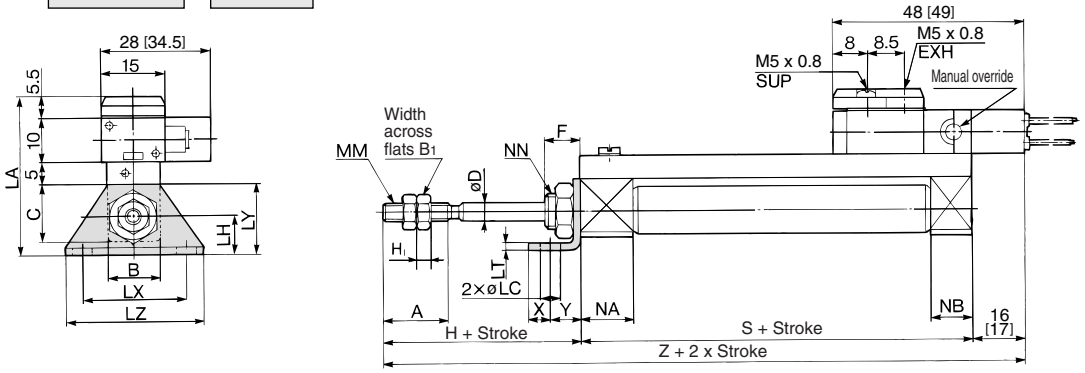
∗ [ ]: Denotes the values of AC.

(mm)

Bore size	A	B	C	D	F	H	HX	MM	NA	NB	ND	NN	5 to 15 st		16 to 30 st		31 to 45 st		46 to 60 st	
													S	Z	S	Z	S	Z	S	Z
10	15	12	14	4	8	28	34.5	M4 x 0.7	12.5	9.5	$8^{0}_{-0.022}$	M8 x 1	52.5	96.5 [97.5]	60	104 [105]	72	116 [117]	84	128 [129]
16	15	18	20	5	8	28	40.5	M5 x 0.8	12.5	9.5	$10^{0}_{-0.022}$	M10 x 1	52.5	96.5 [97.5]	61	105 [106]	73	117 [118]	85	129 [130]

Single Acting, Spring Extend/Axial Foot Style (L)

CVJ3L Bore size – Stroke T



Rod End Nut

Bore size (mm)	B1	H1
10	7	3.2
16	8	4

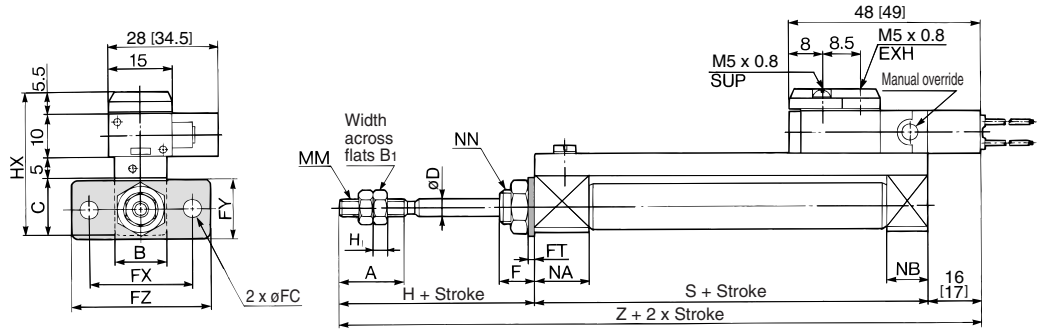
∗ [ ]: Denotes the values of AC.

(mm)

Bore size	A	B	C	D	F	H	LA	LB	LC	LH	LT	LX	LY	LZ	MM	NA	NB	NN	X	Y	5 to 15 st		16 to 30 st		31 to 45 st		46 to 60 st	
																					S	Z	S	Z	S	Z	S	Z
10	15	12	14	4	8	28	37.5	15	4.5	9	1.6	24	16.5	32	M4 x 0.7	12.5	9.5	M8 x 1	5	7	52.5	96.5 [97.5]	60	104 [105]	72	116 [117]	84	128 [129]
16	15	18	20	5	8	28	45.5	23	5.5	14	2.3	33	25	42	M5 x 0.8	12.5	9.5	M10 x 1	6	9	52.5	96.5 [97.5]	61	105 [106]	73	117 [118]	85	129 [130]

Single Acting, Spring Extend/Rod Side Flange Style (F)

CVJ3F Bore size – Stroke T



Rod End Nut

Bore size (mm)	B1	H1
10	7	3.2
16	8	4

∗ [ ]: Denotes the values of AC.

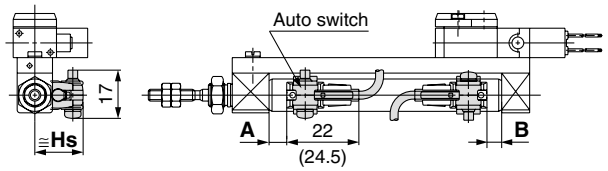
(mm)

Bore size	A	B	C	D	F	FC	FT	FX	FY	FZ	H	HX	MM	NA	NB	NN	5 to 15 st		16 to 30 st		31 to 45 st		46 to 60 st	
																	S	Z	S	Z	S	Z	S	Z
10	15	12	14	4	8	4.5	1.6	24	14	32	28	34.5	M4 x 0.7	12.5	9.5	M8 x 1	52.5	96.5 [97.5]	60	104 [105]	72	116 [117]	84	128 [129]
16	15	18	20	5	8	5.5	2.3	33	20	42	28	40.5	M5 x 0.8	12.5	9.5	M10 x 1	52.5	96.5 [97.5]	61	105 [106]	73	117 [118]	85	129 [130]

Auto Switch Proper Mounting Position (Detection at Stroke End) and Its Mounting Height

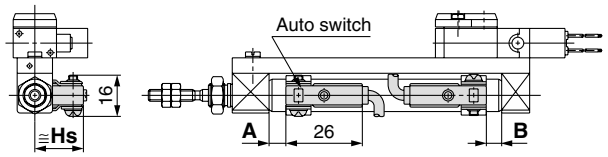
Reed auto switch
<Band mounting>

D-A9□

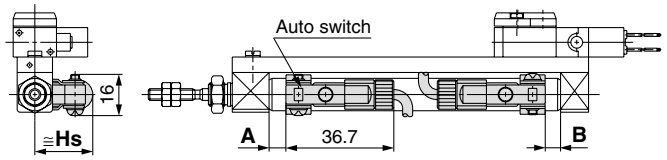


( ): For D-A93 type

D-C7□/C80

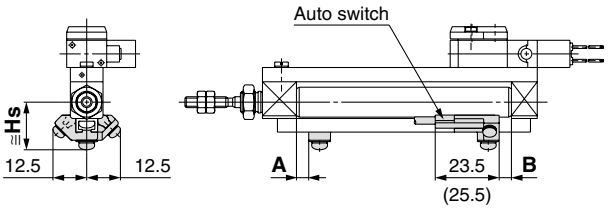


D-C73C□/C80C



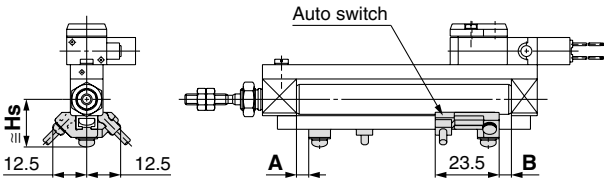
<Rail mounting>

D-A9□

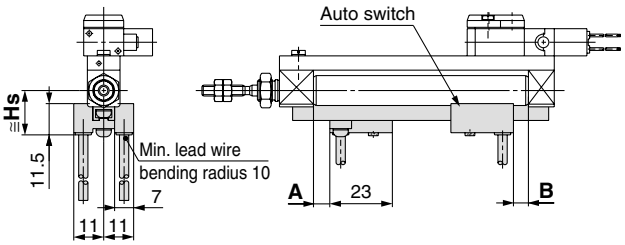


( ): For D-A93 type

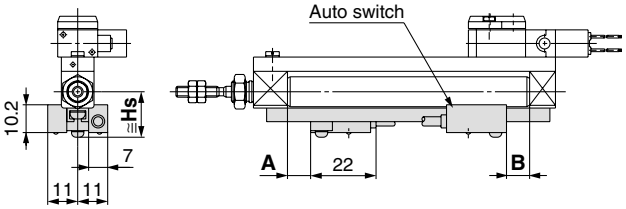
D-A9□V



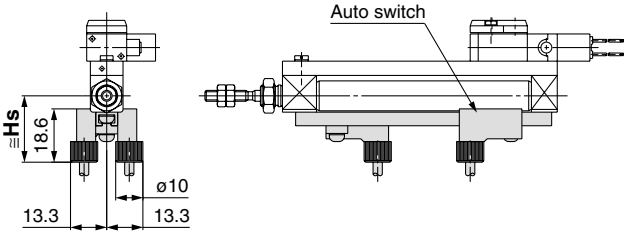
D-A7□/A80



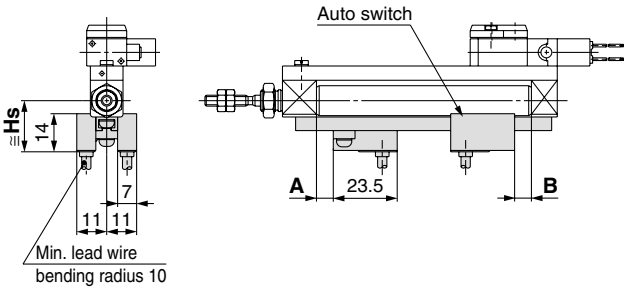
D-A7□H/A80H



D-A73C/A80C



D-A79W

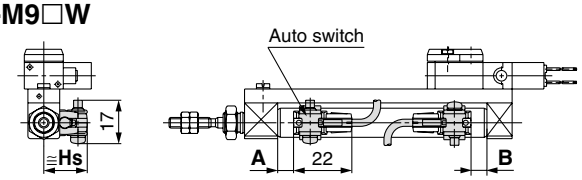


Auto Switch Proper Mounting Position (Detection at Stroke End) and Its Mounting Height

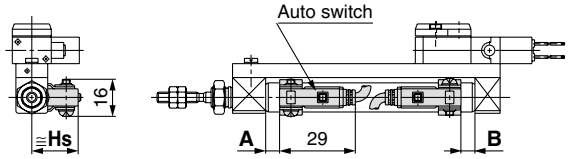
Solid state auto switch

<Band mounting>

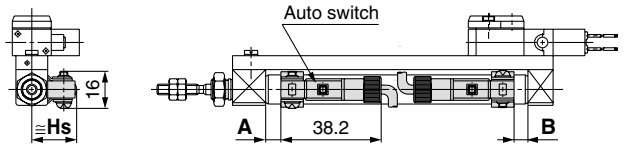
D-M9□
D-M9□W



D-H7□
D-H7□W

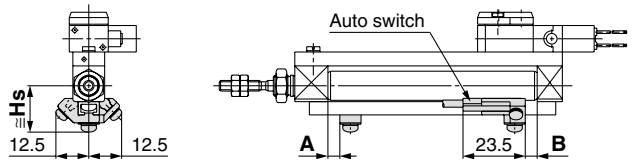


D-H7C

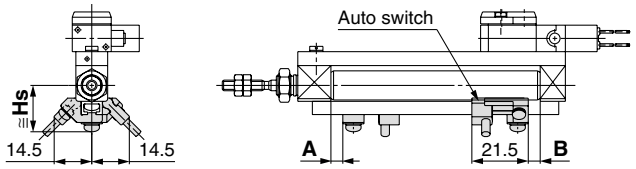


<Rail mounting>

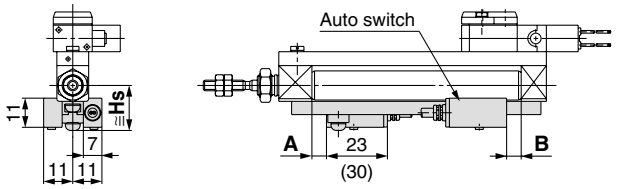
D-M9□
D-M9□W



D-M9□V
D-M9□WV

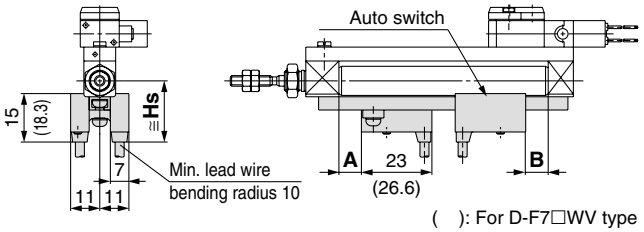


D-F7□/J79
D-F7□W/J79W
D-F79F



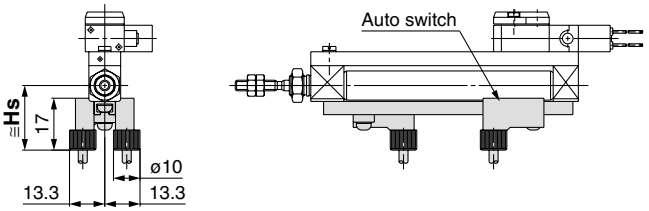
( ): For D-F7LF type

D-F7□V/F7□WV



( ): For D-F7□WV type

D-J79C



Auto Switch Proper Mounting Position (Detection at Stroke End) and Its Mounting Height: Single Acting, Spring Return (S) / Spring Extend (T)

Auto Switch Proper Mounting Position / Spring Return (S)

(mm)

Auto switch model		Bore size (mm)	Dimension **A**				**B**
			10 to 15 st	16 to 30 st	31 to 45 st	46 to 60 st	
Band mounting	**D-A9□**	10	8.5	16	28	40	2
		16	8	16.5	28.5	40.5	2.5
	D-M9□ **D-M9□W**	10	12.5	20	32	44	6
		16	12	20.5	32.5	44.5	6.5
	D-C7□/C80 **D-C73C/C80C**	10	9	16.5	28.5	40.5	2.5
		16	8.5	17	29	41	3
	D-H7□/H7C **D-H7□W** **D-H7NF**	10	8	15.5	27.5	39.5	1.5
		16	7.5	16	28	40	2
Rail mounting	**D-A9□** **D-A9□V**	10	7	14.5	26.5	38.5	0.5
		16	6.5	15	27	39	1
	D-M9□/M9□V **D-M9□W/M9□WV**	10	11	18.5	30.5	42.5	4.5
		16	10.5	19	31	43	5
	D-A7□ **D-A80**	10	9.5	17	29	41	3
		16	9	17.5	29.5	41.5	3.5
	D-A7□H/A80H **D-A73C/A80C** **D-F7□/J79** **D-F7□W/J79W** **D-F7□V/F7□WV** **D-F79F/J79C**	10	10	17.5	29.5	41.5	3.5
		16	9.5	18	30	42	4
	D-F7NTL	10	15	22.5	34.5	46.5	8.5
		16	14.5	23	35	47	9
	D-A79W	10	7	14.5	26.5	38.5	0.5
		16	6.5	15	27	39	1

Note) Adjust the auto switch after confirming the operating conditions in the actual setting.

Auto Switch Proper Mounting Position / Spring Extend (T)

(mm)

Auto switch model		Bore size (mm)	**A**	Dimension **B**			
				10 to 15 st	16 to 30 st	31 to 45 st	46 to 60 st
Band mounting	**D-A9□**	10	2	8.5	16	28	40
		16	2.5	8	16.5	28.5	40.5
	D-M9□ **D-M9□W**	10	6	12.5	20	32	44
		16	6.5	12	20.5	32.5	44.5
	D-C7□/C80 **D-C73C/C80C**	10	2.5	9	16.5	28.5	40.5
		16	3	8.5	17	29	41
	D-H7□/H7C **D-H7□W** **D-H7NF**	10	1.5	8	15.5	27.5	39.5
		16	2	7.5	16	28	40
Rail mounting	**D-A9□** **D-A9□V**	10	0.5	7	14.5	16.5	38.5
		16	1	6.5	15	27	39
	D-M9□/M9□V **D-M9□W/M9□WV**	10	4.5	11	18.5	30.5	42.5
		16	5	10.5	19	31	43
	D-A7□ **D-A80**	10	3	9.5	17	29	41
		16	3.5	9	17.5	29.5	41.5
	D-A7□H/A80H **D-A73C/A80C** **D-F7□/J79** **D-F7□W/J79W** **D-F7□V/F7□WV** **D-F79F/J79C**	10	3.5	10	17.5	29.5	41.5
		16	4	9.5	18	30	42
	D-F7NTL	10	8.5	15	22.5	34.5	46.5
		16	9	14.5	23	35	47
	D-A79W	10	0.5	7	14.5	26.5	38.5
		16	1	6.5	15	27	39

Note) Adjust the auto switch after confirming the operating conditions in the actual setting.

Auto Switch Mounting Height

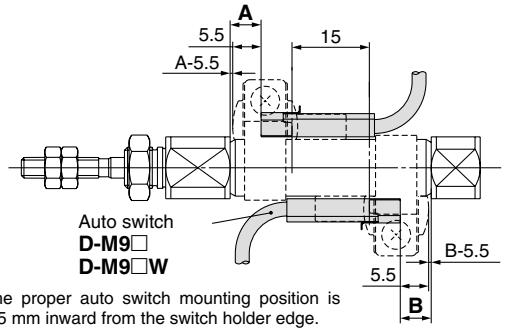
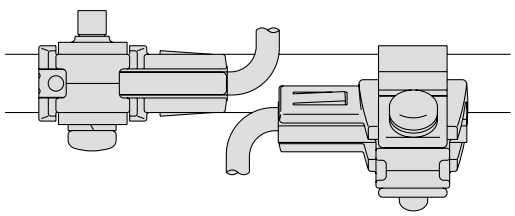
(mm)

Auto switch model / Bore size (mm)	Band mounting				Rail mounting						
	D-A9□ **D-M9□** **D-M9□W**	**D-C7□/C80** **D-H7□** **D-H7□W** **D-H7NF**	**D-C73C** **D-C80C**	**D-H7C**	**D-A9□/A9□V** **D-M9□** **D-M9□V** **D-M9□W** **D-M9□WV**	**D-A7□** **D-A80**	**D-A7□H/A80H** **D-F7□/J79** **D-F7□W/J79W** **D-F79F** **D-F7NTL**	**D-A73C** **D-A80C**	**D-F7□V** **D-F7□WV**	**D-J79C**	**D-A79W**
	Hs	**Hs**	**Hs**	**Hs**	**Hs**	**Hs**	**Hs**	**Hs**	**Hs**	**Hs**	Hs
10	16.5	17	19.5	20	17.5	16.5	17.5	23.5	20	23	19
16	20	20.5	23	23.5	21	19.5	20.5	26.5	23	26	22

Minimum Auto Switch Mounting Stroke

(mm)

Auto switch mounting	Auto switch model	No. of auto switches mounted				
		1	2		n (n: No. of auto switches)	
			Different surfaces	Same surface	Different surfaces	Same surface
Band mounting	**D-A9□** **D-M9□** **D-M9□W**	10	15 (1)	45 (1)	$15 + 35\frac{(n-2)}{2}$ (n = 2, 4, 6···)	45 + 15 (n-2)
	D-C7□ **D-C80**	10	15	50	$15 + 40\frac{(n-2)}{2}$ (n = 2, 4, 6···)	50 + 20 (n-2)
	D-H7□ **D-H7□W** **D-H7NF**	10	15	60	$15 + 45\frac{(n-2)}{2}$ (n = 2, 4, 6···)	60 + 22.5 (n-2)
	D-C73C **D-C80C** **D-H7C**	10	15	65 (2)	$15 + 50\frac{(n-2)}{2}$ (n = 2, 4, 6···)	50 + 27.5 (n-2)
Rail mounting	**D-A9□**	5	—	10	—	10 + 15 (n-2) (n = 4, 6···)
	D-A9□V	5	—	10	—	5 + 10 (n-2) (n = 4, 6···)
	D-M9□	10	—	10	—	10 + 15 (n-2) (n = 4, 6···)
	D-M9□V	5	—	5	—	5 + 10 (n-2) (n = 4, 6···)
	D-M9□W	10	—	15	—	10 + 15 (n-2) (n = 4, 6···)
	D-M9□WV	10	—	15	—	5 + 10 (n-2) (n = 4, 6···)
	D-A7□ **D-A80** **D-A7□H** **D-A80H** **D-A73C** **D-A80C**	5	—	10	—	15 + 10 (n-2) (n = 4, 6···)
	D-A7□H **D-A80H**	5	—	10	—	15 + 15 (n-2) (n = 4, 6···)
	D-A79W	10	—	15	—	10 + 15 (n-2) (n = 4, 6···)
	D-F7□ **D-J79**	5	—	5	—	15 + 15 (n-2) (n = 4, 6···)
	D-F7□V **D-J79C**	5	—	5	—	10 + 10 (n-2) (n = 4, 6···)
	D-F7□W **D-J79W** **D-F79F** **D-F7NTL**	10	—	15	—	15 + 20 (n-2) (n = 4, 6···)
	D-F7□WV	10	—	15	—	10 + 15 (n-2) (n = 4, 6···)

Auto switch model	With 2 auto switches	
	Different surfaces	Same surface
	 The proper auto switch mounting position is 5.5 mm inward from the switch holder edge.	 The auto switch is mounted by slightly displacing it in a direction (cylinder tube circumferential exterior) so that the auto switch and lead wire do not interfere with each other.
D-A93	—	Less than 50 strokes
D-M9□ **D-M9□W**	Less than 20 strokes	Less than 55 strokes

Note 1) When two D-A93/M9□/M9□W auto switches are mounted
Note 2) For Series CDVJ3, note that 65 strokes cannot be manufactured.

Operating Range

(mm)

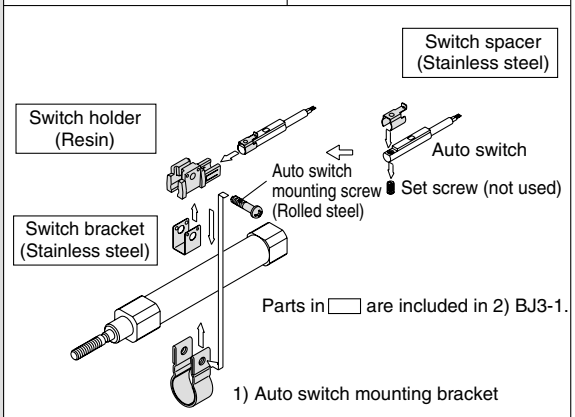
	Auto switch model	Bore size (mm) 10	16
Band mounting	D-A9□	6	7
	D-M9□ D-M9□W	3	3.5
	D-C7□/C80/C73C/C80C	7	7
	D-H7□/H7□W/H7NF	4	4
	D-H7C	8	9

∗ Since the operating range is provided as a guideline including hysteresis, it cannot be guaranteed (assuming approximately ±30% dispersion). It may vary substantially depending on an ambient environment.

(mm)

	Auto switch model	Bore size (mm) 10	16
Rail mounting	D-A9□/A9□V	6	6.5
	D-M9□/M9□V D-M9□W/M9□WV	3	3.5
	D-A7□/A80/A7H/A80H/A73C/A80C	8	9
	D-A79W	11	13
	D-F7□/J79/F7□W/J79W D-F7□V/F7□WV/F79F/J79C D-F7NTL	5	5

Auto Switch Mounting Bracket: Part No.

Auto switch mounting	Auto switch model	Bore size (mm) ø10	ø16
Band mounting	D-A9□ D-M9□ D-M9□W	1) BJ2-010 2) BJ3-1 (1), (2)	1) BJ2-016 2) BJ3-1 (1), (2)
			
	D-C7□/C80 D-C73C/C80C D-H7□/H7□W D-H7NF	BJ2-010	BJ2-016
Rail mounting	D-A9□ D-A9□V D-M9□ D-M9□V D-M9□W D-M9□WV	BJ2-012 (3)	BJ2-012 (3)
			

Note 1) Two kinds of auto switch mounting brackets are used as a set.
Note 2) Only auto switches are assembled when cylinders are shipped.
Note 3) When a compact auto switch is mounted on ø10 or ø16 of the rail mounting type, the auto switch mounting brackets above are required. Order them separately from cylinders.
Example order: CDJ2B10-60-A ····· 1 unit
D-M9BWV ····· 2 pcs.
BQ2-012 ····· 2 pcs.

Besides the models listed in How to Order, the following auto switches are applicable. Refer to pages 1719 to 1827 for detailed specifications.

Auto switch type	Part no.	Electrical entry (Fetching direction)	Features
Reed	D-C73, C76	Grommet (In-let)	—
	D-C80		Without indicator light
Solid state	D-H7A1, H7A2, H7B		—
	D-H7NW, H7PW, H7BW		Diagnostic indication (2-color)

∗ For solid state auto switches, auto switches with a pre-wired connector are also available. Refer to pages 1784 and 1785 for details.
∗ Normally closed (NC = b contact) solid state auto switches (D-F9G/F9H types) are also available. Refer to page 1746 for details.

Valve Mounted Cylinder
Double Acting, Single Rod
Series CVM5
ø20, ø25, ø32, ø40

How to Order

Bore size

20	20 mm
25	25 mm
32	32 mm
40	40 mm

Mounting style

B	Basic style
L	Axial foot style
F	Rod side flange style
G	Head side flange style
C	Single clevis style
D	Double clevis style
T	Head side trunnion style
U	Rod side trunnion style

Solenoid valve voltage

Standard		Option	
1	100 VAC (50/60 Hz)	3	110 VAC (50/60 Hz)
2	200 VAC (50/60 Hz)	4	220 VAC (50/60 Hz)
5	24 VDC	6	12 VDC
		9	Other

Solenoid valve

1	2 position single
2	2 position double
3	3 position closed center (Option)
4	3 position exhaust center (Option)

Electrical entry

G	Grommet
L	L plug connector
M	M plug connector
D	DIN terminal

Light/Surge voltage suppressor

Nil	None
S	With surge voltage suppressor
Z	With light/surge voltage suppressor (Except Type G)

Made to Order
Refer to page 1564 for details.

CVM5 L 32 □ □ – 100 □ □ – 1 1 M Z – □

With auto switch CDVM5 L 32 □ □ – 100 □ □ – 1 1 M Z – M9BW □ – □

With auto switch
(Built-in magnet)

Port thread type

Nil	Rc
TN	NPT
TF	G

Piping

Nil	Screw-in type
F	Built-in One-touch fitting

Cylinder stroke (mm)
(Refer to "Standard Stroke" on page 1564.)

Rod extended/retracted when energized

Nil	Rod extended when energized
B	Rod retracted when energized

∗ Only in case of 2 position single solenoid valve.

Suffix for cylinder

Nil	None
J	Nylon tarpaulin
K	Heat resistant tarpaulin

Auto switch

Nil	Without auto switch

∗ For the applicable auto switch model, refer to the table below.

Number of auto switches

Nil	2 pcs.
S	1 pc.
n	"n" pcs.

Built-in Magnet Cylinder Model

If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) CDVM5B25-150-25GS

Applicable Auto Switch/Refer to pages 1719 to 1827 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC	Load voltage AC	Auto switch model	Lead wire length (m) 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	None (N)	Pre-wired connector	Applicable load	
Solid state switch	——	Grommet	Yes	3-wire (NPN)	5 V, 12 V	—	M9N	●	●	●	○	—	○	IC circuit	Relay, PLC
				3-wire (PNP)			M9P	●	●	●	○	—	○		
				2-wire	12 V		M9B	●	●	●	○	—	○	—	
		Connector					H7C	●	—	●	●	●	—		
	Diagnostic indication (2-color indication)	Grommet		3-wire (NPN)	5 V, 12 V		M9NW	●	●	●	○	—	○	IC circuit	
				3-wire (PNP)			M9PW	●	●	●	○	—	○		
				2-wire	12 V		M9BW	●	●	●	○	—	○	—	
	With diagnostic output (2-color indication)			4-wire (NPN)	5 V, 12 V		H7NF	●	—	●	○	—	○	IC circuit	
Reed switch	——	Grommet	Yes	3-wire (NPN equivalent)	—	5V	A96	●	—	●	—	—	—	IC circuit	—
			None	2-wire	24 V	100 V	A93	●	—	●	—	—	—	—	Relay, PLC
			Yes			100 V or less	A90	●	—	●	—	—	—	IC circuit	
			None			100 V, 200 V	B54	●	—	●	●	—	—	—	
			Yes			200 V or less	B64	●	—	●	—	—	—		
		Connector	None			—	C73C	●	—	●	●	●	—		
			Yes			24 V or less	C80C	●	—	●	●	●	—	IC circuit	
	Diagnostic indication (2-color indication)	Grommet	None		—	—	B59W	●	—	●	—	—	—	—	

∗ 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
None ····· N (Example) H7CN

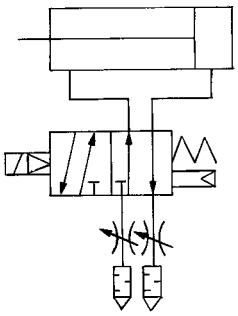
∗ Solid state auto switches marked with "○" are produced upon receipt of order.
∗ D-A9□V□/M9□V□/M9□WV□/M9□A(V) types cannot be mounted.

∗ Since there are other applicable auto switches than listed, refer to page 1581 for details.
∗ For details about auto switches with pre-wired connector, refer to pages 1784 and 1785.
∗ D-A9□/M9□/M9□W auto switches are shipped together (not assembled). (Only auto switch mounting brackets are assembled before shipped.)

Operation type can be changed to rod extended when energized or rod retracted when energized.

An auto switch cylinder with the switch installed can also be manufactured.

JIS Symbol



Specifications

Applicable bore size (mm)		20	25	32	40
Fluid		Air			
Action		Double acting, Single rod			
Cushion		Rubber bumper			
Proof pressure		1 MPa			
Maximum operating pressure		0.7 MPa			
Minimum operating pressure		0.15 MPa			
Ambient and fluid temperature		–10 to 50°C (No freezing)			
Lubrication		Not required (Non-lube)			
Stroke length tolerance		$^{+1.4}_{0}$			
Port size	**Screw-in type**	Rc 1/8			
	Built-in One-touch fitting	O.D.: ø6/I.D.: ø4			
Piston speed (mm/s) Note)		50 to 700*	50 to 650*	50 to 590*	50 to 420*
Allowable kinetic energy		0.27 J	0.4 J	0.65 J	1.2 J
Mounting		Basic style, Axial foot style, Rod side flange style, Head side flange style, Single clevis style, Double clevis style, Head side trunnion style, Rod side trunnion style			

Note) The figures marked with "*" represent the values of the cylinder with the silencer type exhaust throttle valve removed. To operate the cylinder at these values, prevent dust from entering by installing an AN120-M5 silencer on the EXH port.

Solenoid Valve Specifications

Applicable solenoid valve model			Series VZ3□90
Coil rated voltage			Standard: 100/200 VAC (50/60 Hz), 24 VDC Option: 110/220 VAC, 12 VDC
Effestive area of valve (Cv factor)			4.5mm² (0.25)
Allowable voltage			–15 to 10%
Coil insulation			Class B or equivalent (130°C)
Electrical entry			Grommet, L plug connector, M plug connector, DIN terminal
Power consumption (W) Note)	**DC**		1.8 (With indicator light: 2.1)
Appavent power (VA) Note)	**AC**	**Inrush**	4.5/50 Hz, 4.2/60 Hz
		Holding	3.5/50 Hz, 3.0/60 Hz

Note) At the rated voltage.

Made to Order Specifications

(For details, refer to pages 1836, 1851 to 1954.)

Symbol	Specifications
—XA□	Change of rod end shape
—XC4	With heavy duty scraper
—XC6	Made of stainless steel
—XC29	Double knuckle joint with spring pin
—XC52	Mounting nut with set screw

Refer to pages 1579 to 1581 for cylinders with auto switches.

- Minimum auto switch mounting stroke
- Proper auto switch mounting position (detection at stroke end) and mounting height
- Operating range
- Switch mounting bracket: Part no.

Standard Stroke

Bore size (mm)	Standard stroke (mm) Note)	Maximum stroke (mm)
20	25, 50, 75, 100, 125, 150, 200, 250, 300	1000
25		
32		
40		

Note) Other intermediate strokes can be manufactured upon receipt of order. When exceeding 300 stroke, the allowable maximum stroke length is determined by the stroke selection table.

Rod Boot Material

Symbol	Rod boot material	Maximum ambient temperature
J	Nylon tarpaulin	70°C
K	Heat resistant tarpaulin	110°C*

* Maximum ambient temperature for the rod boot itself.

Mass

(kg)

Bore size (mm)		20	25	32	40
Basic mass	Basic style	0.25	0.32	0.39	0.67
	Axial foot style	0.40	0.48	0.55	0.94
	Flange style	0.31	0.41	0.48	0.79
	Single clevis style	0.29	0.36	0.43	0.76
	Double clevis style	0.30	0.38	0.44	0.80
	Trunnion style	0.29	0.39	0.45	0.77
Additional mass per each 50 mm of stroke		0.05	0.07	0.09	0.14
Option bracket	Single knuckle joint	0.06	0.06	0.06	0.23
	Double knuckle joint (With pin)	0.07	0.07	0.07	0.20

Calculation: (Example) **CVM5L32-100-11G**

- Basic mass ····· 0.55 (kg) (Axial foot style ø32)
- Additional mass ····· 0.09/50 (kg/50 st)
- Cylinder stroke ····· 100 (st)

0.55 + 0.09 x 100/50 = 0.73 kg

Mounting Style and Accessory

Mounting \ Accessory	Standard equipment			Option	
	Mounting nut	Rod end nut	Clevis pin	Single knuckle joint	Double knuckle joint (3)
Basic style	● (1 pc.)	●	—	●	●
Axial foot style	● (2)	●	—	●	●
Rod side flange style	● (1)	●	—	●	●
Head side flange style	● (1)	●	—	●	●
Single clevis style	— (1)	●	—	●	●
Double clevis style (3)	— (1)	●	●	●	●
Head side trunnion style	● (1) (2)	●	—	●	●
Rod side trunnion style	● (1) (2)	●	—	●	●

Note 1) Mounting nut is not equipped with single clevis style and double clevis style.
Note 2) Trunnion nuts are equipped for head side trunnion and rod side trunnion.
Note 3) Pin and set ring are shipped together with double clevis and double knuckle joint.

Mounting Bracket Part No.

Bore size (mm)	20	25	32	40
Axial foot*	CM-L020B	CM-L032B		CM-L040B
Flange	CM-F020B	CM-F032B		CM-F040B
Single clevis	CM-C020B	CM-C032B		CM-C040B
Double clevis**	CM-D020B	CM-D032B		CM-D040B
Trunnion (With nut)	CM-T020B	CM-T032B		CM-T040B

* Two foot brackets and a mounting nut are attached.
When ordering the foot bracket, order 2 pcs. per cylinder.
** Clevis pin and retaining ring (cotter pin for ø40) are packaged together.

⚠Precautions

Be sure to read before handling. Refer to front matters 42 and 43 for Safety Instructions, pages 3 to 11 for Actuator and Auto Switch Precautions and 3/4/5 Port Solenoid Valve Precautions in Best Pneumatics No. 1.

Mounting

⚠Warning

1. Do not rotate the cover.

If a cover is rotated when installing a cylinder or screwing a fitting into the port, it is likely to damage the junction part with cover.

⚠Caution

1. Not able to disassemble.

Cover and cylinder tube are connected to each other by caulking method, thus making it impossible to disassemble. Therefore, internal parts of a cylinder other than rod seal are not replaceable.

2. Use caution to the popping of a retaining ring.

When replacing rod seals and removing and mounting a retaining ring, use a proper tool (retaining ring plier: tool for installing type C retaining ring). Even if a proper tool is used, it is likely to inflict damage to a human body or peripheral equipment, as a retaining ring may be flown out of the tip of a plier. Be much careful with the popping of a retaining ring. Besides, be certain that a retaining ring is placed firmly into the groove of rod cover before supplying air at the time of installment.

3. Do not touch the cylinder during operation.

Use caution when handling a cylinder, which is running at a high speed and a high frequency, because the surface of a cylinder tube could get so hot enough as to cause you get burns.

4. Do not use an air cylinder as an air-hydro cylinder.

If it uses turbine oil in place of fluids for cylinder, it may result in oil leakage.

5. Conjoin the rod end part, so that rod boot might not be twisted.

If a rod boot is installed with being twisted when installing a cylinder, it will cause a rod boot to fail during operation.

Model Selection

⚠Warning

1. Confirm the specifications.

Products in this catalog are designed to be used for compressed air systems. If not operated within the designated pressure or temperature, it may damage the products or cause malfunction. (Refer to specifications.)

2. Energizing continuously for a long period of time

When the valve is continuously energized for a long period of time, the performance may deteriorate, shorten the service life or affect peripheral equipment adversely since temperature rises when coils generate heat.

Built-in One-touch Fitting

CVM5 | Mounting style | Bore size | **F** — | For "How to Order", refer to page 1563.

Built-in One-touch fitting

One-touch fittings are installed on cylinders.

Application/Tubing O.D.

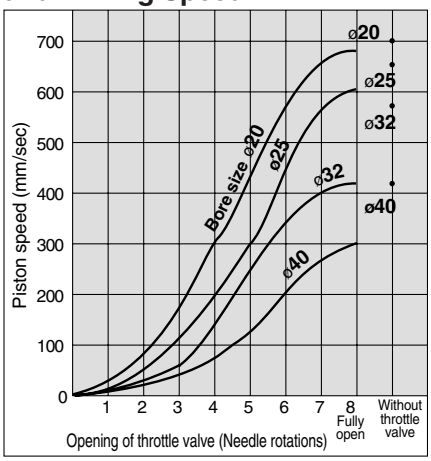
Bore size (mm)	20	25	32	40
Applicable tubing O.D. (mm)	ø6/4	ø6/4	ø6/4	ø6/4
Applicable tubing material	Can be used for either nylon, soft nylon or polyurethane tube.			

Specifications

Action	Double acting, Single rod			
Bore size (mm)	20, 25, 32, 40			
Maximum operating pressure	0.7 MPa			
Minimum operating pressure	0.15 MPa			
Cushion	Rubber bumper			
Piping	Built-in One-touch fitting			
Piston speed (mm/s)	ø20	ø25	ø32	ø40
	50 to 700	50 to 650	50 to 590	50 to 420
Mounting	Basic style, Axial foot style, Rod side flange style, Head side flange style, Single clevis style, Double clevis style, Rod side trunnion style, Head side trunnion style			

For the dimensions of mounting bracket, refer to pages 1569 to 1572.

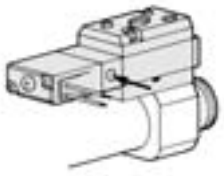
Opening Range of Throttle Valve and Driving Speed



Measuring conditions: Operating pressure 0.5 MPa
Mounting: horizontal Load: no load on the return side
The speeds indicated above are for reference.

Manual Operation

Manual operation is possible by pushing the manual button indicated with the arrow.



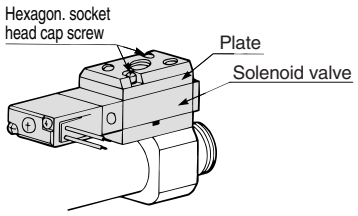
Piston Speed Adjustment

- To slow down the piston speed, screw in the needle of the silencer type exhaust throttle valve clockwise, which reduces the amount of air that is discharged.
- To adjust the piston extension side, regulate the "R1" side silencer type exhaust throttle valve.
  To adjust the retraction side, regulate the "R2" side silencer exhaust throttle valve.
- The needle valve of the throttle valve can be fully opened by loosening it 8 turns from the fully closed position.
- The needle valve has a loosening prevention construction.

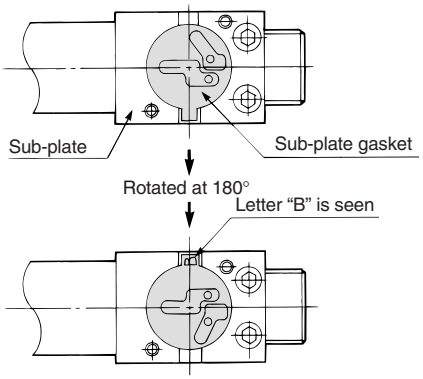
Changing between Rod Extended when Energized and Rod Retracted when Energized

Step [This procedure is for changing the rod extended when energized to the rod retracted when energized.]

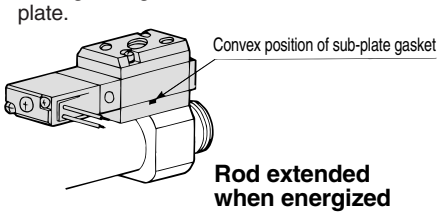
1. Using a tool, loosen the two hexagon socket bolts, and remove the plate and the solenoid valve. At this time, instead of removing the plate and the solenoid valve separately, remove them together, with the hexagon socket bolts remaining inserted.



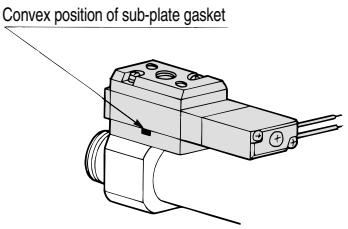
2. A sub-plate gasket is inside the sub-plate. Invert this sub-plate gasket 180° and install it with its letter "B" visible. (A portion that protrudes is provided on the periphery of the sub-plate gasket, and the letter "B" is on one side of this protrusion.)



3. Install the solenoid valve and the plate, and tighten the hexagon socket bolts with a tool. The tightening torque is between 0.6 and 0.8 N·m.
After tightening, press the manual button on the solenoid valve, check for any air leaks, and verify the operating conditions. Distinction between rod extended when energized and rod retracted when energized can be determined from the outside, by looking through the small window in the sub-plate.

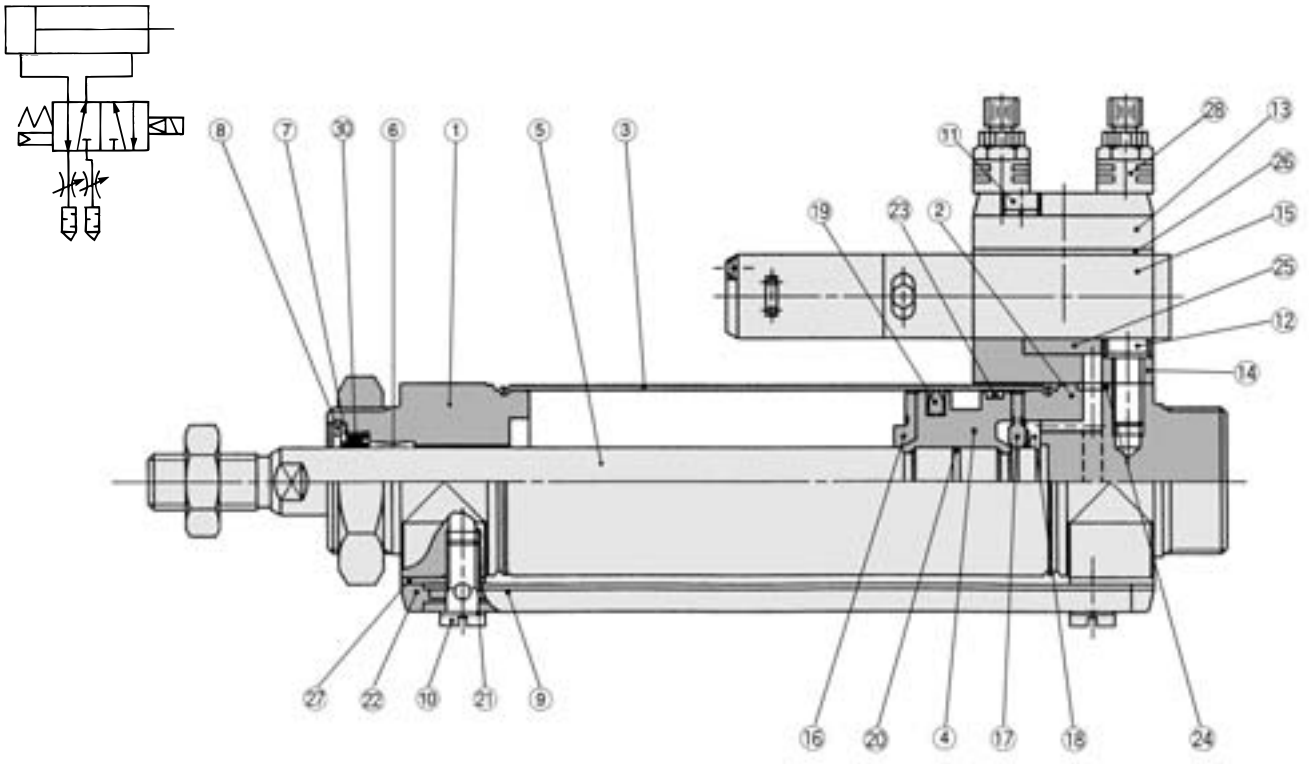


Rod extended when energized

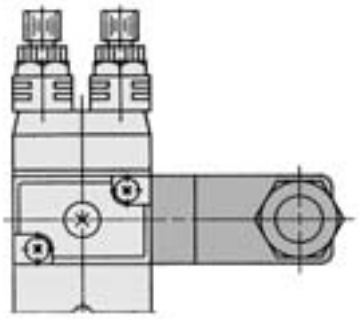


Rod retracted when energized

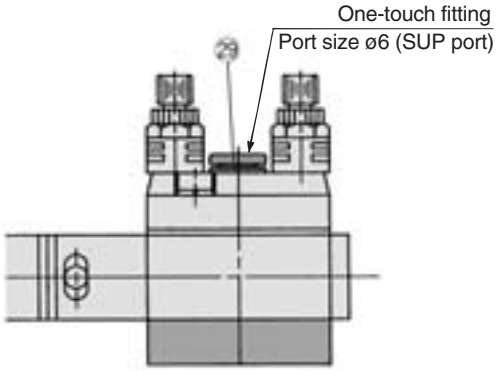
Construction



DIN terminal



Built-in One-touch fitting



Component Parts

No.	Description	Material	Note
1	**Rod cover**	Aluminum alloy	Clear anodized
2	**Head cover**	Aluminum alloy	Clear anodized
3	**Cylinder tube**	Stainless steel	
4	**Piston**	Aluminum alloy	Chromated
5	**Piston rod**	Carbon steel	Hard chrome plated
6	**Bushing**	Oil-impregnated sintered alloy	
7	**Seal retainer**	Rolled steel	Nickel plated
8	**Retaining ring**	Carbon tool steel	Nickel plated
9	**Pipe**	Aluminum alloy	Clear anodized
10	**Stud**	Brass	Electroless nickel plated
11	Hex. socket head cap screw with spring washer	Carbon steel	Nickel plated
12	Hex. socket head cap screw with spring washer	Carbon steel	Nickel plated
13	**Plate**	Aluminum alloy	Metallic painted
14	**Sub-plate**	Aluminum alloy	Metallic painted
15	**Solenoid valve**	—	Refer to the "How to order" below.*
16	**Bumper A**	Urethane	
17	**Bumper B**	Urethane	

* How to order solenoid valves Electrical entry
VZ3□90- Voltage

Component Parts

No.	Description	Material	Note
18	**Retaining ring**	Stainless steel	
19	**Piston seal**	NBR	
20	**Piston gasket**	NBR	
21	**Gasket**	Resin	
22	**Pipe gasket**	Urethane rubber	
23	**Wear ring**	Resin	
24	**Head cover gasket**	NBR	
25	**Sub-plate gasket**	NBR	
26	**Gasket**	NBR	
27	**Spacer gasket**	Resin	Except ø25
28	**Exhaust throttle with silencer**	—	ASN2-M5
29	**One-touch fitting**	—	Port size: ø6

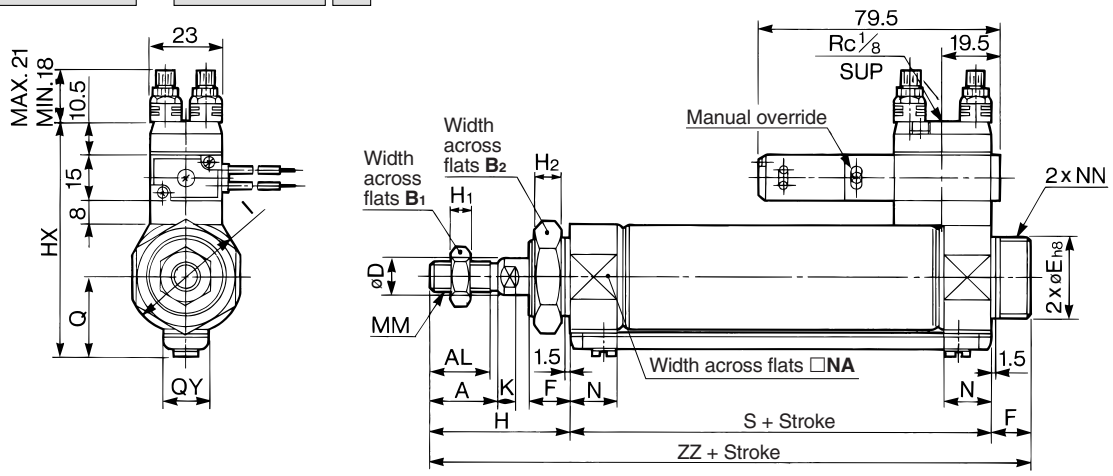
Replacement Parts/Seal Kit

No.	Description	Material	Part no.			
			20	25	32	40
30	**Rod seal**	NBR	PDU-8Z	PDU-10Z	PDU-12LZ	PDU-14LZ

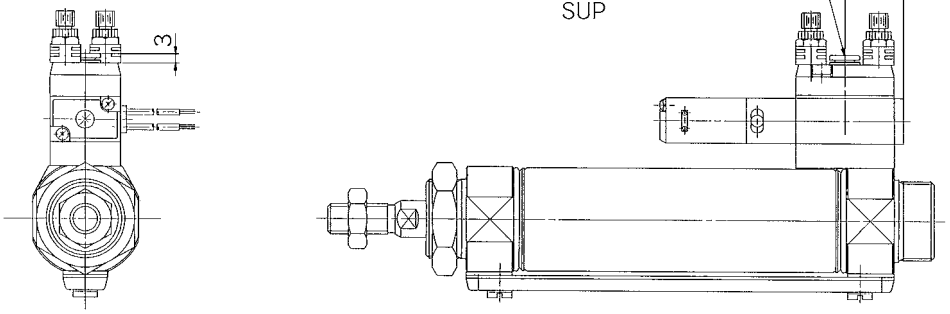
* Since the seal kit does not include a grease pack, order it separately.
Grease pack part no.: GR-S-010 (10g)

Basic Style (B)

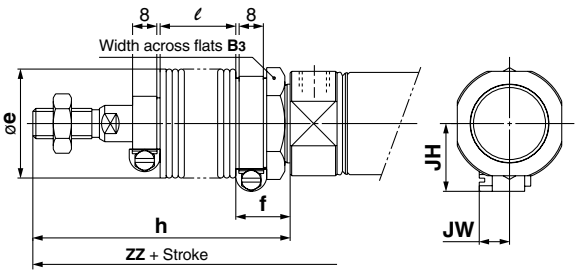
CVM5B **Bore size** — **Stroke** ☐



Built-in One-touch fitting



With rod boot



For DIN terminal and double solenoid, refer to page 1572.

(mm)

Bore size (mm)	Stroke range	A	AL	B1	B2	D	Eh8	F	Q	QY	H	H1	H2	HX	I	K	MM	N	NA	NN	S	ZZ
20	Up to 300	18	15.5	13	26	8	$20^{0}_{-0.033}$	13	19.8	14	41	5	8	65.3	28	5	M8 x 1.25	15	24	M20 x 1.5	62	116
25	Up to 300	22	19.5	17	32	10	$26^{0}_{-0.033}$	13	22	14	45	6	8	70.5	33.5	5.5	M10 x 1.25	15	30	M26 x 1.5	62	120
32	Up to 300	22	19.5	17	32	12	$26^{0}_{-0.033}$	13	25.8	16	45	6	8	76.5	37.5	5.5	M10 x 1.25	15	34.5	M26 x 1.5	64	122
40	Up to 300	24	21	22	41	14	$32^{0}_{-0.039}$	16	29.8	16	50	8	10	84.5	46.5	7	M14 x 1.5	21.5	42.5	M32 x 2	88	154

With Rod Boot

(mm)

Bore size (mm)	B3	e	f	h							ℓ							JH	JW
				1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	301 to 400	401 to 500	1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	301 to 400	401 to 500	(Reference)	(Reference)
20	30	36	18	68	81	93	106	131	156	—	12.5	25	37.5	50	75	100	—	23.5	10.5
25	32	36	18	72	85	97	110	135	160	185	12.5	25	37.5	50	75	100	125	23.5	10.5
32	32	36	18	72	85	97	110	135	160	185	12.5	25	37.5	50	75	100	125	23.5	10.5
40	41	46	20	77	90	102	115	140	165	190	12.5	25	37.5	50	75	100	125	27	10.5

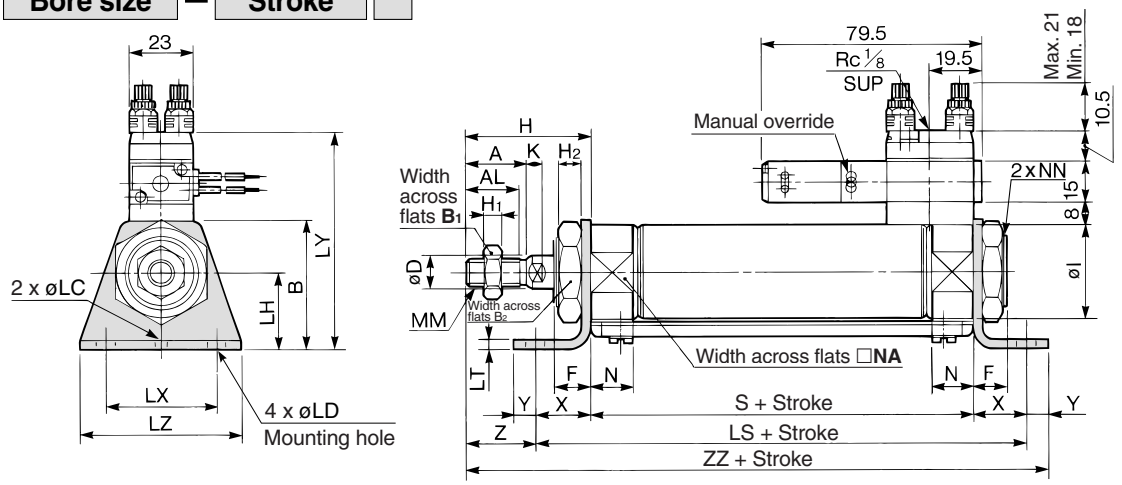
(mm)

Bore size (mm)	ZZ						
	1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	301 to 400	401 to 500
20	143	156	168	181	206	231	256
25	147	160	172	185	210	235	260
32	149	162	174	187	212	237	262
40	181	194	206	219	244	269	294

∗ For short strokes, a solenoid valve may protrude from the rod cover end. Confirm S dimension and solenoid dimensions.
∗ Long stroke type includes ones for strokes more than 301 mm.

Axial Foot Style (L)

CVM5L **Bore size** – **Stroke** ☐



(mm)

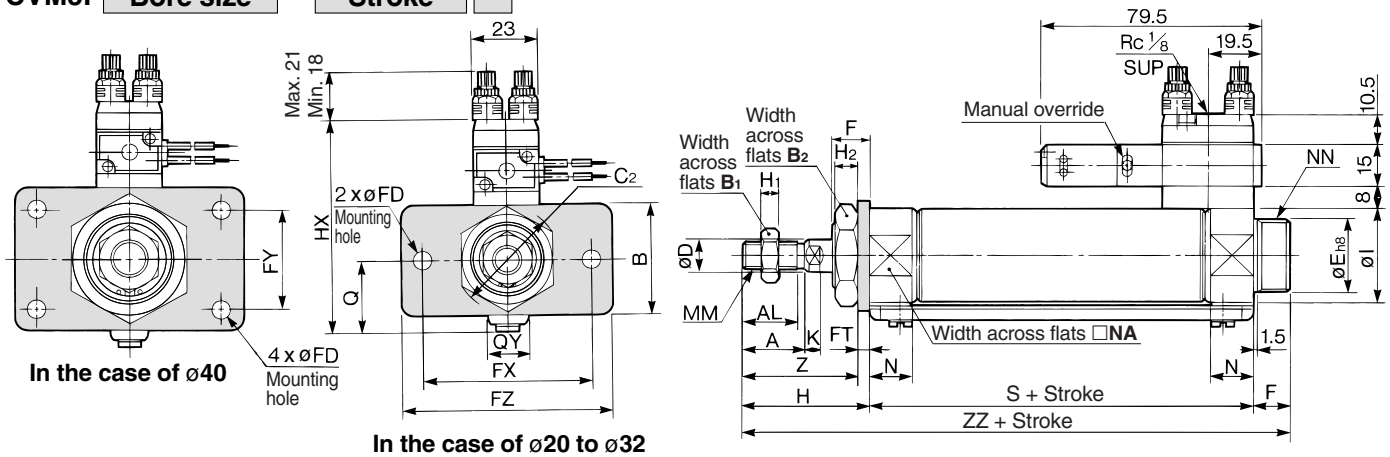
Bore size (mm)	Stroke range	A	AL	B	B_1	B_2	D	F	H	H_1	H_2	I	K	LC	LD	LH	LS	LT	LX	LY
20	Up to 300	18	15.5	40	13	26	8	13	41	5	8	28	5	4	6.8	25	102	3.2	40	70.5
25	Up to 300	22	19.5	47	17	32	10	13	45	6	8	33.5	5.5	4	6.8	28	102	3.2	40	76.5
32	Up to 300	22	19.5	47	17	32	12	13	45	6	8	37.5	5.5	4	6.8	28	104	3.2	40	78.8
40	Up to 300	24	21	54	22	41	14	16	50	8	10	46.5	7	4	7	30	134	3.2	55	84.8

(mm)

Bore size (mm)	LZ	MM	N	NA	NN	S	X	Y	Z	ZZ
20	55	M8 x 1.25	15	24	M20 x 1.5	62	20	8	21	131
25	55	M10 x 1.25	15	30	M26 x 1.5	62	20	8	25	135
32	55	M10 x 1.25	15	34.5	M26 x 1.5	64	20	8	25	137
40	75	M14 x 1.5	21.5	42.5	M32 x 2	88	23	10	27	171

Rod Side Flange Style (F)

CVM5F **Bore size** – **Stroke** ☐



(mm)

Bore size (mm)	Stroke range	A	AL	B	B_1	B_2	C_2	D	Eh_8	F	FD	FT	FX	FY	FZ	H	H_1	H_2	HX
20	Up to 300	18	15.5	34	13	26	30	8	$20^{0}_{-0.033}$	13	7	4	60	—	75	41	5	8	65.3
25	Up to 300	22	19.5	40	17	32	37	10	$26^{0}_{-0.033}$	13	7	4	60	—	75	45	6	8	70.5
32	Up to 300	22	19.5	40	17	32	37	12	$26^{0}_{-0.033}$	13	7	4	60	—	75	45	6	8	76.5
40	Up to 300	24	21	52	22	41	47.3	14	$32^{0}_{-0.039}$	16	7	5	66	36	82	50	8	10	84.5

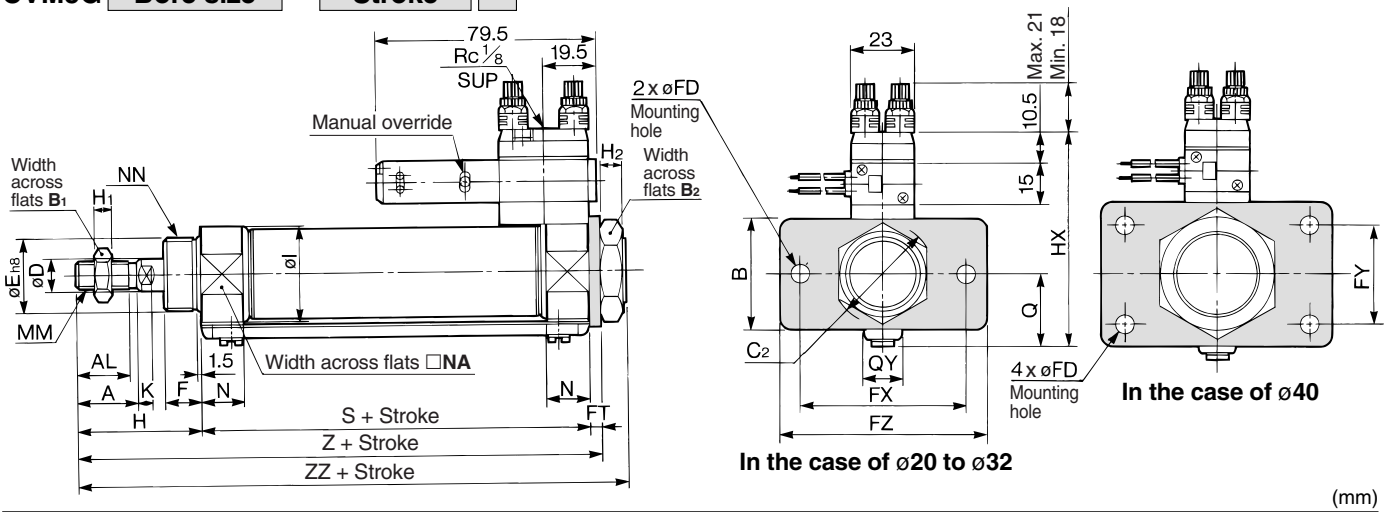
(mm)

Bore size (mm)	I	K	MM	N	NA	NN	Q	QY	S	Z	ZZ
20	28	5	M8 x 1.25	15	24	M20 x 1.5	19.8	14	62	37	116
25	33.5	5.5	M10 x 1.25	15	30	M26 x 1.5	22	14	62	41	120
32	37.5	5.5	M10 x 1.25	15	34.5	M26 x 1.5	25.8	16	64	41	122
40	46.5	7	M14 x 1.5	21.5	42.5	M32 x 2	29.8	16	88	45	154

∗ For short strokes, a solenoid valve may protrude from the rod cover end. Confirm S dimension and solenoid dimensions.

Head Side Flange Style (G)

CVM5G [Bore size] — [Stroke] [ ]



(mm)

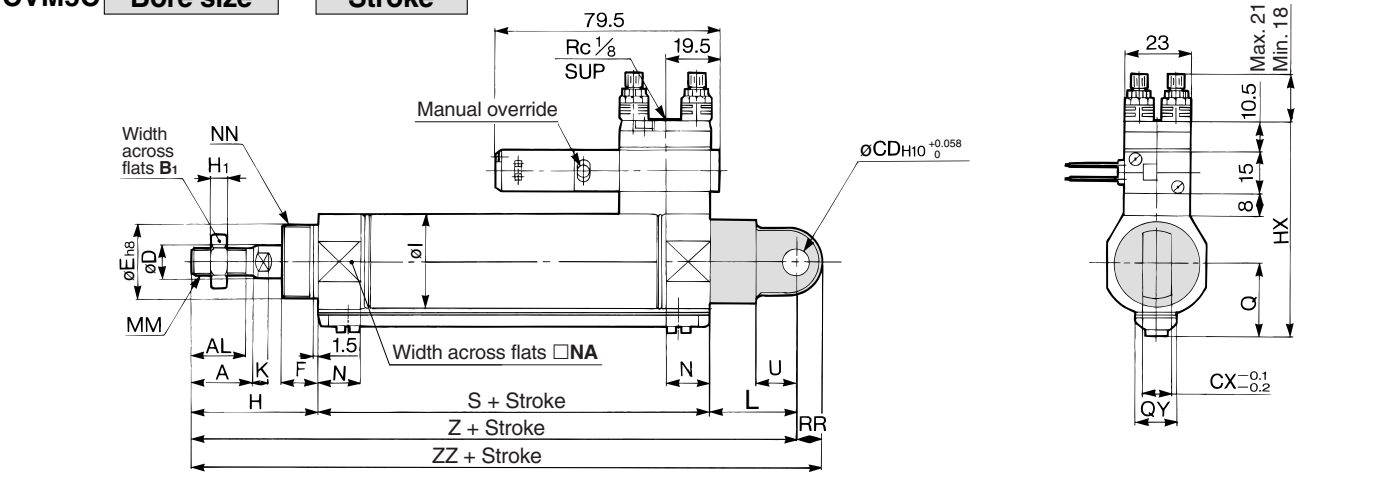
Bore size (mm)	Stroke range	A	AL	B	B_1	B_2	C_2	D	Eh_8	F	FD	FT	FX	FY	FZ	H	H_1	H_2	HX
20	Up to 300	18	15.5	34	13	26	30	8	$20^{0}_{-0.033}$	13	7	4	60	—	75	41	5	8	65.3
25	Up to 300	22	19.5	40	17	32	37	10	$26^{0}_{-0.033}$	13	7	4	60	—	75	45	6	8	70.5
32	Up to 300	22	19.5	40	17	32	37	12	$26^{0}_{-0.033}$	13	7	4	60	—	75	45	6	8	76.5
40	Up to 300	24	21	52	22	41	47.3	14	$32^{0}_{-0.039}$	16	7	5	66	36	82	50	8	10	84.5

(mm)

Bore size (mm)	I	K	MM	N	NA	NN	Q	QY	S	Z	ZZ
20	28	5	M8 x 1.25	15	24	M20 x 1.5	19.8	14	62	107	116
25	33.5	5.5	M10 x 1.25	15	30	M26 x 1.5	22	14	62	111	120
32	37.5	5.5	M10 x 1.25	15	34.5	M26 x 1.5	25.8	16	64	113	122
40	46.5	7	M14 x 1.5	21.5	42.5	M32 x 2	29.8	16	88	143	154

Single Clevis Style (C)

CVM5C [Bore size] — [Stroke]



(mm)

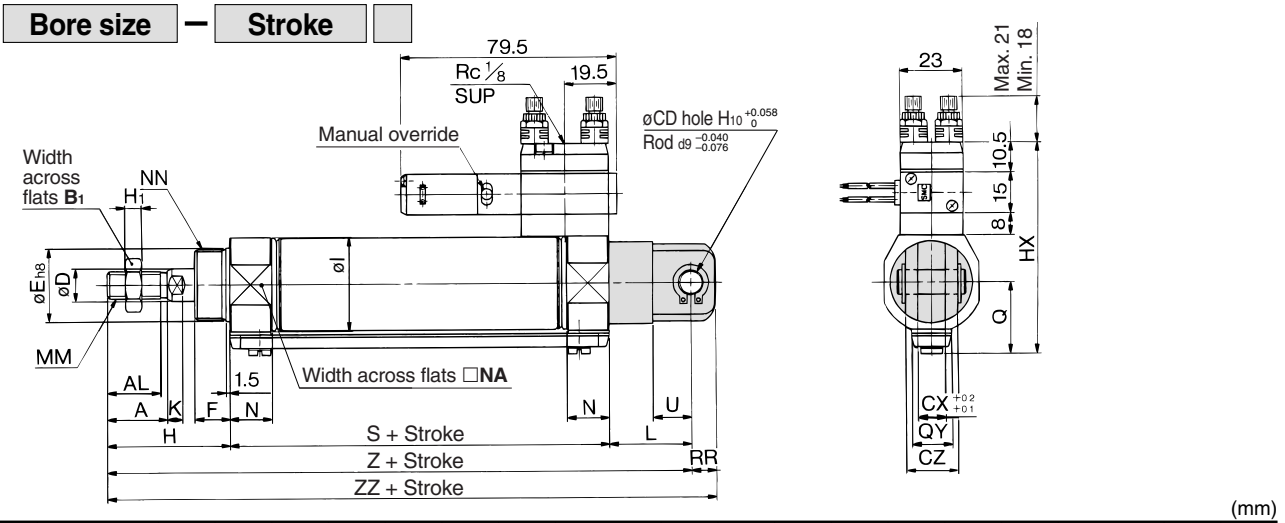
Bore size (mm)	Stroke range	A	AL	B_1	CD	CX	D	Eh_8	F	H	H_1	I	HX	K	L	MM	N	NA
20	Up to 300	18	15.5	13	9	10	8	$20^{0}_{-0.033}$	13	41	5	28	65.3	5	30	M8 x 1.25	15	24
25	Up to 300	22	19.5	17	9	10	10	$26^{0}_{-0.033}$	13	45	6	33.5	70.5	5.5	30	M10 x 1.25	15	30
32	Up to 300	22	19.5	17	9	10	12	$26^{0}_{-0.033}$	13	45	6	37.5	76.5	5.5	30	M10 x 1.25	15	34.5
40	Up to 300	24	21	22	10	15	14	$32^{0}_{-0.039}$	16	50	8	46.5	84.5	7	39	M14 x 1.5	21.5	42.5

(mm)

Bore size (mm)	NN	Q	QY	RR	S	U	Z	ZZ
20	M20 x 1.5	19.8	14	9	62	14	133	142
25	M26 x 1.5	22	14	9	62	14	137	146
32	M26 x 1.5	25.8	16	9	64	14	139	148
40	M32 x 2	29.8	16	11	88	18	177	188

Double Clevis Style (D)

CVM5D **Bore size** — **Stroke** ☐



(mm)

Bore size (mm)	Stroke range	A	AL	B_1	CD	CX	CZ	D	Eh_8	F	H	H_1	HX	I	K	L	MM	N	NA
20	Up to 300	18	15.5	13	9	10	19	8	$20^{0}_{-0.033}$	13	41	5	65.3	28	5	30	M8 x 1.25	15	24
25	Up to 300	22	19.5	17	9	10	19	10	$26^{0}_{-0.033}$	13	45	6	70.5	33.5	5.5	30	M10 x 1.25	15	30
32	Up to 300	22	19.5	17	9	10	19	12	$26^{0}_{-0.033}$	13	45	6	76.5	37.5	5.5	30	M10 x 1.25	15	34.5
40	Up to 300	24	21	22	10	15	30	14	$32^{0}_{-0.039}$	16	50	8	84.5	46.5	7	39	M14 x 1.5	21.5	42.5

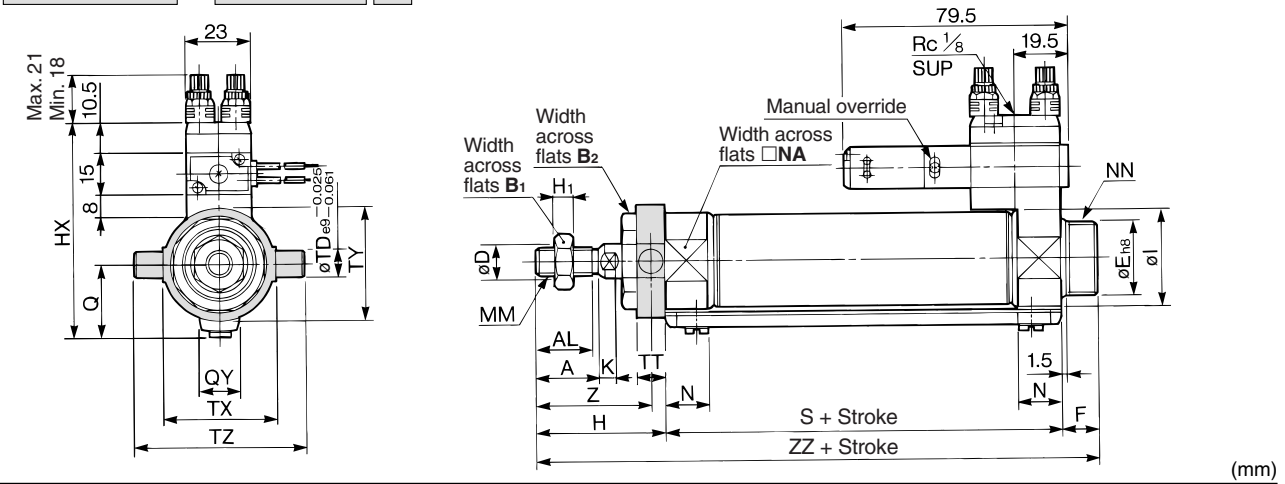
(mm)

Bore size (mm)	NN	Q	QY	RR	S	U	Z	ZZ
20	M20 x 1.5	19.8	14	9	62	14	133	142
25	M26 x 1.5	22	14	9	62	14	137	146
32	M26 x 1.5	25.8	16	9	64	14	139	148
40	M32 x 2	29.8	16	11	88	18	177	188

∗ Clevis pin and snap ring (cotter pin for ø40) are packaged together.

Rod Side Trunnion Style (U)

CVM5U **Bore size** — **Stroke** ☐



(mm)

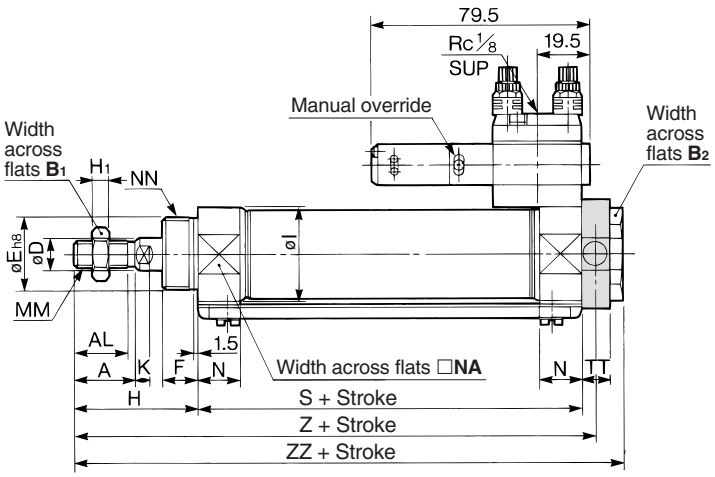
Bore size (mm)	Stroke range	A	AL	B_1	B_2	D	Eh_8	F	H	H_1	HX	I	K	MM	N	NA	NN	Q
20	Up to 300	18	15.5	13	26	8	$20^{0}_{-0.033}$	13	41	5	65.3	28	5	M8 x 1.25	15	24	M20 x 1.5	19.8
25	Up to 300	22	19.5	17	32	10	$26^{0}_{-0.033}$	13	45	6	70.5	33.5	5.5	M10 x 1.25	15	30	M26 x 1.5	22
32	Up to 300	22	19.5	17	32	12	$26^{0}_{-0.033}$	13	45	6	76.5	37.5	5.5	M10 x 1.25	15	34.5	M26 x 1.5	25.8
40	Up to 300	24	21	22	41	14	$32^{0}_{-0.039}$	16	50	8	84.5	46.5	7	M14 x 1.5	21.5	42.5	M32 x 2	29.8

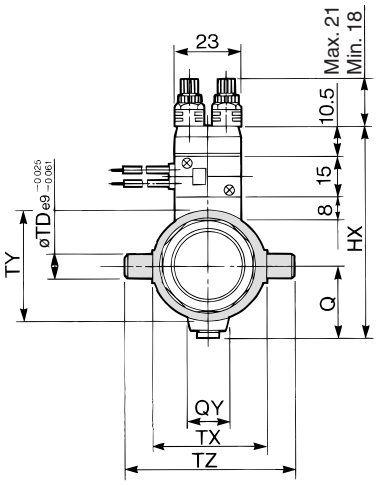
(mm)

Bore size (mm)	QY	S	TD	TT	TX	TY	TZ	Z	ZZ
20	14	62	8	10	32	32	52	36	116
25	14	62	9	10	40	40	60	40	120
32	16	64	9	10	40	40	60	40	122
40	16	88	10	11	53	53	77	44.5	154

Head Side Trunnion Style (T)

CVM5T [Bore size] – [Stroke] [ ]





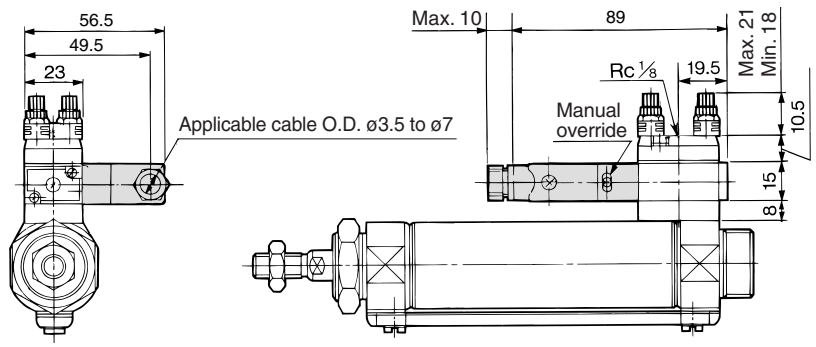
(mm)

Bore size (mm)	Stroke range	A	AL	B_1	B_2	D	Eh_8	F	H	H_1	HX	I	K	MM	N	NA	NN
20	Up to 300	18	15.5	13	26	8	$20^{0}_{-0.033}$	13	41	5	65.3	28	5	M8 x 1.25	15	24	M20 x 1.5
25	Up to 300	22	19.5	17	32	10	$26^{0}_{-0.033}$	13	45	6	70.5	33.5	5.5	M10 x 1.25	15	30	M26 x 1.5
32	Up to 300	22	19.5	17	32	12	$26^{0}_{-0.033}$	13	45	6	76.5	37.5	5.5	M10 x 1.25	15	34.5	M26 x 1.5
40	Up to 300	24	21	22	41	14	$32^{0}_{-0.039}$	16	50	8	84.5	46.5	7	M14 x 1.5	21.5	42.5	M32 x 2

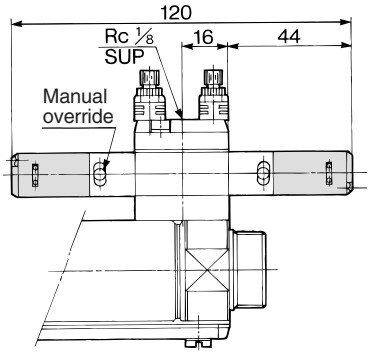
(mm)

Bore size (mm)	Q	QY	S	TD	TT	TX	TY	TZ	Z	ZZ
20	19.8	14	62	8	10	32	32	52	108	118
25	22	14	62	9	10	40	40	60	112	122
32	25.8	16	64	9	10	40	40	60	114	124
40	29.8	16	88	10	11	53	53	77	143.5	154

DIN Terminal



Double Solenoid



* For the mounting brackets of flange, single clevis, double clevis and head side trunnion style, the doule soleoid may not be used depending on the mounting conditions.

Accessory Dimensions

Accessories for Series CVM5 are the same specifications as those for Series CM2. Refer to pages 144 and 145 of Best Pneumatics No. 2 (it is not applicable to clevis integrated style).

Valve Mounted Cylinder: Non-rotating Rod Type Double Acting

Series CVM5K

ø20, ø25, ø32, ø40

How to Order

Mounting style

B	Basic style
L	Axial foot style
F	Rod side flange style
G	Head side flange style
C	Single clevis style
D	Double clevis style
T	Head side trunnion style
U	Rod side trunnion style

Solenoid valve voltage

Standard	
1	100 VAC (50/60 Hz)
2	200 VAC (50/60 Hz)
5	24 VDC

Option	
3	110 VAC (50/60 Hz)
4	220 VAC (50/60 Hz)
6	12 VDC
9	Other

Electrical entry

G	Grommet
L	L plug connector
M	M plug connector
D	DIN terminal

Solenoid valve

1	2 position single
2	2 position double
3	3 position closed center (Option)
4	3 position exhaust center (Option)

Light/Surge voltage suppressor

Nil	None
S	With surge voltage suppressor
Z	With light/surge voltage suppressor (Except Type G)

Made to Order
Refer to page 1574 for details.

CVM5K L 32 □ □ – 100 □ □ – 1 1 M Z – □

With auto switch **CDVM5K** L 32 □ □ – 100 □ □ – 1 1 M Z – M9BW □ – □

With auto switch
(Built-in magnet)

Non-rotating rod type

Bore size

20	20 mm
25	25 mm
32	32 mm
40	40 mm

Port thread type

Nil	Rc
TN	NPT
TF	G

Piping

Nil	Screw-in type
F	Built-in One-touch fitting

Cylinder stroke (mm)
(Refer to "Standard Stroke" on page 1574.)

Suffix for cylinder

Nil	None
J	Nylon tarpaulin
K	Heat resistant tarpaulin

Rod extended/retracted when energized

Nil	Rod extended when energized
B	Rod retracted when energized

∗ Only in case of 2 position single solenoid valve.

Auto switch

Nil	Without auto switch

∗ For the applicable auto switch model, refer to the table below.

Number of auto switches

Nil	2 pcs.
S	1 pc.
n	"n" pcs.

Built-in Magnet Cylinder Model

If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) CDVM5KF40-100-11GZ

Applicable Auto Switch/Refer to pages 1719 to 1827 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC	Load voltage AC	Auto switch model	Lead wire length (m) 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	None (N)	Pre-wired connector	Applicable load	
Solid state switch	——	Grommet	Yes	3-wire (NPN)	5 V, 12 V	—	M9N	●	●	●	○	—	○	IC circuit	Relay, PLC
				3-wire (PNP)			M9P	●	●	●	○	—	○		
		Connector		2-wire	12 V		M9B	●	●	●	○	—	○	—	
							H7C	●	—	●	●	●	—		
	Diagnostic indication (2-color indication)	Grommet		3-wire (NPN)	5 V, 12 V		M9NW	●	●	●	○	—	○	IC circuit	
				3-wire (PNP)			M9PW	●	●	●	○	—	○		
				2-wire	12 V		M9BW	●	●	●	○	—	○	—	
	With diagnostic output (2-color indication)			4-wire (NPN)	5 V, 12 V		H7NF	●	—	●	○	—	○	IC circuit	
Reed switch	——	Grommet	Yes	3-wire (NPN equivalent)	5 V	—	A96	●	—	●	—	—	—	IC circuit	—
				2-wire	12 V	100V	A93	●	—	●	—	—	—	—	Relay, PLC
			None			100 V or less	A90	●	—	●	—	—	—	IC circuit	
			Yes			100 V, 200 V	B54	●	—	●	●	—	—	—	
			None			200 V or less	B64	●	—	●	—	—	—		
		Connector	Yes			—	C73C	●	—	●	●	●	—		
			None			24 V or less	C80C	●	—	●	●	●	—	IC circuit	
	Diagnostic indication (2-color indication)	Grommet	Yes		—	—	B59W	●	—	●	—	—	—	—	

∗ 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
None ····· N (Example) H7CN

∗ Solid state auto switches marked with "○" are produced upon receipt of order.
∗ D-A9□V□/M9□V□/M9□WV□/M9□A(V) types cannot be mounted.

∗ Since there are other applicable auto switches than listed, refer to page 1581 for details.
∗ For details about auto switches with pre-wired connector, refer to pages 1784 and 1785.
∗ D-A9□/M9□/M9□W auto switches are shipped together (not assembled). (Only auto switch mounting brackets are assembled before shipped.)

A hexagon shaped rod that does not rotate.

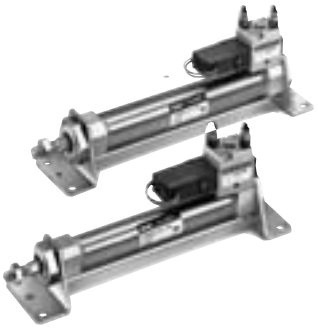
Non-rotating accuracy

ø20, ø25 — ±0.7°
ø32, ø40 — ±0.5°

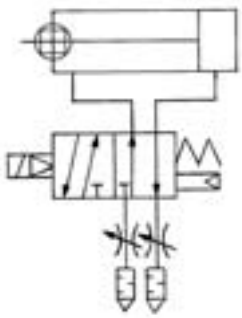
Can operate without lubrication.

Auto switches can also be mounted.

Can be installed with auto switches to facilitate the detection of the cylinder's stroke position.



JIS Symbol



Specifications

Applicable bore size (mm)		20	25	32	40
Rod non-rotating accuracy		± 0.7°		± 0.5°	
Fluid		Air			
Action		Double acting, Single rod			
Proof pressure		1 MPa			
Maximum operating pressure		0.7 MPa			
Minimum operating pressure		0.15 MPa			
Ambient and fluid temperature		–10 to 50°C (No freezing)			
Lubrication		Not required (Non-lube)			
Stroke length tolerance		$^{+1.4}_{0}$			
Piston speed (mm/s)		50 to 700*	50 to 650*	50 to 590*	50 to 420*
Allowable kinetic energy		0.27 J	0.4 J	0.65 J	1.2 J
Port size	**Screw-in type**	Rc 1/8			
	Built-in One-touch fitting	O.D.: ø6/I.D.: ø4			
Mounting		Basic style, Axial foot style, Rod side flange style, Head side flange style, Single clevis style, Double clevis style, Head side trunnion style, Rod side trunnion style			

Note) The figures marked with "*" represent the values of the cylinder with the silencer type exhaust throttle valve removed. To operate the cylinder at these values, prevent dust from entering by installing an AN120-M5 silencer on the EXH port.

Solenoid Valve Specifications

Applicable solenoid valve model			Series VZ3□90
Coil rated voltage			Standard: 100/200 VAC (50/60 Hz), 24 VDC Option: 110/220 VAC, 12 VDC
Effective area of valve (Cv factor)			4.5 mm² (0.25)
Allowable voltage			–15 to 10%
Coil insulation			Class B or equivalent (130°C)
Electrical entry			Grommet, L plug connector, M plug connector, DIN terminal
Power consumption (W) Note)	**DC**		1.8 (With indicator light: 2.1)
Apparent power (VA) Note)	**AC**	**Inrush**	4.5/50 Hz, 4.2/60 Hz
		Holding	3.5/50 Hz, 3.0/60 Hz

Note) At the rated voltage.

Standard Stroke

Bore size (mm)	Standard stroke (mm) Note)
20	25, 50, 75, 100, 125, 150 200, 250, 300
25	
32	
40	

Note) Other intermediate strokes can be manufactured upon receipt of order.
Although it is possible to make up to 1000 stroke length, when exceeding the standard stroke, there may be the case which cannot meet the specifications.

Rod Boot Material

Symbol	Rod boot material	Maximum ambient temperature
J	Nylon tarpaulin	70°C
K	Heat resistant tarpaulin	110°C *

* Maximum ambient temperature for the rod boot itself.

Made to Order Specifications (For details, refer to pages 1836, 1882.)

Symbol	Specifications
—XA□	Change of rod end shape
—XC6	Made of stainless steel

Refer to pages 1579 to 1581 for cylinders with auto switches.

- Minimum auto switch mounting stroke
- Proper auto switch mounting position (detection at stroke end) and mounting height
- Operating range
- Switch mounting bracket: Part no.

Mass

(kg)

Bore size (mm)		20	25	32	40
Basic mass	Basic style	0.25	0.32	0.39	0.67
	Axial foot style	0.40	0.48	0.55	0.94
	Flange style	0.31	0.41	0.48	0.79
	Single clevis style	0.29	0.36	0.43	0.76
	Double clevis style	0.30	0.38	0.44	0.80
	Trunnion style	0.29	0.39	0.45	0.77
Additional mass per each 50 mm of stroke		0.05	0.07	0.09	0.14
Option bracket	Single knuckle joint	0.06	0.06	0.06	0.23
	Double knuckle joint (with pin)	0.07	0.07	0.07	0.20

Calculation: (Example) **CVM5KL32-100-11G**
- Basic mass····· 0.55 (kg) (Axial foot style ø32)
- Additional mass····· 0.09 (kg/50 st)
- Cylinder stroke····· 100 (st) 0.55 + 0.09 x 100/50 = 0.73 kg

Mounting Bracket Part No.

Bore size (mm)	20	25	32	40
Axial foot *	CM-L020B	CM-L032B		CM-L040B
Flange	CM-F020B	CM-F032B		CM-F040B
Single clevis	CM-C020B	CM-C032B		CM-C040B
Double clevis **	CM-D020B	CM-D032B		CM-D040B
Trunnion (With nut)	CM-T020B	CM-T032B		CM-T040B

* Two foot brackets and a mounting nut are attached. When ordering the foot bracket, order 2 pcs. per cylinder.
** Clevis pin and snap ring (cotter pin for ø40) are packaged together.

Mounting Bracket and Accessory

Mounting \ Accessory	Standard equipment			Option	
	Mounting nut	Rod end nut	Clevis pin	Single knuckle joint	Double knuckle joint (3)
Basic style	● (1 pc.)	●	—	●	●
Axial foot style	● (2)	●	—	●	●
Rod side flange style	● (1)	●	—	●	●
Head side flange style	● (1)	●	—	●	●
Single clevis style	— (1)	●	—	●	●
Double clevis style (3)	— (1)	●	●	●	●
Head side trunnion style	● (1) (2)	●	—	●	●
Rod side trunnion style	● (1) (2)	●	—	●	●

Note 1) Mounting nut is not equipped with single clevis style and double clevis style.
Note 2) Trunnion nuts are equipped for head side trunnion and rod side trunnion.
Note 3) Pin and set ring are shipped together with double clevis and double knuckle joint.

⚠ Precautions

Be sure to read before handling. Refer to front matters 42 and 43 for Safety Instructions, pages 3 to 11 for Actuator and Auto Switch Precautions and 3/4/5 Port Solenoid Valve Precautions in Best Pneumatics No. 1.

Precautions

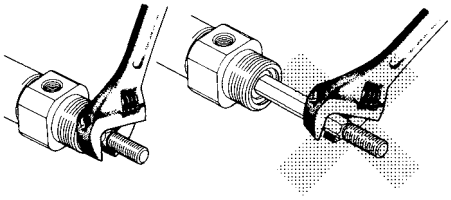
⚠Warning

1. Do not rotate the cover.
If a cover is rotated when installing a cylinder or screwing a fitting into the port, it is likely to damage the junction part with cover.

⚠Caution

1. Avoid using the air cylinder in such a way that rotational torque would be applied to the piston rod.
If rotational torque is applied, the non-rotating guide will deform, causing a loss of non-rotating accuracy. Also, to screw a bracket or a nut onto the threaded portion at the end of the piston rod, make sure to retract the piston rod entirely, and place a wrench on the parallel sections of the rod that protrudes. To tighten, take precautions to prevent the tightening torque from being applied to the non-rotating guide.

Allowable rotational torque (N·m or less)	ø20	ø25	ø32	ø40
	0.2	0.25	0.25	0.44



Disassembly/Replacement

⚠Caution

1. When replacing rod seals, please contact SMC.
Air leakage may be happened, depending on the position in which a rod seal is fitted. Thus, please contact SMC when replacing them.

2. Not able to disassemble.
Since the cover and the cylinder tube are combined by crimping method, it is impossible to disassemble it. Therefore, the internal parts of a cylinder other than rod seal cannot be replaced at all.

3. Do not touch the cylinder during operation.
If the cylinder is operating at a high frequency, be aware that the cylinder tube surface could become very hot, creating the risk of burns.

4. Conjoin the rod end part, so that rod boot might not be twisted.
If a cylinder were installed with its rod boot being twisted, the rod boot could be damaged during operation.

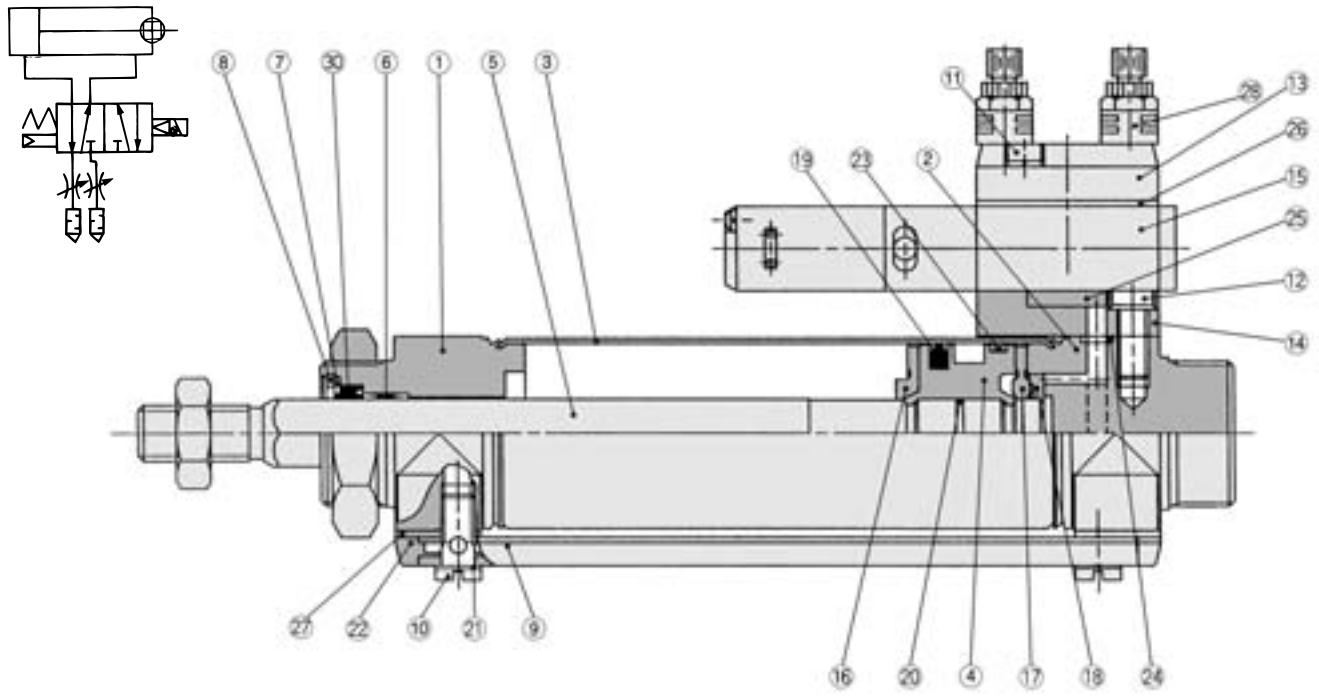
Model Selection

⚠Warning

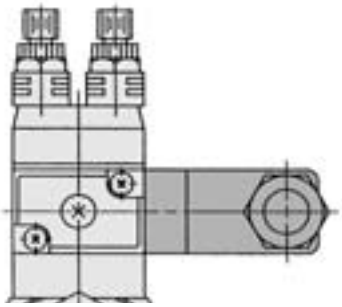
1. Confirm the specifications.
Products in this catalog are designed to be used for compressed air systems. If not operated within the designated pressure or temperature, it may damage the products or cause malfunction. (Refer to specifications.)

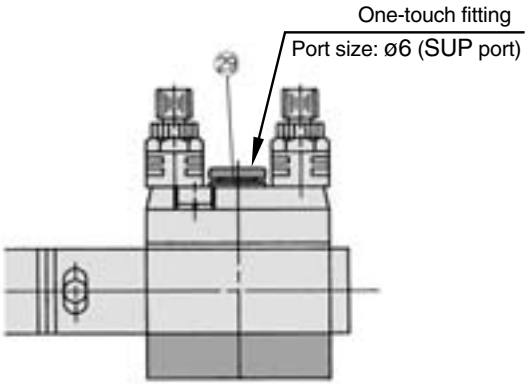
2. Energizing continuously for a long period of time
When the valve is continuously energized for a long period of time, the performance may deteriorate, shorten the service life or affect peripheral equipment adversely since temperature rises when coils generate heat.

Construction



DIN terminal **Built-in One-touch fitting**





Component Parts

No.	Description	Material	Note
1	**Rod cover**	Aluminum alloy	Clear anodized
2	**Head cover**	Aluminum alloy	Clear anodized
3	**Cylinder tube**	Stainless steel	
4	**Piston**	Aluminum alloy	Chromated
5	**Piston rod**	Stainless steel	
6	**Non-rotating guide**	Oil-impregnated sintered alloy	
7	**Seal retainer**	Rolled steel	Nickel plated
8	**Retaining ring**	Carbon tool steel	Nickel plated
9	**Pipe**	Aluminum alloy	White anodized
10	**Stud**	Brass	Electroless nickel plated
11	Hex. socket head cap screw with spring washer	Carbon steel	Nickel plated
12	Hex. socket head cap screw with spring washer	Carbon steel	Nickel plated
13	**Plate**	Aluminum alloy	Metallic painted
14	**Sub-plate**	Aluminum alloy	Metallic painted
15	**Solenoid valve**	—	Refer to the "How to order" below.*
16	**Bumper A**	Urethane	
17	**Bumper B**	Urethane	

* How to order solenoid valves
VZ3□90- Voltage Electrical entry

Component Parts

No.	Description	Material	Note
18	**Retaining ring**	Stainless steel	
19	**Piston seal**	NBR	
20	**Piston gasket**	NBR	
21	**Gasket**	Resin	
22	**Pipe gasket**	Urethane rubber	
23	**Wear ring**	Resin	
24	**Head cover gasket**	NBR	
25	**Sub-plate gasket**	NBR	
26	**Gasket**	NBR	
27	**Spacer gasket**	Resin	Except ø25
28	**Exhaust throttle with silencer**	—	ASN2-M5
29	**One-touch fitting**	—	Port size: ø6

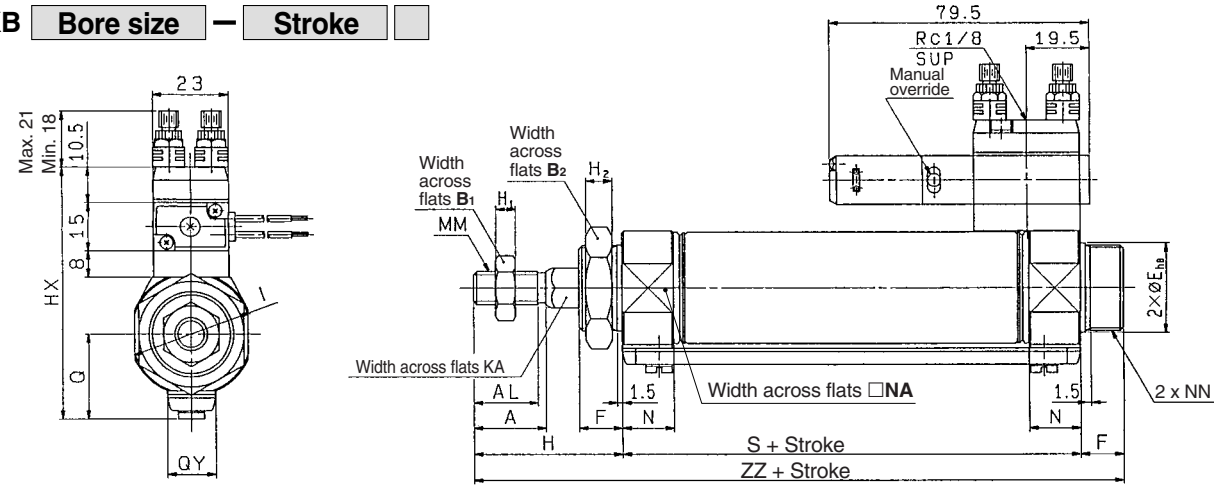
Replacement Parts/Seal Kit

No.	Description	Material	Part no.			
			20	**25**	**32**	**40**
30	**Rod seal**	NBR	PDR-8W	PDR-10W	PDR-12W	PDR-14W

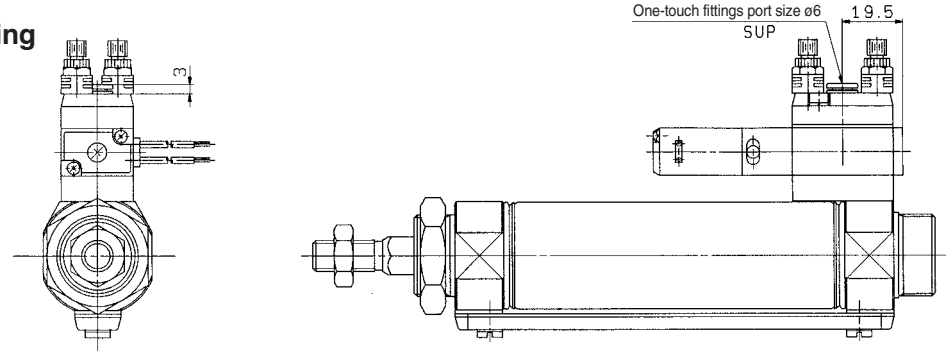
* Since the seal kit does not include a grease pack, order it separately.
Grease pack part no.: GR-S-010 (10g)

Basic Style (B): External Dimensions

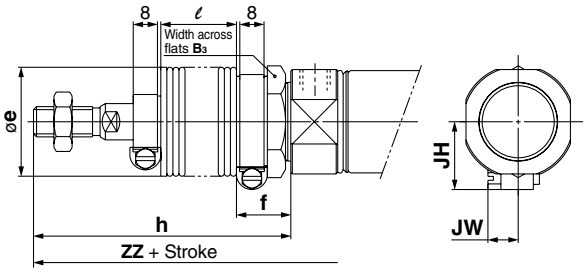
CVM5KB **Bore size** – **Stroke** □



Built-in One-touch fitting



With rod boot



For DIN terminal and double solenoid, refer to page 1572.

(mm)

Bore size (mm)	Stroke range	A	AL	B1	B2	Eh8	F	Q	QY	H	H1	H2	HX	I	KA	MM	N	NA	NN	S	ZZ
20	Up to 300	18	15.5	13	26	$20^{0}_{-0.033}$	13	19.8	14	41	5	8	65.3	28	8.2	M8 x 1.25	15	24	M20 x 1.5	62	116
25	Up to 300	22	19.5	17	32	$26^{0}_{-0.033}$	13	22	14	45	6	8	70.5	33.5	10.2	M10 x 1.25	15	30	M26 x 1.5	62	120
32	Up to 300	22	19.5	17	32	$26^{0}_{-0.033}$	13	25.8	16	45	6	8	76.5	37.5	12.2	M10 x 1.25	15	34.5	M26 x 1.5	64	122
40	Up to 300	24	21	22	41	$32^{0}_{-0.039}$	16	29.8	16	50	8	10	84.5	46.5	14.2	M14 x 1.5	21.5	42.5	M32 x 2	88	154

With Rod Boot

(mm)

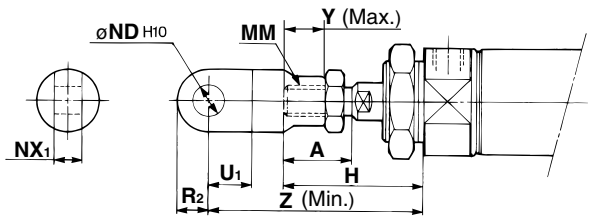
Bore size (mm)	B3	e	f	h					ℓ					JH	JW
				1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	1 to 50	51 to 100	101 to 150	151 to 200	201 to 300	(Reference)	(Reference)
20	30	36	18	68	81	93	106	131	12.5	25	37.5	50	75	23.5	10.5
25	32	36	18	72	85	97	110	135	12.5	25	37.5	50	75	23.5	10.5
32	32	36	18	72	85	97	110	135	12.5	25	37.5	50	75	23.5	10.5
40	41	46	20	77	90	102	115	140	12.5	25	37.5	50	75	27	10.5

(mm)

Bore size (mm)	ZZ				
	1 to 50	51 to 100	101 to 150	151 to 200	201 to 300
20	143	156	168	181	206
25	147	160	172	185	210
32	149	162	174	187	212
40	181	194	206	219	244

Accessory dimensions

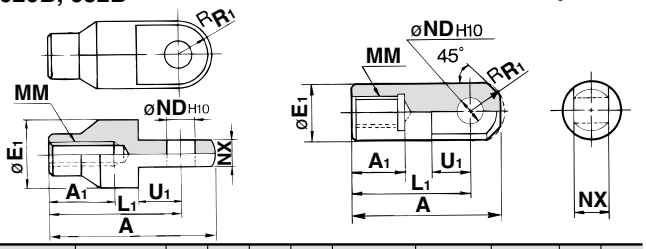
Single Knuckle Joint Mounting (mm)



Bore size	A	H	MM	ND H10	NX1	U1	R2	Y	Z
20	18	41	M8 x 1.25	9 +0.058 0	9 −0.1 −0.2	14	10	11	66
25, 32	22	45	M10 x 1.25	9 +0.058 0	9 −0.1 −0.2	14	10	14	69
40	24	50	M14 x 1.5	12 +0.070 0	16 −0.1 −0.3	20	14	13	92

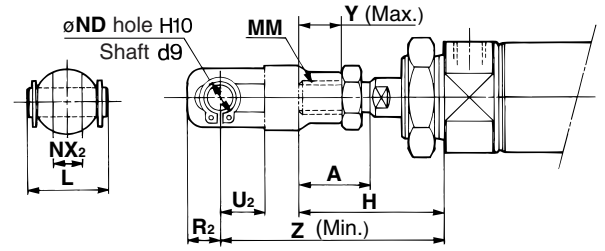
Single Knuckle Joint (mm)

I-020B, 032B Material: Rolled steel **I-040B** Material: Free cutting sulfur steel



Part no.	Applicable bore size	A	A1	E1	L1	MM	ND H10	NX	R1	U1
I-020B	**20**	46	16	20	36	M8 x 1.25	9 +0.058 0	9 −0.1 −0.2	10	14
I-032B	**25, 32**	48	18	20	38	M10 x 1.25	9 +0.058 0	9 −0.1 −0.2	10	14
I-040B	**40**	69	22	24	55	M14 x 1.5	12 +0.070 0	16 −0.1 −0.3	15.5	20

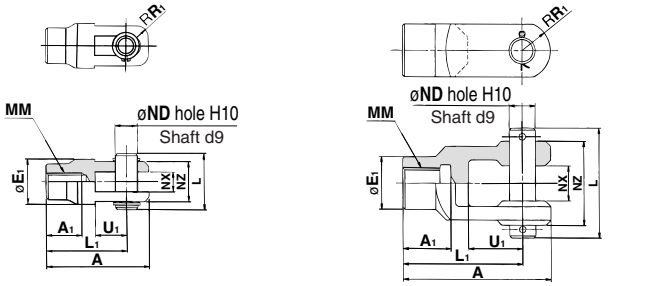
Double Knuckle Joint Mounting (mm)



Bore size	A	H	L	MM	ND	NX2	R2	U2	Y	Z
20	18	41	25	M8 x 1.25	9	9 +0.2 +0.1	10	14	11	66
25, 32	22	45	25	M10 x 1.25	9	9 +0.2 +0.1	10	14	14	69
40	24	50	49.7	M14 x 1.5	12	16 +0.3 +0.1	13	25	13	92

Double Knuckle Joint (mm)

Y-020B, Y-032B Material: Rolled steel **Y-040B** Material: Cast iron



Part no.	Applicable cylinder bore size	A	A1	E1	L	L1	MM	ND
Y-020B	20	46	16	20	25	36	M8 x 1.25	9
Y-032B	25, 32	48	18	20	25	38	M10 x 1.25	9
Y-040B	40	68	22	24	49.7	55	M14 x 1.5	12

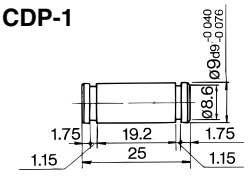
Part no.	NX	NZ	R1	U1	Applicable pin par no.	Retaining ring Cotter pin size
Y-020B	9 +0.2 +0.1	18	5	14	CDP-1	Type C9 for shaft
Y-032B	9 +0.2 +0.1	18	5	14	CDP-1	Type C9 for shaft
Y-040B	16 +0.3 +0.1	38	13	25	CDP-3	ø3 x 18ℓ

∗ Knuckle pins and retaining rings (cotter pins for ø40) are included.

Double Clevis Pin/Material: Carbon steel (mm)

Bore size: ø20, ø25, ø32

CDP-1

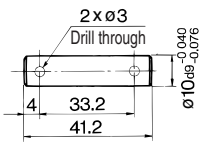


Retaining ring: Type C9 for shaft

∗ Retaining rings (cotter pins for ø40) are included.

Bore size: ø40

CDP-2

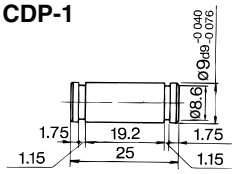


Cotter pins used
ø3 x 18ℓ

Double Clevis Pin/Material: Carbon steel (mm)

Bore size: ø20, ø25, ø32

CDP-1

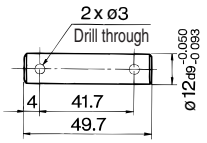


Retaining ring: Type C9 for shaft

∗ Retaining rings (cotter pins for ø40) are included.

Bore size: ø40

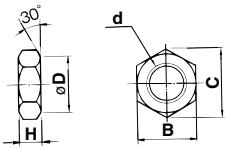
CDP-3



Cotter pins used
ø3 x 18ℓ

Rod End Nut (mm)

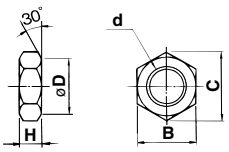
Material: Carbon steel



Part no.	Applicable bore size	B	C	D	d	H
NT-02	**20**	13	15.0	12.5	M8 x 1.25	5
NT-03	**25, 32**	17	19.6	16.5	M10 x 1.25	6
NT-04	**40**	22	25.4	21.0	M14 x 1.5	8

Mounting Nut (mm)

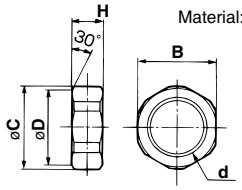
Material: Carbon steel



Part no.	Applicable bore size	B	C	D	d	H
SN-020B	**20**	26	30	25.5	M20 x 1.5	8
SN-032B	**25, 32**	32	37	31.5	M26 x 1.5	8
SN-040B	**40**	41	47.3	40.5	M32 x 2.0	10

Trunnion Nut (mm)

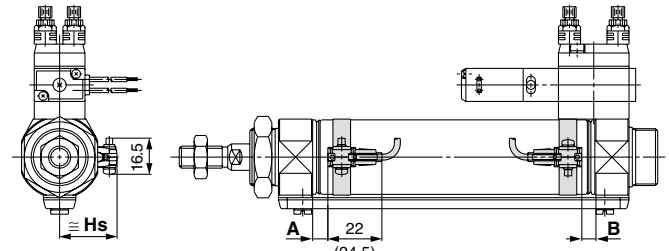
Material: Carbon steel



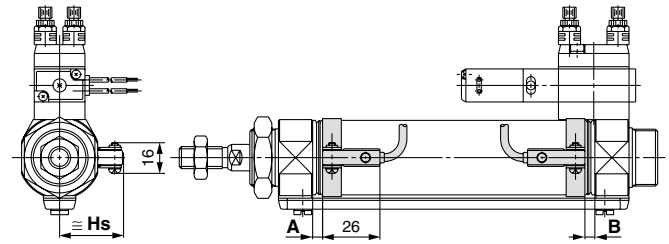
Part no.	Applicable bore size	B	C	D	d	H
TN-020B	**20**	26	28	25.5	M20 x 1.5	10
TN-032B	**25, 32**	32	34	31.5	M26 x 1.5	10
TN-040B	**40**	41	45	40.5	M32 x 2	10

Auto Switch Proper Mounting Position (Detection at Stroke End) and Mounting Height

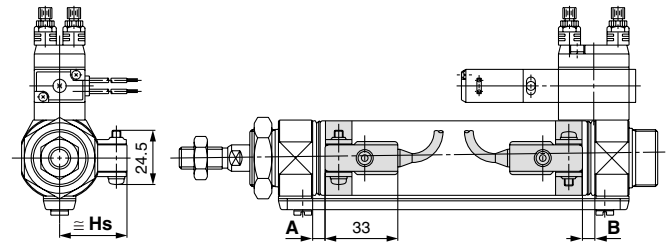
Reed auto switch
D-A9□



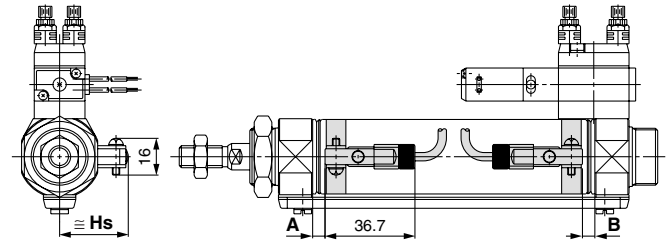
D-C7/C8



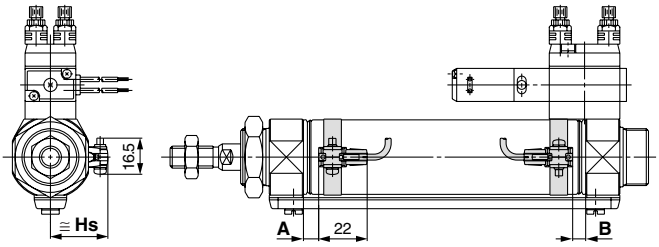
D-B5/B6/B59W



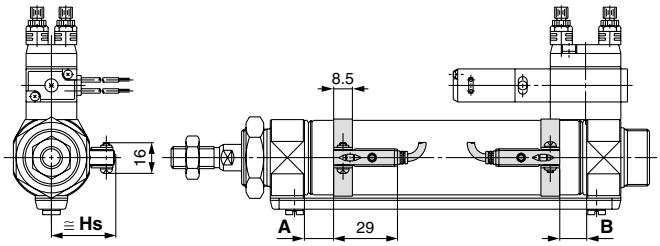
D-C73C/C80C



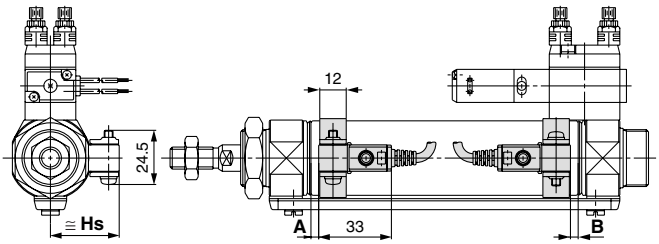
Solid state auto switch
D-M9□
D-M9□W



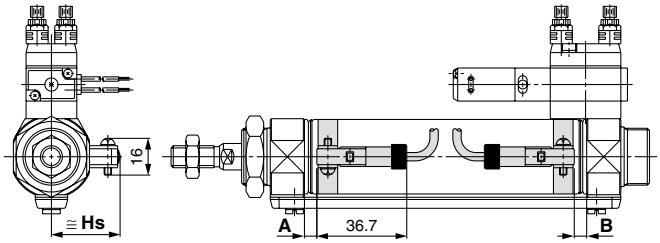
D-H7□/H7□W/H7NF



D-G5NTL



D-H7C



Auto Switch Proper Mounting Position (Detection at Stroke End) and Mounting Height

Auto Switch Proper Mounting Position

(mm)

Auto switch model / Bore size (mm)	D-A9□		D-M9□ D-M9□W		D-B5□ D-B64		D-C7□ D-C80 D-C73C D-C80C		D-B59W		D-H7□ D-H7C D-H7□W D-H7NF		D-G5NTL	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
20	6.5	5.5	10.5	9.5	1	0	7	6	4	3	6	5	2.5	1.5
25	6.5	5.5	10.5	9.5	1	0	7	6	4	3	6	5	2.5	1.5
32	7.5	6.5	11.5	10.5	2	1	8	7	5	4	7	6	3.5	2.5
40	13.5	11.5	17.5	15.5	7	6	13	12	10	9	12	11	8.5	7.5

Note) Adjust the auto switch after confirming the operating conditions in the actual setting.

Auto Switch Mounting Height

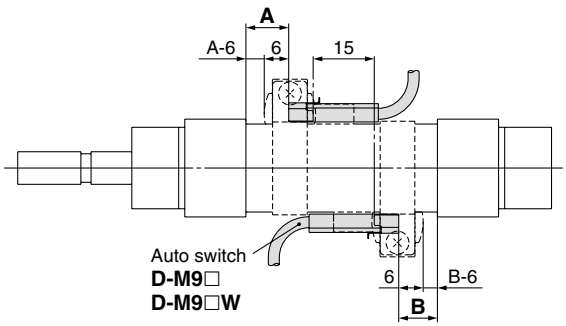
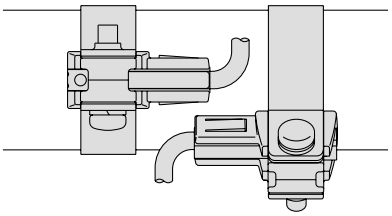
(mm)

Auto switch model / Bore size (mm)	D-A9□ D-M9□ D-M9□W	D-B5□ D-B64 D-B59W D-G5NTL D-H7C	D-C7□ D-C80 D-H7□ D-H7□W D-H7NF	D-C73C D-C80C
	Hs	Hs	Hs	Hs
20	22	25.5	22.5	25
25	24.5	28	25	27.5
32	28	31.5	28.5	31
40	32	35.5	32.5	35

Minimum Auto Switch Mounting Stroke

n: No. of auto switches (mm)

Auto switch model	No. of auto switch mounted				
	1	2		n	
		Different surfaces	Same surface	Different surfaces	Same surface
D-A9□ D-M9□ D-M9□W	10	15 Note)	45 Note)	$15 + 45\frac{(n-2)}{2}$ (n = 2, 4, 6···)	45 + 45 (n - 2)
D-C7□ D-C80	10	15	50	$15 + 45\frac{(n-2)}{2}$ (n = 2, 4, 6···)	50 + 45 (n - 2)
D-H7□ D-H7□W D-H7NF	10	15	60	$15 + 45\frac{(n-2)}{2}$ (n = 2, 4, 6···)	60 + 45 (n - 2)
D-C73C D-C80C D-H7C	10	15	65	$15 + 50\frac{(n-2)}{2}$ (n = 2, 4, 6···)	65 + 50 (n - 2)
D-B5□/B64 D-G5NTL	10	15	75	$15 + 50\frac{(n-2)}{2}$ (n = 2, 4, 6···)	75 + 55 (n - 2)
D-B59W	15	20	75	$20 + 50\frac{(n-2)}{2}$ (n = 2, 4, 6···)	75 + 55 (n - 2)

Auto switch model	With 2 auto switches	
	Different surfaces	Same surface
	 The proper auto switch mounting position is 6 mm inward from the switch holder edge.	 The auto switch is mounted by slightly displacing it in a direction (cylinder tube circumferential exterior) so that the auto switch and lead wire do not interfere with each other.
D-A93	—	Less than 50 strokes
D-M9□ D-M9□W	Less than 20 strokes	Less than 55 strokes

Note) When two auto switches of D-A93/M9□/M9□W are mounted.

Operating Range

(mm)

Auto switch model	Bore size (mm)			
	20	**25**	**32**	**40**
D-A9□	6	6	6	6
D-M9□/M9□W	3.5	3	3.5	3
D-C7□/C80 D-C73C/C80C	7	8	8	8
D-B5□/B64	8	8	9	9
D-B59W	12	12	13	13
D-H7□/H7□W D-G5NTL/H7NF	4	4	4.5	5
D-H7C	7	8.5	9	10

∗ Since the operating range is provided as a guideline including hysteresis, it cannot be guaranteed (assuming approximately ±30% dispersion).
It may vary substantially depending on an ambient environment.

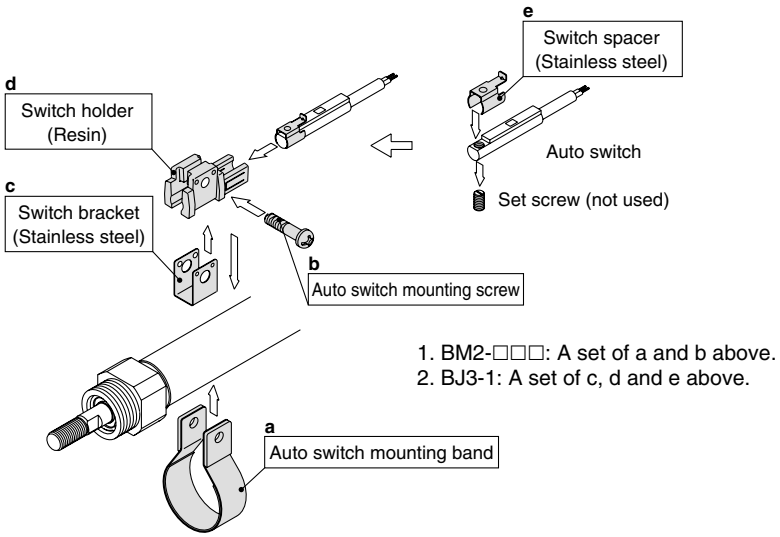
Auto Switch Mounting Bracket: Part No.

Auto switch mounting	Bore size (mm)			
	ø20	ø25	ø32	ø40
D-A9□ **D-M9□** **D-M9□W**	Note 1) ①BM2-020 ②BJ3-1	Note 1) ①BM2-025 ②BJ3-1	Note 1) ①BM2-032 ②BJ3-1	Note 1) ①BM2-040 ②BJ3-1
D-C7□/C80 **D-C73C/C80C** **D-H7□** **D-H7□W** **D-H7NF**	BM2-020	BM2-025	BM2-032	BM2-040
D-B5□/B64 **D-B59W** **D-G5NTL** **D-G5NBL**	BA2-020	BA2-025	BA2-032	BA2-040

Note 1) Two kinds of auto switch mounting brackets are used as a set.

[Mounting screw set made of stainless steel]

The following set of mounting screws made of stainless steel is available. Use it in accordance with the operating environment. (Please order the auto switch mounting bracket separately, since it is not included.)
BBA4: For D-C7/C8/H7 types
Note 2) Refer to page 1814 for the details of BBA4.



1. BM2-□□□: A set of a and b above.
2. BJ3-1: A set of c, d and e above.

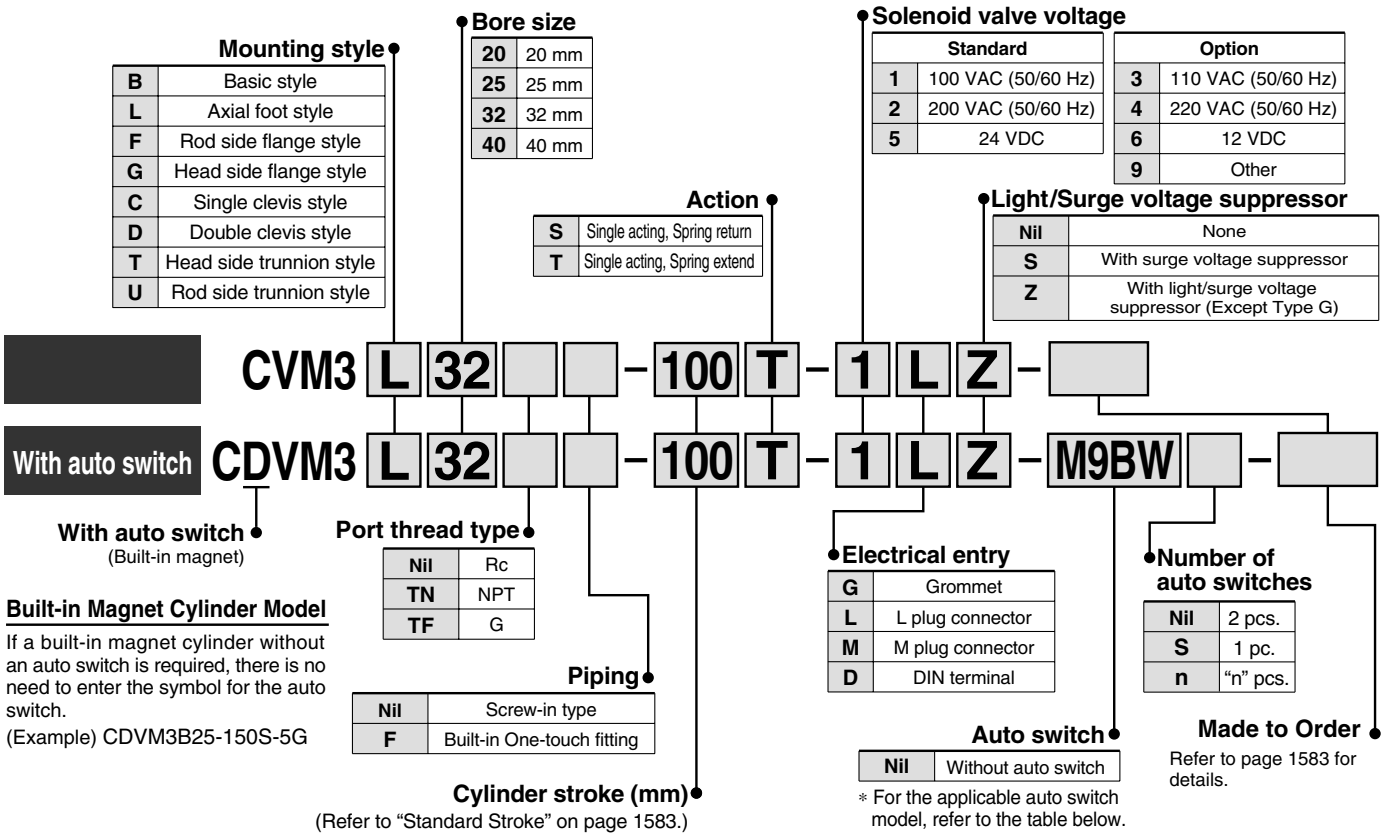
Besides the models listed in How to Order, the following auto switches are applicable.
Refer to pages 1719 to 1827 for detailed specifications.

Auto switch type	Part no.	Electrical entry (Fetching direction)	Features
Reed	D-B53, C73, C76	Grommet (In-let)	—
	D-C80		Without indicator light
Solid state	D-H7A1, H7A2, H7B		—
	D-H7NW, H7PW, H7BW		Diagnostic indication (2-color)
	D-G5NTL		With timer

∗ For solid state auto switches, auto switches with a pre-wired connector are also available. Refer to pages 1784 and 1785 for details.
∗ Normally closed (NC = b contact) solid state auto switches (D-F9G/F9H types) are also available. Refer to page 1746 for details.
∗ Wide range detection type, solid state auto switches (D-G5NBL type) are also available. Refer to page 1776 for details.

Valve Mounted Cylinder
Single Acting, Spring Return/Extend
Series CVM3
ø20, ø25, ø32, ø40

How to Order



Built-in Magnet Cylinder Model

If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.

(Example) CDVM3B25-150S-5G

Applicable Auto Switch/Refer to pages 1719 to 1827 for further information on auto switches.

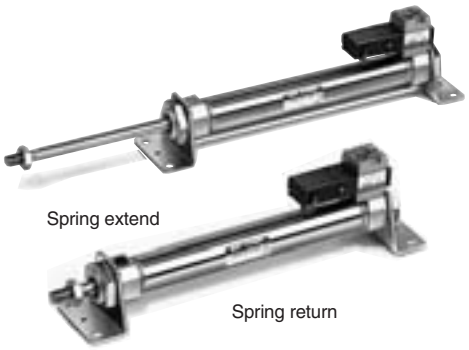
Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC	Load voltage AC	Auto switch model	Lead wire length (m) 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	None (N)	Pre-wired connector	Applicable load	
Solid state switch	——	Grommet	Yes	3-wire (NPN)	5 V, 12 V	—	M9N	●	●	●	○	—	○	IC circuit	Relay, PLC
				3-wire (PNP)			M9P	●	●	●	○	—	○		
				2-wire	12 V		M9B	●	●	●	○	—	○	—	
		Connector					H7C	●	—	●	●	●	—		
	Diagnostic indication (2-color indication)	Grommet		3-wire (NPN)	5 V, 12 V		M9NW	●	●	●	○	—	○	IC circuit	
				3-wire (PNP)			M9PW	●	●	●	○	—	○		
				2-wire	12 V		M9BW	●	●	●	○	—	○	—	
	With diagnostic output (2-color indication)			4-wire (NPN)	5 V, 12 V		H7NF	●	—	●	○	—	○	IC circuit	
Reed switch	——	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	A96	●	—	●	—	—	—	IC circuit	—
			None	2-wire	24 V	12 V	100 V	A93	●	—	●	—	—	—	—	Relay, PLC
			Yes				100 V or less	A90	●	—	●	—	—	—	IC circuit	
			None				100 V, 200V	B54	●	—	●	●	—	—	—	
			Yes				200 V or less	B64	●	—	●	—	—	—		
		Connector	None				—	C73C	●	—	●	●	●	—		
			Yes				24 V or less	C80C	●	—	●	●	●	—	IC circuit	
			None													
	Diagnostic indication (2-color indication)	Grommet	Yes		—	—	B59W	●	—	●	—	—	—	—	

* 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
None ····· N (Example) H7CN

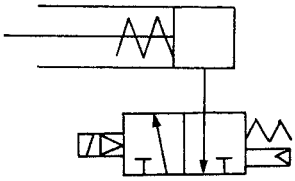
* Solid state auto switches marked with "○" are produced upon receipt of order.
* D-A9□V□/M9□V□/M9□WV□/M9□A(V) types cannot be mounted.

* Since there are other applicable auto switches than listed, refer to page 1603 for details.
* For details about auto switches with pre-wired connector, refer to pages 1784 and 1785.
* D-A9□/M9□/M9□W auto switches are shipped together (not assembled). (Only auto switch mounting brackets are assembled before shipped.)

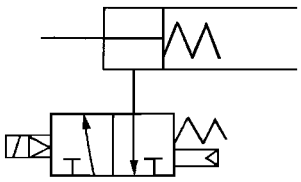
An auto switch cylinder with the switch installed can also be manufactured.



JIS Symbol
Spring return



Spring extend



Specifications

Applicable bore size (mm)		20	25	32	40
Action		Single acting, Spring return/Spring extend			
Fluid		Air			
Cushion		Rubber bumper			
Proof pressure		1 MPa			
Maximum operating pressure		0.7 MPa			
Minimum operating pressure		0.18 MPa Spring return		0.23 MPa Spring extend	
Ambient and fluid temperature		–10 to 50°C (No freezing)			
Lubrication		Not required (Non-lube)			
Stroke length tolerance		$^{+1.4}_{0}$			
Piping	**Screw-in type**	Rc 1/8			
	Built-in One-touch fitting	O.D.: ø6/I.D.: ø4			
Manual override		Non locking (Standard)			
Piston speed (mm/s)		50 to 700	50 to 650	50 to 590	50 to 420
Allowable kinetic energy		0.27 J	0.4 J	0.65 J	1.2 J
Mounting		Basic style, Axial foot style, Rod side flange style, Head side flange style, Single clevis style, Double clevis style, Head side trunnion style, Rod side trunnion style			

Solenoid Valve Specifications

Applicable solenoid valve model			VZ319
Coil rated voltage			Standard: 100/200 VAC (50/60 Hz), 24 VDC Option: 110/220 VAC, 12 VDC
Effestive area of valve (Cv factor)			4.5 mm² (0.25)
Allowable voltage			–15 to 10% of the rated voltage
Coil insulation			Class B or equivalent (130°C)
Electrical entry			Grommet, L plug connector, M plug connector, DIN terminal
Power consumption (W) Note)	**DC**		1.8 (With indicator light: 2.1)
power (VA) Note)	**AC**	**Inrush**	4.5/50 Hz, 4.2/60 Hz
		Holding	3.5/50 Hz, 3.0/60 Hz

Note) At the rated voltage.

CV□
MVGQ

Made to Order

Made to Order Specifications
(For details, refer to pages 1836, 1851 to 1954.)

Symbol	Specifications
—XA□	Change of rod end shape
—XC6	Made of stainless steel
—XC29	Double knuckle joint with spring pin
—XC52	Mounting nut with set screw

Refer to pages 1600 to 1603 for cylinders with auto switches.

- Minimum auto switch mounting stroke
- Proper auto switch mounting position (detection at stroke end) and mounting height
- Operating range
- Switch mounting bracket: Part no.

Standard Stroke

Bore size (mm)	Standard stroke (mm) Note)
20	25, 50, 75, 100, 125, 150 *
25	25, 50, 75, 100, 125, 150 *
32	25, 50, 75, 100, 125, 150, 200 *
40	25, 50, 75, 100, 125, 150, 200, 250 *

Note 1) Intermediate stroke except mentioned above is produced upon receipt of order.
Note 2) Strokes marked with "*" are the maximum strokes which are available.

Theoretical Output

Refer to the Technical Data (Theoretical Output 1) in Best Pneumatics No. 2.

Spring Reaction Force

Refer to the Technical Data (Table 2: Spring Reaction Force) in Best Pneumatics No. 2.

D-□
-X□
Individual -X□

Mounting Bracket and Accessory

Mounting \ Accessory	Standard equipment			Option	
	Mounting nut	Rod end nut	Clevis pin	Single knuckle joint	Double knuckle joint (3)
Basic style	● (1 pc.)	●	—	●	●
Axial foot style	● (2)	●	—	●	●
Rod side flange style	● (1)	●	—	●	●
Head side flange style	● (1)	●	—	●	●
Single clevis style	— (1)	●	—	●	●
Double clevis style (3)	— (1)	●	●	●	●
Head side trunnion style	● (1) (2)	●	—	●	●
Rod side trunnion style	● (1) (2)	●	—	●	●

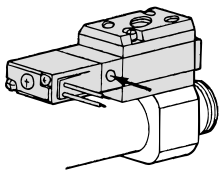
Note 1) Mounting nut is not equipped with single clevis style and double clevis style.
Note 2) Trunnion nuts are equipped for head side trunnion and rod side trunnion.
Note 3) Pin and retaining ring are shipped together with double clevis and double knuckle joint.

Accessory Bracket

Further information on accessories are the same specifications as these of the standard double acting single rod. Refer to page 1578.

Manual Operation

Manual operation is possible by pushing the manual button indicated with the arrow.



Mass

Spring Return/( ): Denotes Spring Extend.

(kg)

Bore size (mm)		20	25	32	40
Basic mass	25 stroke	0.30 (0.30)	0.40 (0.04)	0.52 (0.51)	0.87 (0.86)
	50 stroke	0.32 (0.32)	0.43 (0.43)	0.56 (0.56)	0.94 (0.93)
	75 stroke	0.37 (0.37)	0.52 (0.51)	0.68 (0.66)	1.13 (1.09)
	100 stroke	0.39 (0.39)	0.55 (0.54)	0.73 (0.70)	1.19 (1.16)
	125 stroke	0.45 (0.44)	0.64 (0.61)	0.86 (0.82)	1.39 (1.33)
	150 stroke	0.47 (0.46)	0.67 (0.64)	0.90 (0.86)	1.46 (1.40)
	200 stroke	— (—)	— (—)	1.07 (1.02)	1.71 (1.63)
	250 stroke	— (—)	— (—)	— (—)	1.97 (1.85)
Mounting bracket mass	Axial foot	0.15 (0.15)	0.16 (0.16)	0.16 (0.16)	0.27 (0.27)
	Flange	0.06 (0.06)	0.09 (0.09)	0.09 (0.09)	0.12 (0.12)
	Single clevis	0.04 (0.04)	0.04 (0.04)	0.04 (0.04)	0.09 (0.09)
	Double clevis	0.05 (0.05)	0.06 (0.06)	0.06 (0.06)	0.13 (0.13)
	Trunnion	0.04 (0.04)	0.07 (0.07)	0.07 (0.07)	0.10 (0.10)
Option bracket	Single knuckle joint	0.06 (0.06)	0.06 (0.06)	0.06 (0.06)	0.23 (0.23)
	Double knuckle (With pin)	0.07 (0.07)	0.07 (0.07)	0.07 (0.07)	0.20 (0.20)

Calculation: (Example) **CVM3L32-100-1G**
(ø32, 100 stroke, Spring return)
- Basic mass·····0.73 (kg)
- Mass of brackets·····0.16 (kg)

0.73 + 0.16 = 0.89 kg

⚠Precautions

Be sure to read before handling. Refer to front matters 42 and 43 for Safety Instructions, pages 3 to 11 for Actuator and Auto Switch Precautions and 3/4/5 Port Solenoid Valve Precautions in Best Pneumatics No. 1.

Operating Precautions

⚠ Warning

1. Do not rotate the cover.

If a cover is rotated when installing a cylinder or screwing a fitting into port, it is likely to damage the junction part with cover.

⚠ Caution

1. Not able to disassemble.

Cover and cylinder tube are connected to each other by caulking method, thus making it impossible to disassemble. Therefore, internal parts of a cylinder other than rod seal are not replaceable.

2. Use caution to the popping of a retaining ring.

When replacing rod seals and removing and mounting a retaining ring, use a proper tool (retaining ring plier: tool for installing type C retaining ring). Even if a proper tool is used, it is likely to inflict damage to a human body or peripheral equipment, as a retaining ring may be flown out of the tip of a plier. Be much careful with the popping of a retaining ring. Besides, be certain that a retaining ring is placed firmly into the groove of rod cover before supplying air at the time of installment.

⚠ Caution

3. Do not touch the cylinder during operation.

Use caution when handling a cylinder, which is running at a high speed and a high frequency, because the surface of a cylinder tube could get so hot enough as to cause you get burned.

4. One-touch fitting cannot be replaced.

One-touch fitting is press-fit into the cover, thus cannot be replaced.

Model Selection

⚠ Warning

1. Confirm the specifications.

Products in this catalog are designed to be used for compressed air systems (including vacuum). If not operated within the designated pressure or temperature, it may damage the products or cause malfunction. (Refer to specifications.)

2. Energizing continuously for a long period of time

When the valve is continuously energized for a long period of time, the performance may deteriorate, shorten the service life or affect peripheral equipment adversely since temperature rises when coils generate heat.

Built-in One-touch Fitting

CVM3 | **Mounting style** | **Bore size** | **F** — | **For "How to Order", refer to page 1582.**

F: Built-in One-touch fitting

One-touch fittings are installed on cylinders.

For dimensions of each mounting bracket, refer to pages 1588 to 1594.

Specifications

Action	Single acting, Spring return		Single acting, Spring extend	
Bore size (mm)	ø20, ø25, ø32, ø40			
Max. operating pressure	0.7 MPa			
Min. operating pressure	0.18 MPa		0.23 MPa	
Cushion	Rubber bumper			
Piping	Built-in One-touch fitting			
Piston speed (mm/s)	ø20	ø25	ø32	ø40
	50 to 700	50 to 650	50 to 590	50 to 420
Port size (Tube bore size)	O.D.: ø6/I.D.: ø4			
Applicable bore size	Can be used for either nylon, soft nylon or polyurethane tube.			
Mounting	Basic style, Axial foot style, Rod side flange style, Head side flange style, Single clevis style, Double clevis style, Head side trunnion style, Rod side trunnion style			

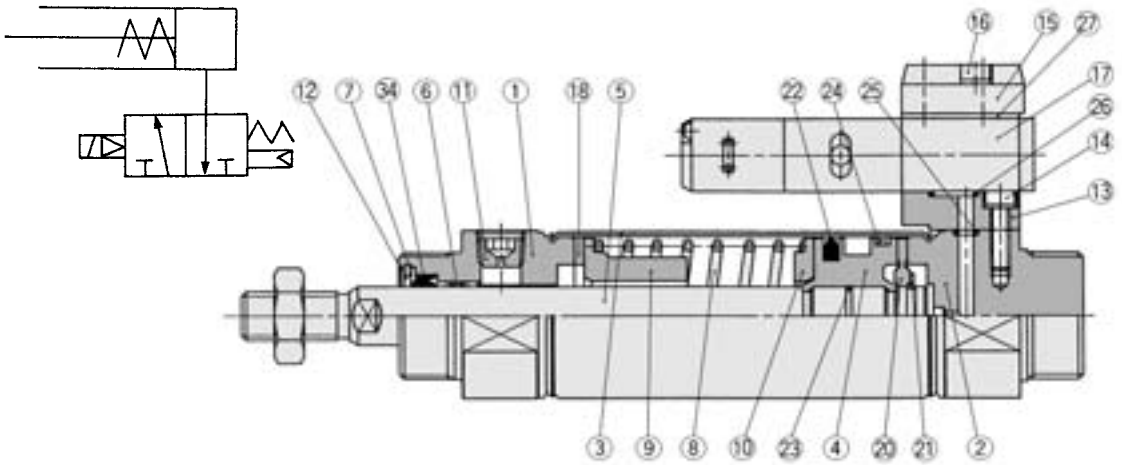
Mounting Bracket Part No.

Bore size (mm)	20	25	32	40
Axial foot *	CM-L020B	CM-L032B		CM-L040B
Flange	CM-F020B	CM-F032B		CM-F040B
Single clevis	CM-C020B	CM-C032B		CM-C040B
Double clevis **	CM-D020B	CM-D032B		CM-D040B
Trunnion (with nut)	CM-T020B	CM-T032B		CM-T040B

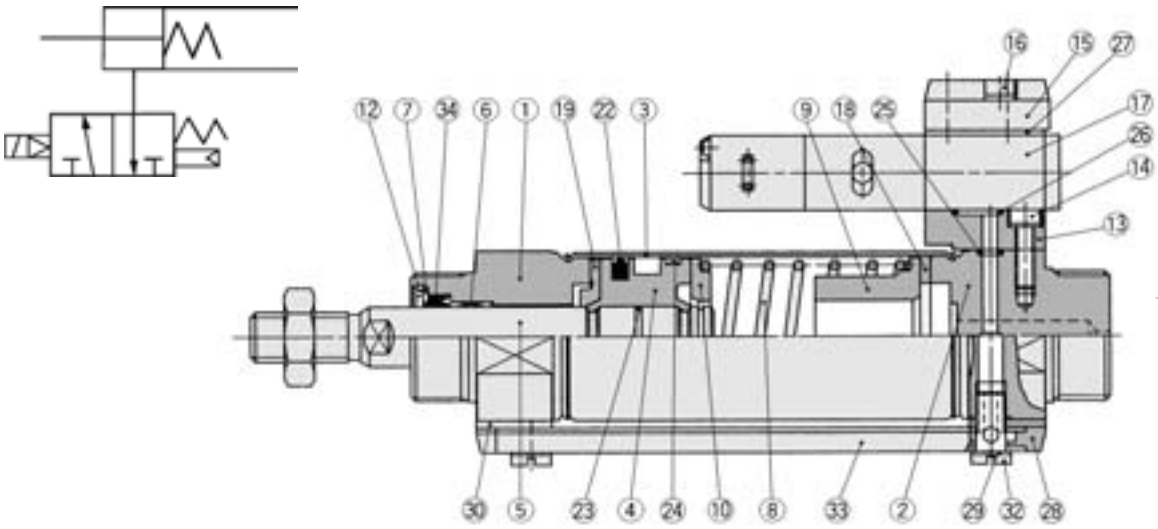
* Two foot brackets and a mounting nut are attached.
When ordering the foot bracket, order 2 pcs. per cylinder.
** Clevis pin and retaining ring (cotter pin for ø40) are packaged together.

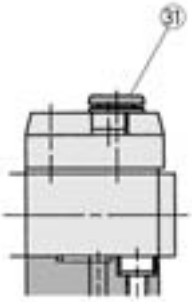
Construction

Spring return

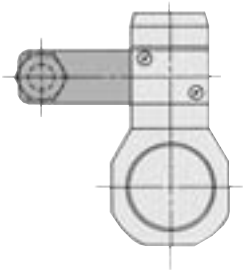


Spring extend





Built-in One-touch fitting



DIN terminal

Component Parts

No.	Description	Material	Note
1	**Rod cover**	Aluminum alloy	Clear anodized
2	**Head cover**	Aluminum alloy	Clear anodized
3	**Cylinder tube**	Stainless steel	
4	**Piston**	Aluminum alloy	Chromated
5	**Piston rod**	Carbon steel	Hard chromium electroplated
6	**Bushing**	Oil-impregnated sintered alloy	
7	**Seal retainer**	Rolled steel	Nickel plated
8	**Return spring**	Steel wire	Zinc chromated
9	**Spring guide**	Aluminum alloy	Chromated
10	**Spring seat**	Aluminum alloy	Chromated
11	**Plug with fixed orifice**	Alloy steel	Black zinc chromated
12	**Retaining ring**	Carbon tool steel	Nickel plated
13	**Sub-plate**	Aluminum alloy	Metallic painted
14	Hex. socket head cap screw with spring washer	Carbon steel	Nickel plated
15	**Plate**	Aluminum alloy	Metallic painted
16	Hex. socket head cap screw with spring washer	Carbon steel	Nickel plated
17	**Solenoid valve**	—	Refer to "How to order" below.*
18	**Bumper**	Urethane	
19	**Bumper A**	Urethane	

* How to order solenoid valves
VZ319-[Voltage][Electrical entry]

Component Parts

No.	Description	Material	Note
20	**Bumper B**	Urethane	
21	**Retaining ring**	Stainless steel	
22	**Piston seal**	NBR	
23	**Piston gasket**	NBR	
24	**Wear ring**	Resin	
25	**Head cover gasket**	NBR	
26	**Sub-plate gasket**	NBR	
27	**Gasket**	NBR	
28	**Pipe gasket**	Urethane rubber	
29	**Gasket**	Resin	
30	**Spacer gasket**	Resin	
31	**One-touch fitting**	—	Port size: ø6
32	**Stud**	Brass	Electroless nickel plated
33	**Pipe**	Aluminum alloy	Clear anodized

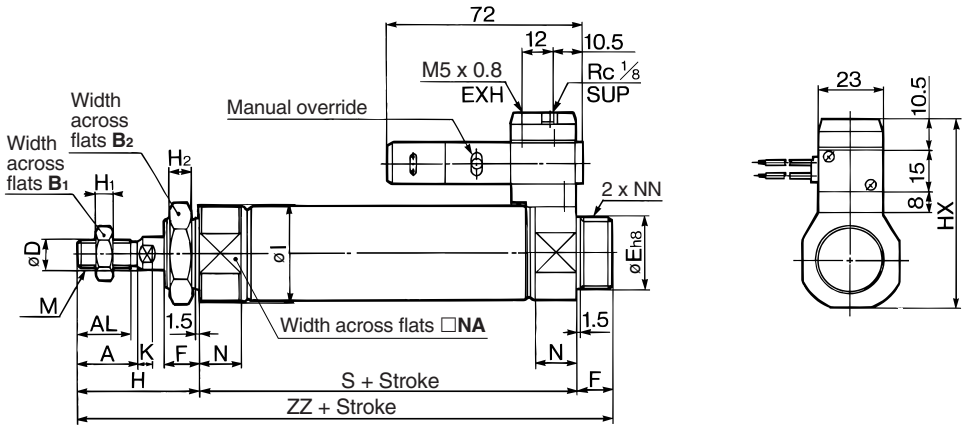
Replacement Parts/Seal Kit

No.	Description	Material	Part no.			
			20	**25**	**32**	**40**
34	**Rod seal**	NBR	PDU-8Z	PDU-10Z	PDU-12LZ	PDU-14LZ

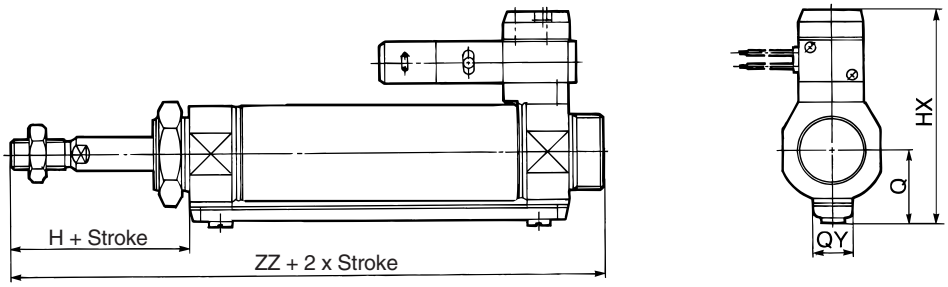
* Since the seal kit does not include a grease pack, order it separately.
Grease pack part no.: GR-S-010 (10g)

Basic Style (B)

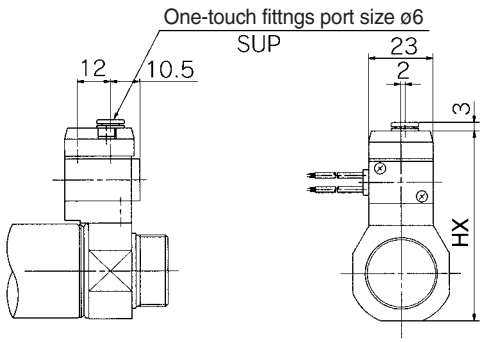
Single acting, Spring return: CVM3B Bore size – Stroke S



Single acting, Spring extend: CVM3B Bore size – Stroke T



Built-in One-touch fitting



(mm)

Bore size (mm)	A	AL	B_1	B_2	D	Eh_8	F	H	H_1	H_2	HX	I	K	MM	N	NA	NN
20	18	15.5	13	26	8	$20^{0}_{-0.033}$	13	41	5	8	57.5	28	5	M8 x 1.25	15	24	M20 x 1.5
25	22	19.5	17	32	10	$26^{0}_{-0.033}$	13	45	6	8	63.5	33.5	5.5	M10 x 1.25	15	30	M26 x 1.5
32	22	19.5	17	32	12	$26^{0}_{-0.033}$	13	45	6	8	68	37.5	5.5	M10 x 1.25	15	34.5	M26 x 1.5
40	24	21	22	41	14	$32^{0}_{-0.039}$	16	50	8	10	76	46.5	7	M14 x 1.5	21.5	42.5	M32 x 2

Dimensions by Stroke

(mm)

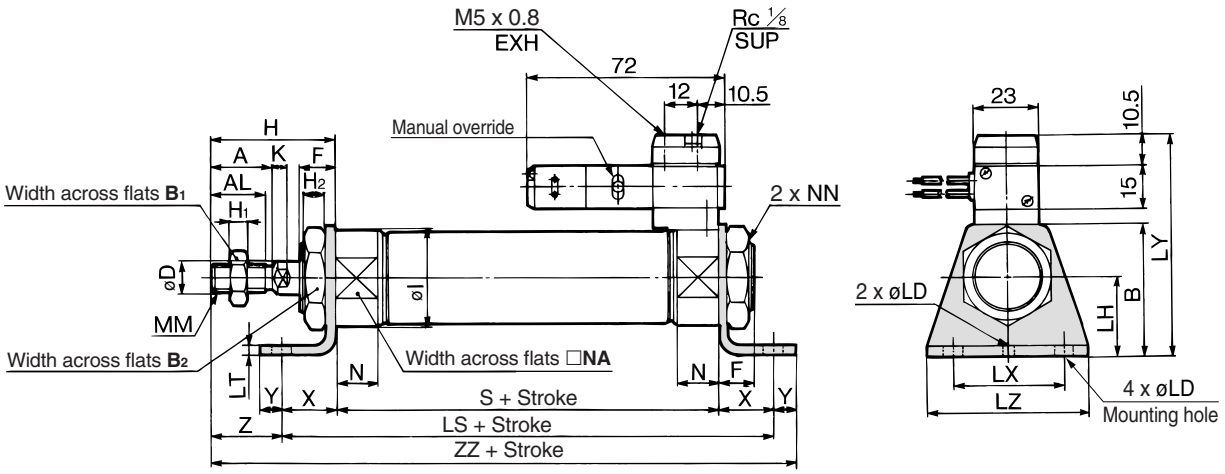
Bore size (mm) \ Stroke / Symbol	1 to 50		51 to 100		101 to 150		151 to 200		201 to 250	
	S	**ZZ**	**S**	**ZZ**	**S**	**ZZ**	**S**	**ZZ**	**S**	**ZZ**
20	87	141	112	166	137	191	—	—	—	—
25	87	145	112	170	137	195	—	—	—	—
32	89	147	114	172	139	197	164	222	—	—
40	113	179	138	204	163	229	188	254	213	279

Single Acting/Spring Extend (mm)

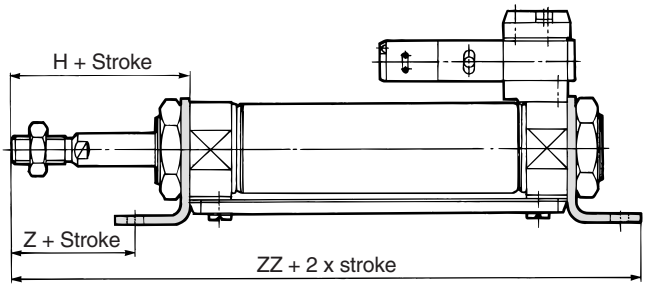
Bore size (mm)	HX	Q	QY
20	65.3	19.8	14
25	70.5	22	14
32	76.5	25.8	16
40	84.5	29.8	16

Axial Foot Style (L)

Single acting, Spring return: CVM3L Bore size — Stroke S



Single acting, Spring extend: CVM3L Bore size — Stroke T



(mm)

Bore size (mm)	A	AL	B	B1	B2	D	F	H	H1	H2	I	K	LC	LD	LH	LT	LX	LY	LZ	MM	N	NA
20	18	15.5	40	13	26	8	13	41	5	8	28	5	4	6.8	25	3.2	40	70.5	55	M8 x 1.25	15	24
25	22	19.5	47	17	32	10	13	45	6	8	33.5	5.5	4	6.8	28	3.2	40	76.5	55	M10 x 1.25	15	30
32	22	19.5	47	17	32	12	13	45	6	8	37.5	5.5	4	6.8	28	3.2	40	78.8	55	M10 x 1.25	15	34.5
40	24	21	54	22	41	14	16	50	8	10	46.5	7	4	7	30	3.2	55	84.8	75	M14 x 1.5	21.5	42.5

(mm)

Bore size (mm)	NN	X	Y	Z
20	M20 x 1.5	20	8	21
25	M26 x 1.5	20	8	25
32	M26 x 1.5	20	8	25
40	M32 x 2	23	10	27

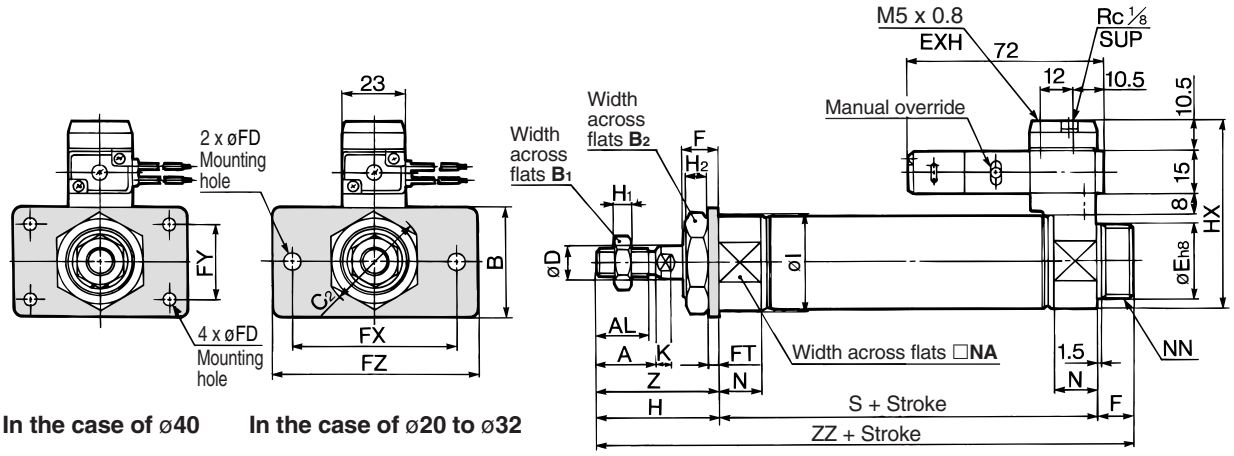
Dimensions by Stroke

(mm)

Bore size (mm) \ Stroke / Symbol	1 to 50			51 to 100			101 to 150			151 to 200			201 to 250		
	S	**LS**	**ZZ**	**S**	**LS**	**ZZ**	**S**	**LS**	**ZZ**	**S**	**LS**	**ZZ**	**S**	**LS**	**ZZ**
20	87	127	156	112	152	181	137	177	206	—	—	—	—	—	—
25	87	127	160	112	152	185	137	177	210	—	—	—	—	—	—
32	89	129	162	114	154	187	139	179	212	164	204	237	—	—	—
40	113	159	196	138	184	221	163	209	246	188	234	271	213	259	296

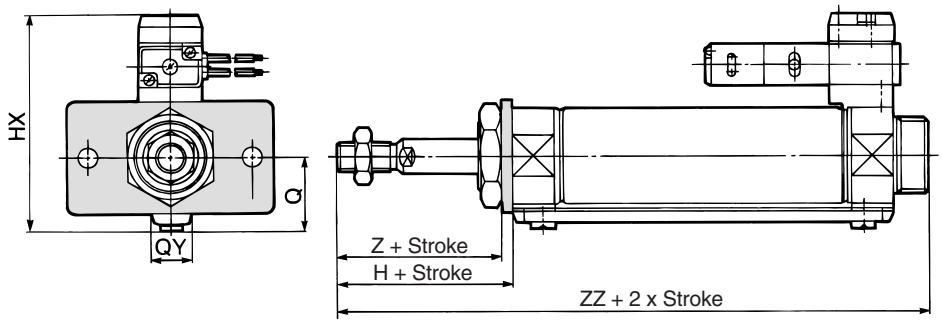
Rod Side Flange Style (F)

Single acting, Spring return: CVM3F Bore size — Stroke **S**



In the case of ø40 In the case of ø20 to ø32

Single acting, Spring extend: CVM3F Bore size — Stroke **T**



(mm)

Bore size (mm)	A	AL	B	B_1	B_2	C_2	D	Eh_8	F	FD	FT	FX	FY	FZ	H	H_1	H_2	HX	I	K
20	18	15.5	34	13	26	30	8	$20^{\ 0}_{-0.033}$	13	7	4	60	—	75	41	5	8	57.5	28	5
25	22	19.5	40	17	32	37	10	$26^{\ 0}_{-0.033}$	13	7	4	60	—	75	45	6	8	63.5	33.5	5.5
32	22	19.5	40	17	32	37	12	$26^{\ 0}_{-0.033}$	13	7	4	60	—	75	45	6	8	68	37.5	5.5
40	24	21	52	22	41	47.3	14	$32^{\ 0}_{-0.039}$	16	7	5	66	36	82	50	8	10	76	46.5	7

(mm)

Bore size (mm)	MM	N	NA	NN	Z
20	M8 x 1.25	15	24	M20 x 1.5	37
25	M10 x 1.25	15	30	M26 x 1.5	41
32	M10 x 1.25	15	34.5	M26 x 1.5	41
40	M14 x 1.5	21.5	42.5	M32 x 2	45

Dimensions by Stroke (mm)

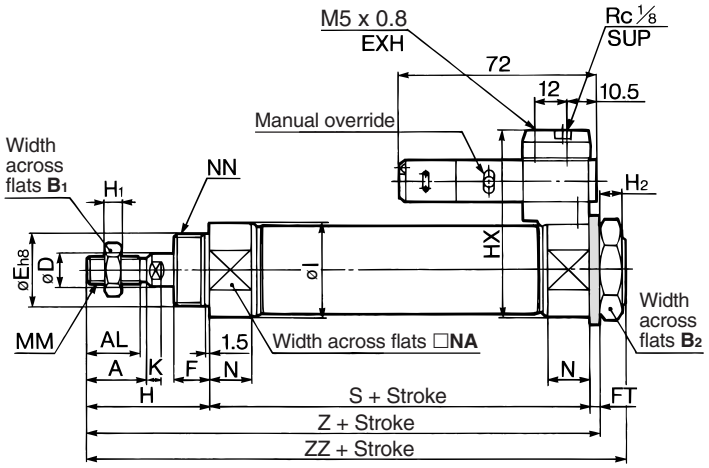
Bore size (mm) \ Stroke / Symbol	1 to 50		51 to 100		101 to 150		151 to 200		201 to 250	
	S	**ZZ**	**S**	**ZZ**	**S**	**ZZ**	**S**	**ZZ**	**S**	**ZZ**
20	87	141	112	166	137	191	—	—	—	—
25	87	145	112	170	137	195	—	—	—	—
32	89	147	114	172	139	197	164	222	—	—
40	113	179	138	204	163	229	188	254	213	279

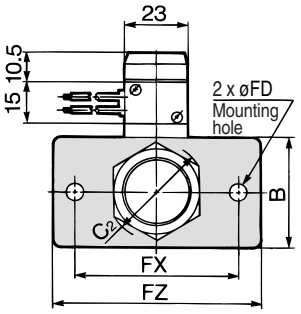
Single Acting/Spring Extend (mm)

Bore size (mm)	HX	Q	QY
20	65.3	19.8	14
25	70.5	22	14
32	76.5	25.8	16
40	84.5	29.8	16

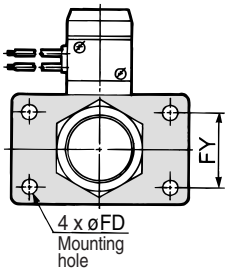
Head Side Flange Style (G)

Single acting, Spring return: CVM3G Bore size — Stroke S



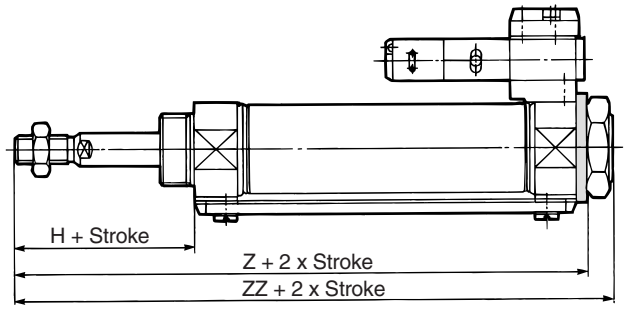


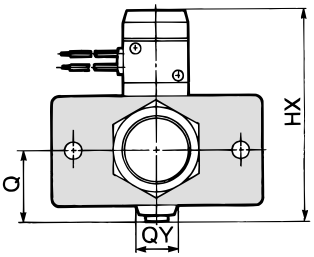
In the case of ø20 to ø32



In the case of ø40

Single acting, Spring extend: CVM3G Bore size — Stroke T





(mm)

Bore size (mm)	A	AL	B	B1	B2	C2	D	Eh8	F	FD	FT	FX	FY	FZ	H	H1	H2	HX	I	K	MM
20	18	15.5	34	13	26	30	8	20 $^{0}_{-0.033}$	13	7	4	60	—	75	41	5	8	57.5	28	5	M8 x 1.25
25	22	19.5	40	17	32	37	10	26 $^{0}_{-0.033}$	13	7	4	60	—	75	45	6	8	63.5	33.5	5.5	M10 x 1.25
32	22	19.5	40	17	32	37	12	26 $^{0}_{-0.033}$	13	7	4	60	—	75	45	6	8	68	37.5	5.5	M10 x 1.25
40	24	21	52	22	41	47.3	14	32 $^{0}_{-0.039}$	16	7	5	66	36	82	50	8	10	76	46.5	7	M14 x 1.5

(mm)

Bore size (mm)	N	NA	NN
20	15	24	M20 x 1.5
25	15	30	M26 x 1.5
32	15	34.5	M26 x 1.5
40	21.5	42.5	M32 x 2

Dimensions by Stroke

(mm)

Bore size (mm) \ Stroke / Symbol	1 to 50			51 to 100			101 to 150			151 to 200			201 to 250		
	S	Z	ZZ	S	Z	ZZ	S	Z	ZZ	S	Z	ZZ	S	Z	ZZ
20	87	132	141	112	157	166	137	182	191	—	—	—	—	—	—
25	87	136	145	112	161	170	137	186	195	—	—	—	—	—	—
32	89	138	147	114	163	172	139	188	197	164	213	222	—	—	—
40	113	168	179	138	193	204	163	218	229	188	243	254	213	268	279

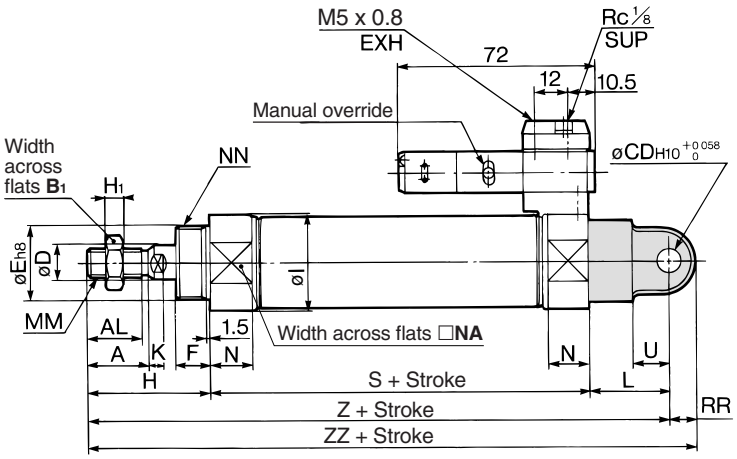
Single Acting/Spring Extend

(mm)

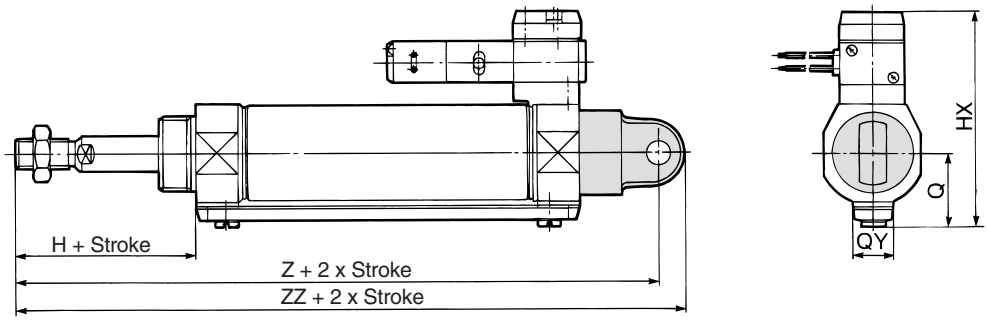
Bore size (mm)	HX	Q	QY
20	65.3	19.8	14
25	70.5	22	14
32	76.5	25.8	16
40	84.5	29.8	16

Single Clevis Style (C)

Single acting, Spring return: CVM3C **Bore size** – **Stroke** **S**



Single acting, Spring extend: CVM3C **Bore size** – **Stroke** **T**



(mm)

Bore size (mm)	A	AL	B1	CD	CX	D	Eh8	F	H	H1	HX	I	K	L	MM	N	NA	NN	RR	U
20	18	15.5	13	9	10	8	20 0 −0.033	13	41	5	57.5	28	5	30	M8 x 1.25	15	24	M20 x 1.5	9	14
25	22	19.5	17	9	10	10	26 0 −0.033	13	45	6	63.5	33.5	5.5	30	M10 x 1.25	15	30	M26 x 1.5	9	14
32	22	19.5	17	9	10	12	26 0 −0.033	13	45	6	68	37.5	5.5	30	M10 x 1.25	15	34.5	M26 x 1.5	9	14
40	24	21	22	10	15	14	32 0 −0.039	16	50	8	76	46.5	7	39	M14 x 1.5	21.5	42.5	M32 x 2	11	18

Dimensions by Stroke

(mm)

Bore size (mm) \ Stroke / Symbol	1 to 50			51 to 100			101 to 150			151 to 200			201 to 250		
	S	**Z**	**ZZ**	**S**	**Z**	**ZZ**	**S**	**Z**	**ZZ**	**S**	**Z**	**ZZ**	**S**	**Z**	**ZZ**
20	87	158	167	112	183	192	137	208	217	—	—	—	—	—	—
25	87	162	171	112	187	196	137	212	221	—	—	—	—	—	—
32	89	164	173	114	189	198	139	214	223	164	239	248	—	—	—
40	113	202	213	138	227	238	163	252	263	188	277	288	213	302	313

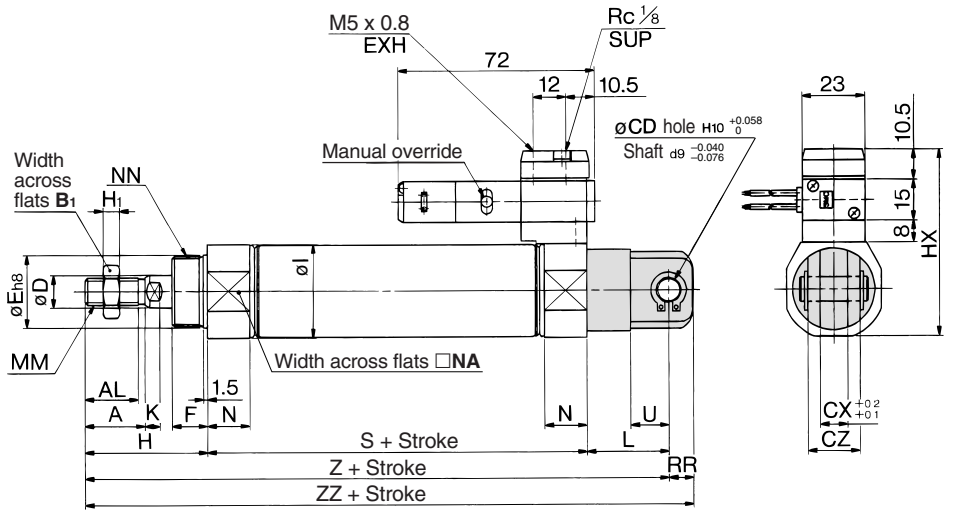
Single Acting/Spring Extend (mm)

Bore size (mm)	HX	Q	QY
20	65.3	19.8	14
25	70.5	22	14
32	76.5	25.8	16
40	84.5	29.8	16

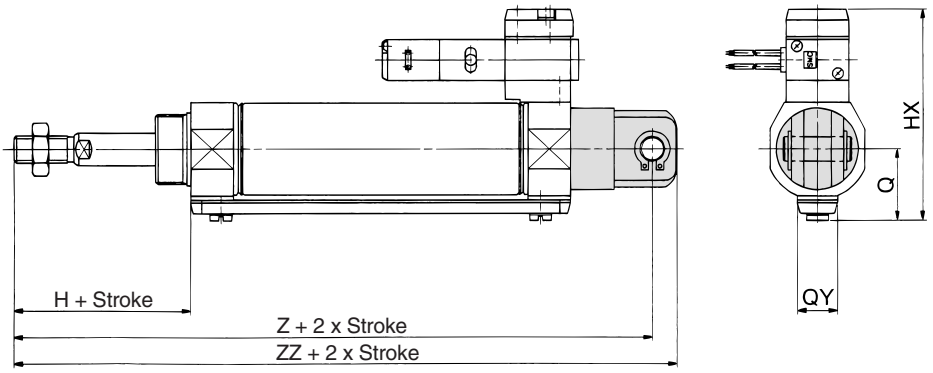
CV□
MVGQ
D-□
-X□
Individual -X□

Double Clevis Style (D)

Single acting, Spring return: CVM3D Bore size – Stroke S



Single acting, Spring extend: CVM3D Bore size – Stroke T



(mm)

Bore size (mm)	A	AL	B1	CD	CX	CZ	D	Eh8	F	H	H1	HX	I	K	L	MM	N	NA	NN	RR	U
20	18	15.5	13	9	10	19	8	$20^{0}_{-0.033}$	13	41	5	57.5	28	5	30	M8 x 1.25	15	24	M20 x 1.5	9	14
25	22	19.5	17	9	10	19	10	$26^{0}_{-0.033}$	13	45	6	63.5	33.5	5.5	30	M10 x 1.25	15	30	M26 x 1.5	9	14
32	22	19.5	17	9	10	19	12	$26^{0}_{-0.033}$	13	45	6	68	37.5	5.5	30	M10 x 1.25	15	34.5	M26 x 1.5	9	14
40	24	21	22	10	15	30	14	$32^{0}_{-0.039}$	16	50	8	76	46.5	7	39	M14 x 1.5	21.5	42.5	M32 x 2	11	18

Dimensions by Stroke

(mm)

Bore size (mm) \ Stroke / Symbol	1 to 50			51 to 100			101 to 150			151 to 200			201 to 250		
	S	**Z**	**ZZ**	**S**	**Z**	**ZZ**	**S**	**Z**	**ZZ**	**S**	**Z**	**ZZ**	**S**	**Z**	**ZZ**
20	87	158	167	112	183	192	137	208	217	—	—	—	—	—	—
25	87	162	171	112	187	196	137	212	221	—	—	—	—	—	—
32	89	164	173	114	189	198	139	214	223	164	239	248	—	—	—
40	113	202	213	138	227	238	163	252	263	188	277	288	213	302	313

∗ Clevis pin and snap ring (cotter pin for ø40) is shipped together.

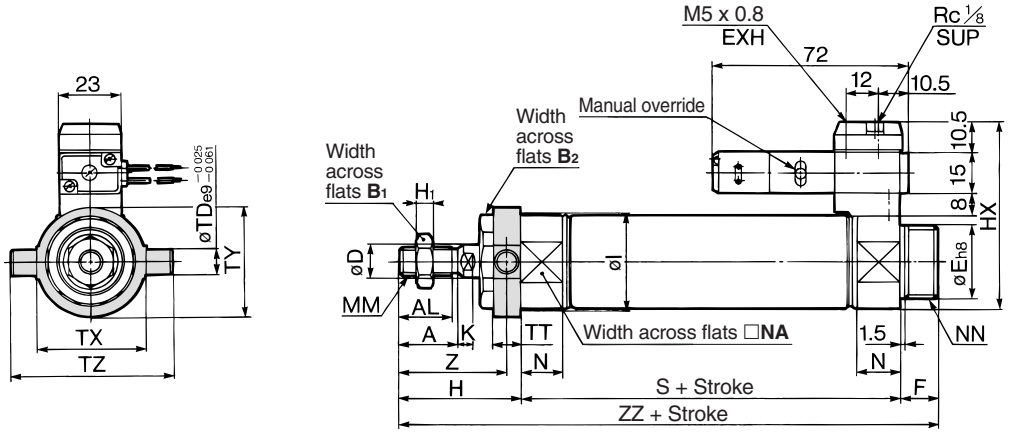
Single Acting/Spring Extend

(mm)

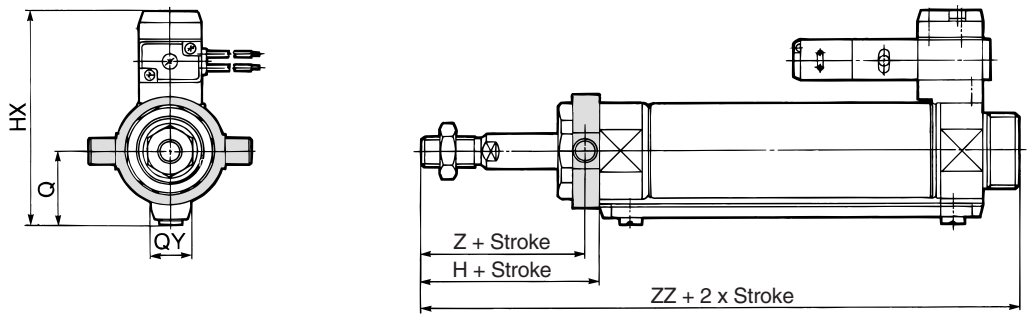
Bore size (mm)	HX	Q	QY
20	65.3	19.8	14
25	70.5	22	14
32	76.5	25.8	16
40	84.5	29.8	16

Rod Side Trunnion Style (U)

Single acting, Spring return: CVM3U **Bore size** — **Stroke** **S**



Single acting, Spring extend: CVM3U **Bore size** — **Stroke** **T**



(mm)

Bore size (mm)	A	AL	B_1	B_2	D	Eh_8	F	H	H_1	HX	I	K	MM	N	NA	NN	TD	TT	TX	TY	TZ	Z
20	18	15.5	13	26	8	$20^{0}_{-0.033}$	13	41	5	57.5	28	5	M8 x 1.25	15	24	M20 x 1.5	8	10	32	32	52	36
25	22	19.5	17	32	10	$26^{0}_{-0.033}$	13	45	6	63.5	33.5	5.5	M10 x 1.25	15	30	M26 x 1.5	9	10	40	40	60	40
32	22	19.5	17	32	12	$26^{0}_{-0.033}$	13	45	6	68	37.5	5.5	M10 x 1.25	15	34.5	M26 x 1.5	9	10	40	40	60	40
40	24	21	22	41	14	$32^{0}_{-0.039}$	16	50	8	76	46.5	7	M14 x 1.5	21.5	42.5	M32 x 2	10	11	53	53	77	44.5

Dimensions by Stroke

(mm)

Bore size (mm) \ Stroke / Symbol	1 to 50		51 to 100		101 to 150		151 to 200		201 to 250	
	S	**ZZ**	**S**	**ZZ**	**S**	**ZZ**	**S**	**ZZ**	**S**	**ZZ**
20	87	141	112	166	137	191	—	—	—	—
25	87	145	112	170	137	195	—	—	—	—
32	89	147	114	172	139	197	164	222	—	—
40	113	179	138	204	163	229	188	254	213	279

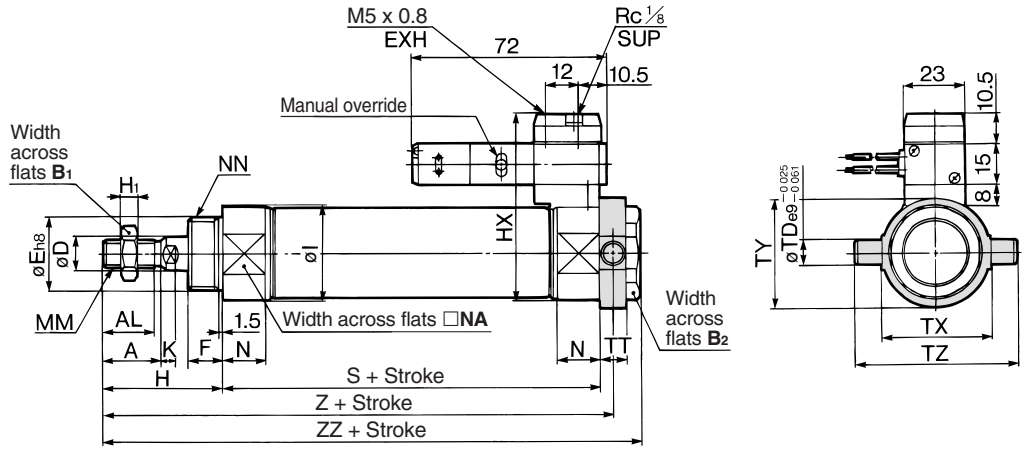
Single Acting/Spring Extend

(mm)

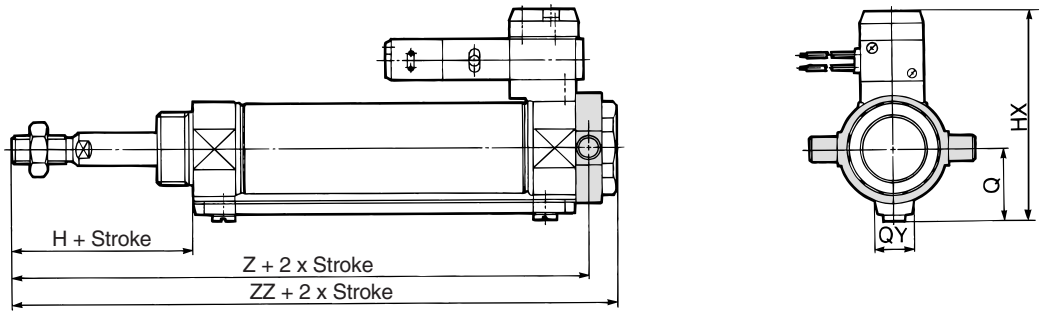
Bore size (mm)	HX	Q	QY
20	65.3	19.8	14
25	70.5	22	14
32	76.5	25.8	16
40	84.5	29.8	16

Head Side Trunnion Style (T)

Single acting, Spring return: CVM3T Bore size – Stroke S



Single acting, Spring extend: CVM3T Bore size – Stroke T



(mm)

Bore size (mm)	A	AL	B_1	B_2	D	Eh_8	F	H	H_1	HX	I	K	MM	N	NA	NN	TD	TT	TX	TY	TZ
20	18	15.5	13	26	8	$20^{0}_{-0.033}$	13	41	5	57.5	28	5	M8 x 1.25	15	24	M20 x 1.5	8	10	32	32	52
25	22	19.5	17	32	10	$26^{0}_{-0.033}$	13	45	6	63.5	33.5	5.5	M10 x 1.25	15	30	M26 x 1.5	9	10	40	40	60
32	22	19.5	17	32	12	$26^{0}_{-0.033}$	13	45	6	68	37.5	5.5	M10 x 1.25	15	34.5	M26 x 1.5	9	10	40	40	60
40	24	21	22	41	14	$32^{0}_{-0.039}$	16	50	8	76	46.5	7	M14 x 1.5	21.5	42.5	M32 x 2	10	11	53	53	77

Dimensions by Stroke

(mm)

Bore size (mm) \ Stroke / Symbol	1 to 50			51 to 100			101 to 150			151 to 200			201 to 250		
	S	**Z**	**ZZ**	**S**	**Z**	**ZZ**	**S**	**Z**	**ZZ**	**S**	**Z**	**ZZ**	**S**	**Z**	**ZZ**
20	87	133	143	112	158	168	137	183	193	—	—	—	—	—	—
25	87	137	147	112	162	172	137	187	197	—	—	—	—	—	—
32	89	139	149	114	164	174	139	189	199	164	214	224	—	—	—
40	113	168.5	179	138	193.5	204	163	218.5	229	188	243.5	254	213	268.5	279

Single Acting/Spring Extend

(mm)

Bore size (mm)	HX	Q	QY
20	65.3	19.8	14
25	70.5	22	14
32	76.5	25.8	16
40	84.5	29.8	16

Valve Mounted Cylinder: Non-rotating Rod Type
Single Acting, Spring Return/Extend
Series CVM3K
ø20, ø25, ø32, ø40

How to Order

Mounting style

B	Basic style
L	Axial foot style
F	Rod side flange style
G	Head side flange style
C	Single clevis style
D	Double clevis style
T	Head side trunnion style
U	Rod side trunnion style

Bore size

20	20 mm
25	25 mm
32	32 mm
40	40 mm

Solenoid valve voltage

Standard		Option	
1	100 VAC (50/60 Hz)	3	110 VAC (50/60 Hz)
2	200 VAC (50/60 Hz)	4	220 VAC (50/60 Hz)
5	24 VDC	6	12 VDC
		9	Other

Action

S	Single acting, Spring return
T	Single acting, Spring extend

Light/Surge voltage suppressor

Nil	None
S	With surge voltage suppressor
Z	With light/surge voltage suppressor (Except Type G)

	CVM3K	L	20			–	100	T	–	1	L		–			
With auto switch	CDVM3K	L	20			–	100	T	–	1	L		–	M9BW		–	

With auto switch (Built-in magnet)

Non-rotating rod type

Port thread type

Nil	Rc
TN	NPT
TF	G

Piping

Nil	Screw-in type
F	Built-in One-touch fitting

Cylinder stroke (mm)
(Refer to "Standard Stroke" on page 1596.)

Electrical entry

G	Grommet
L	L plug connector
M	M plug connector
D	DIN terminal

Auto switch

Nil	Without auto switch

* For the applicable auto switch model, refer to the table below.

Made to Order
Refer to page 1596 for details.

Number of auto switches

Nil	2 pcs.
S	1 pc.
n	"n" pcs.

Built-in Magnet Cylinder Model

If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) CDVM3K40-100S-5G

Applicable Auto Switch/Refer to pages 1719 to 1827 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC	Load voltage AC	Auto switch model	Lead wire length (m) 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	None (N)	Pre-wired connector	Applicable load	
Solid state switch	—	Grommet	Yes	3-wire (NPN)	5 V, 12 V	—	M9N	●	●	●	○	—	○	IC circuit	Relay, PLC
				3-wire (PNP)			M9P	●	●	●	○	—	○		
				2-wire	12 V		M9B	●	●	●	○	—	○	—	
		Connector					H7C	●	—	●	●	●	—		
	Diagnostic indication (2-color indication)	Grommet		3-wire (NPN)	5 V, 12 V		M9NW	●	●	●	○	—	○	IC circuit	
				3-wire (PNP)			M9PW	●	●	●	○	—	○		
				2-wire	12 V		M9BW	●	●	●	○	—	○	—	
	With diagnostic output (2-color indication)			4-wire (NPN)	5 V, 12 V		H7NF	●	—	●	○	—	○	IC circuit	
Reed switch	—	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	A96	●	—	●	—	—	—	IC circuit	—
			Yes	2-wire	24 V	12 V	100 V	A93	●	—	●	—	—	—	—	Relay, PLC
			None				100 V or less	A90	●	—	●	—	—	—	IC circuit	
			Yes				100 V, 200 V	B54	●	—	●	●	—	—	—	
			None				200 V or less	B64	●	—	●	—	—	—		
		Connector	Yes				—	C73C	●	—	●	●	●	—		
			None				24 V or less	C80C	●	—	●	●	●	—	IC circuit	
	Diagnostic indication (2-color indication)	Grommet	Yes			—	—	B59W	●	—	●	—	—	—	—	

∗ 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
None ····· N (Example) H7CN

∗ Solid state auto switches marked with "○" are produced upon receipt of order.
∗ D-A9□V□/M9□V□/M9□WV□/M9□A(V) types cannot be mounted.

∗ Since there are other applicable auto switches than listed, refer to page 1603 for details.
∗ For details about auto switches with pre-wired connector, refer to pages 1784 and 1785.
∗ D-A9□/M9□/M9□W auto switches are shipped together (not assembled). (Only auto switch mounting brackets are assembled before shipped.)

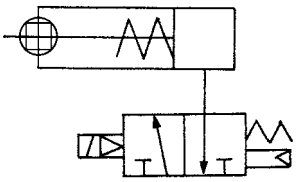
A hexagon shaped rod that does not rotate.

Non-rotating accuracy
ø20, ø25 — ±0.7°
ø32, ø40 — ±0.5°

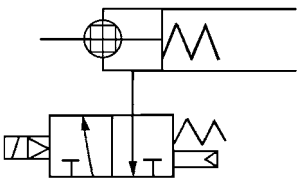
Can operate without lubrication.

Auto switches can also be mounted.
Can be installed with auto switches to facilitate the detection of the cylinder's stroke position.

Spring extend



Spring return



Specifications

Applicable bore size (mm)		20	25	32	40
Rod non-rotating accuracy		±0.7°		±0.5°	
Action		Single acting, Spring return/Spring extend			
Fluid		Air			
Cushion		Rubber bumper			
Proof pressure		1 MPa			
Maximum operating pressure		0.7 MPa			
Minimum operating pressure		0.18 MPa spring return		0.23 MPa spring extend	
Ambient and fluid temperature		–10 to 50°C (No freezing)			
Lubrication		Not required (Non-lube)			
Stroke length tolerance		$^{+1.4}_{0}$			
Piping	**Screw-in type**	Rc 1/8			
	Built-in One-touch fitting	O.D.: ø6/I.D.: ø4			
Manual override		Non locking (Standard)			
Piston speed (mm/s)		50 to 700	50 to 650	50 to 590	50 to 420
Allowable kinetic energy		0.27 J	0.4 J	0.65 J	1.2 J
Mounting		Basic style, Axial foot style, Rod side flange style, Head side flange style, Single clevis style, Double clevis style, Head side trunnion style, Rod side trunnion style			

Solenoid Valve Specifications

Applicable solenoid valve model			VZ319
Coil rated voltage			Standard: 100/200 VAC (50/60 Hz), 24 VDC Option: 110/220 VAC, 12 VDC
Effective area of valve (Cv factor)			4.5 mm² (0.25)
Allowable voltage			–15 to 10% of the rated voltage
Coil insulation			Class B or equivalent (130°C)
Electrical entry			Grommet, L plug connector, M plug connector, DIN terminal
Power consumption (W) Note)	**DC**		1.8 (With indicator light: 2.1)
Apparent power (VA) Note)	**AC**	**Inrush**	4.5/50 Hz, 4.2/60 Hz
		Holding	3.5/50 Hz, 3.0/60 Hz

Note) At the rated voltage.

Standard Stroke

Bore size (mm)	Standard stroke (mm) Note)
20	25, 50, 75, 100, 125, 150 *
25	25, 50, 75, 100, 125, 150 *
32	25, 50, 75, 100, 125, 150, 200 *
40	25, 50, 75, 100, 125, 150, 200, 250 *

Note 1) Intermediate stroke other than above is manufactured upon receipt of order.
Note 2) Strokes marked with "*" are the maximum strokes which are available.

Made to Order

Made to Order Specifications
(For details, refer to pages 1836, 1882.)

Symbol	Specifications
—XA□	Change of rod end shape
—XC6	Made of stainless steel

Refer to pages 1600 to 1603 for cylinders with auto switches.

- Minimum auto switch mounting stroke
- Proper auto switch mounting position (detection at stroke end) and mounting height
- Operating range
- Switch mounting bracket: Part no.

Mounting Bracket Part No.

Bore size (mm)	20	25	32	40
Axial foot*	CM-L020B	CM-L032B		CM-L040B
Flange	CM-F020B	CM-F032B		CM-F040B
Single clevis	CM-C020B	CM-C032B		CM-C040B
Double clevis**	CM-D020B	CM-D032B		CM-D040B
Trunnion (With nut)	CM-T020B	CM-T032B		CM-T040B

* Two foot brackets and a mounting nut are attached.
When ordering the foot bracket, order 2 pcs. per cylinder.
** Clevis pin and retaining ring (cotter pin for ø40) are packaged together.

Theoretical Output

Refer to the Technical Data (Theoretical Output 1) in Best Pneumatics No. 2.

Spring Reaction Force

Refer to the Technical Data (Table 2: Spring Reaction Force) in Best Pneumatics No. 2.

Mounting Bracket and Accessory

Mounting \ Accessory	Standard equipment			Option	
	Mounting nut	Rod end nut	Clevis pin	Single knuckle joint	Double knuckle joint (3)
Basic style	● (1 pc.)	●	—	●	●
Axial foot style	● (2)	●	—	●	●
Rod side flange style	● (1)	●	—	●	●
Head side flange style	● (1)	●	—	●	●
Single clevis style	— (1)	●	—	●	●
Double clevis style	— (1)	●	●	●	●
Head side trunnion style	● (1) (2)	●	—	●	●
Rod side trunnion style	● (1) (2)	●	—	●	●

Note 1) Mounting nut is not equipped with single clevis style and double clevis style.
Note 2) Trunnion nuts are equipped for head side trunnion and rod side trunnion.
Note 3) Pin and retaining ring are shipped together with double clevis and double knuckle joint.

Mass

Spring Return/( ): Denotes Spring Extend.

(kg)

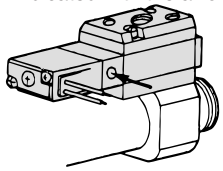
Bore size (mm)		20	25	32	40
Basic mass	25 stroke	0.30 (0.30)	0.40 (0.04)	0.52 (0.51)	0.87 (0.86)
	50 stroke	0.32 (0.32)	0.43 (0.43)	0.56 (0.56)	0.94 (0.93)
	75 stroke	0.37 (0.37)	0.52 (0.51)	0.68 (0.66)	1.13 (1.09)
	100 stroke	0.39 (0.39)	0.55 (0.54)	0.73 (0.70)	1.19 (1.16)
	125 stroke	0.45 (0.44)	0.64 (0.61)	0.86 (0.82)	1.39 (1.33)
	150 stroke	0.47 (0.46)	0.67 (0.64)	0.90 (0.86)	1.46 (1.40)
	200 stroke	— (—)	— (—)	1.07 (1.02)	1.71 (1.63)
	250 stroke	— (—)	— (—)	— (—)	1.97 (1.85)
Mounting bracket mass	Axial foot	0.15 (0.15)	0.16 (0.16)	0.16 (0.16)	0.27 (0.27)
	Flange	0.06 (0.06)	0.09 (0.09)	0.09 (0.09)	0.12 (0.12)
	Single clevis	0.04 (0.04)	0.04 (0.04)	0.04 (0.04)	0.09 (0.09)
	Double clevis	0.05 (0.05)	0.06 (0.06)	0.06 (0.06)	0.13 (0.13)
	Trunnion	0.04 (0.04)	0.07 (0.07)	0.07 (0.07)	0.10 (0.10)
Option bracket mass	Single knuckle joint	0.06 (0.06)	0.06 (0.06)	0.06 (0.06)	0.23 (0.23)
	Double knuckle (With pin)	0.07 (0.07)	0.07 (0.07)	0.07 (0.07)	0.20 (0.20)

Calculation: (Example) **CVM3KL32-100-1G** (ø32, 100 stroke, Spring return)
- Basic mass ····· 0.73 (kg)
- Mass of brackets ····· 0.16 (kg)

0.73 + 0.16 = 0.89 kg

Manual Operation

Manual operation is possible by pushing the manual button indicated with the arrow.



⚠ Precautions

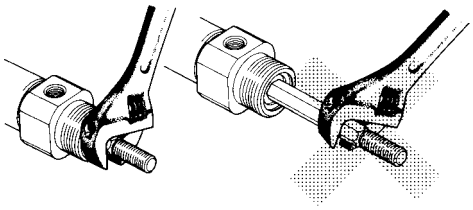
Be sure to read before handling. Refer to front matters 42 and 43 for Safety Instructions, pages 3 to 11 for Actuator and Auto Switch Precautions and 3/4/5 Port Solenoid Valve Precautions in Best Pneumatics No. 1.

Operating Precautions

⚠Caution

1. Avoid using the air cylinder in such a way that rotational torque would be applied to the piston rod.
If rotational torque is applied, the non-rotating guide will deform, causing a loss of non-rotating accuracy. Also, to screw a bracket or a nut onto the threaded portion at the end of the piston rod, make sure to retract the piston rod entirely, and place a wrench on the parallel sections of the rod that protrudes. To tighten, take precautions to prevent the tightening torque from being applied to the non-rotating guide.

Allowable rotational torque (N·m or less)	ø20	ø25	ø32	ø40
	0.2	0.25	0.25	0.44



Disassembly/Replacement

⚠Caution

1. When replacing rod seals, please contact SMC.
Air leakage may be happened, depending on the position in which a rod seal is fitted. Thus, please contact SMC when replacing them.

Model Selection

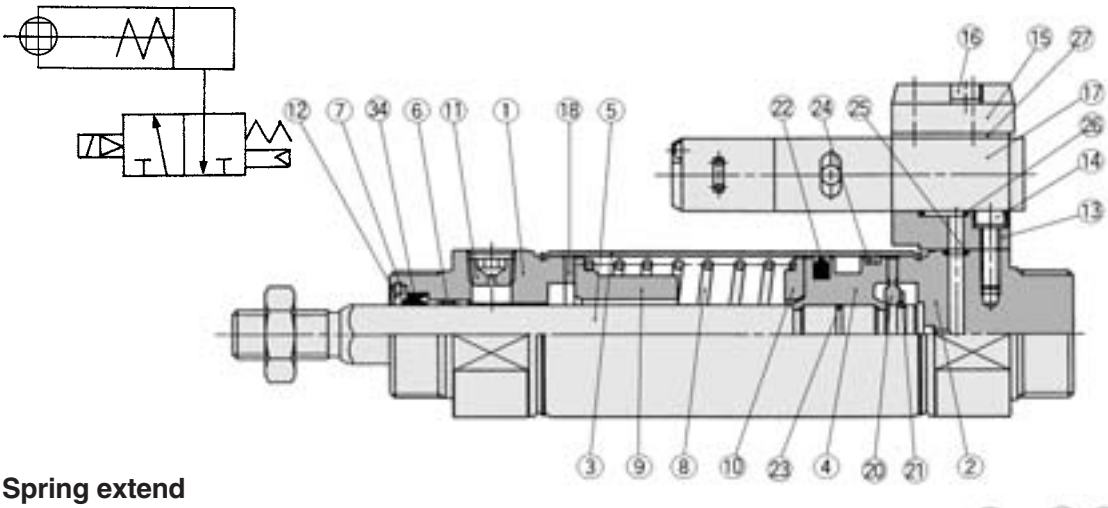
⚠Warning

1. Confirm the specifications.
Products in this catalog are designed to be used for compressed air systems. If not operated within the designated pressure or temperature, it may damage the products or cause malfunction. (Refer to specifications.)

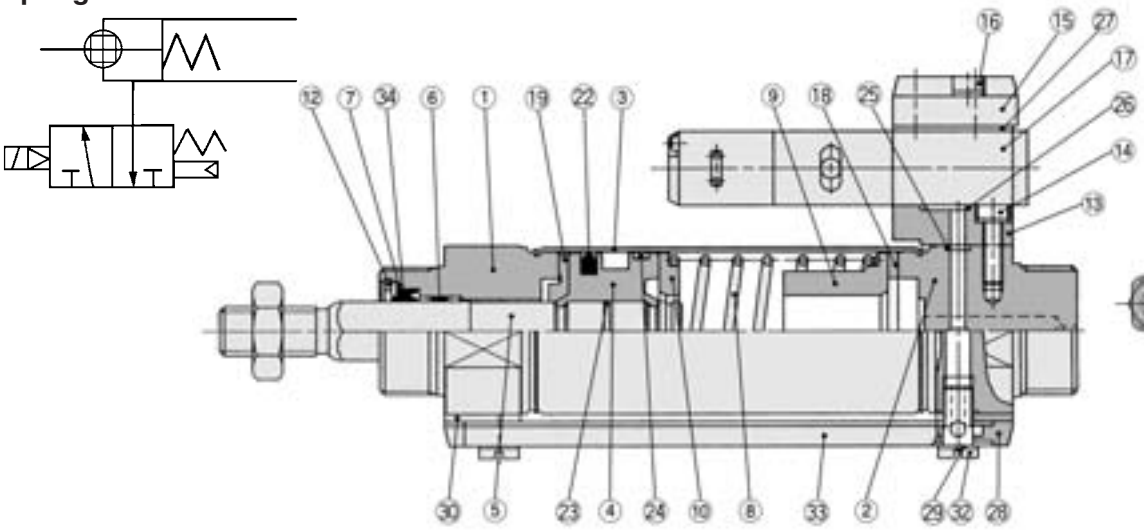
2. Energizing continuously for a long period of time
When the valve is continuously energized for a long period of time, the performance may deteriorate or affect peripheral equipment adversely since temperature rises when coils generate heat.

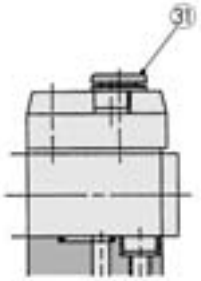
Construction

Spring return

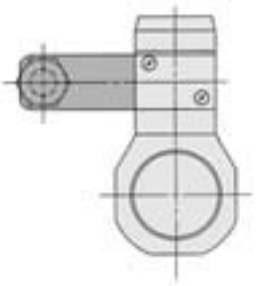


Spring extend





Built-in One-touch fitting



DIN terminal

Component Parts

No.	Description	Material	Note
1	**Rod cover**	Aluminum alloy	Clear anodized
2	**Head cover**	Aluminum alloy	Clear anodized
3	**Cylinder tube**	Stainless steel	
4	**Piston**	Aluminum alloy	Chromated
5	**Piston rod**	Carbon steel	Hard chrome plated
6	**Non-rotating guide**	Stainless steel	
7	**Seal retainer**	Rolled steel	Nickel plated
8	**Return spring**	Steel wire	Zinc chromated
9	**Spring guide**	Aluminum alloy	Chromated
10	**Spring seat**	Aluminum alloy	Chromated
11	**Plug with fixed orifice**	Alloy steel	Black zinc chromated
12	**Retaining ring**	Carbon tool steel	Nickel plated
13	**Sub-plate**	Aluminum alloy	Metallic painted
14	Hex. socket head cap screw with spring washer	Carbon steel	Nickel plated
15	**Plate**	Aluminum alloy	Metallic painted
16	Hex. socket head cap screw with spring washer	Carbon steel	Nickel plated
17	**Solenoid valve**	—	Refer to the below.*
18	**Bumper**	Urethane	
19	**Bumper A**	Urethane	

* How to order solenoid valves
VZ319-[Voltage][Electrical entry]

Component Parts

No.	Description	Material	Note
20	**Bumper B**	Urethane	
21	**Retaining ring**	Stainless steel	
22	**Piston seal**	NBR	
23	**Piston gasket**	NBR	
24	**Wear ring**	Resin	
25	**Head cover gasket**	NBR	
26	**Sub-plate gasket**	NBR	
27	**Gasket**	NBR	
28	**Pipe gasket**	Urethane rubber	
29	**Gasket**	Resin	
30	**Spacer gasket**	Resin	
31	**One-touch fitting**	—	Port size: ø6
32	**Stud**	Brass	Electroless nickel plated
33	**Pipe**	Aluminum alloy	Clear anodized

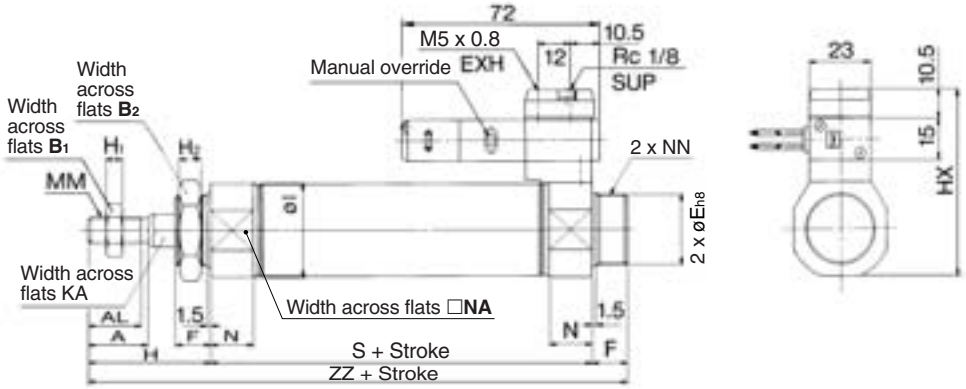
Replacement Parts/Seal Kit

No.	Description	Material	Part no.			
			20	**25**	**32**	**40**
34	**Rod seal**	NBR	PDR-8W	PDR-10W	PDR-12W	PDR-14W

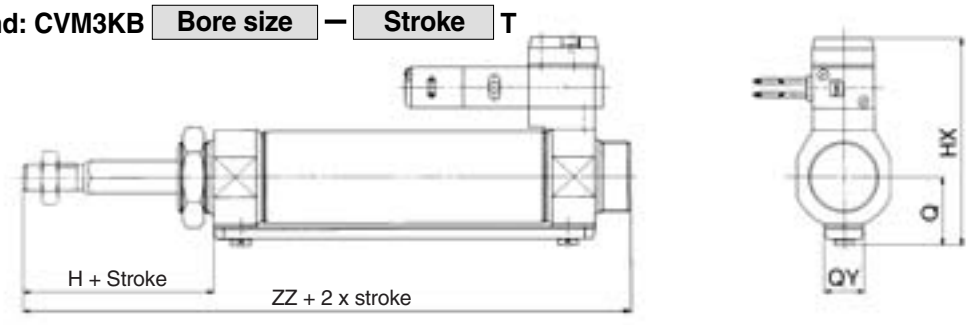
* Since the seal kit does not include a grease pack, order it separately.
Grease pack part no.: GR-S-010 (10g)

Basic Style (B): External Dimensions

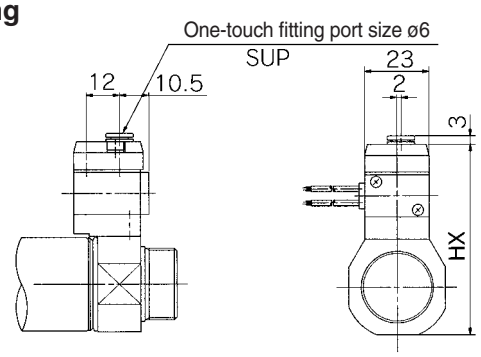
Single acting, Spring return: CVM3KB Bore size — Stroke **S**



Single acting, Spring extend: CVM3KB Bore size — Stroke **T**



Built-in One-touch fitting



(mm)

Bore size (mm)	A	AL	B_1	B_2	Eh_8	F	H	H_1	H_2	HX	I	KA	MM	N	NA	NN
20	18	15.5	13	26	$20^{0}_{-0.033}$	13	41	5	8	57.5	28	8.2	M8 x 1.25	15	24	M20 x 1.5
25	22	19.5	17	32	$26^{0}_{-0.033}$	13	45	6	8	63.5	33.5	10.2	M10 x 1.25	15	30	M26 x 1.5
32	22	19.5	17	32	$26^{0}_{-0.033}$	13	45	6	8	68	37.5	12.2	M10 x 1.25	15	34.5	M26 x 1.5
40	24	21	22	41	$32^{0}_{-0.039}$	16	50	8	10	76	46.5	14.2	M14 x 1.5	21.5	42.5	M32 x 2

Dimensions by Stroke

(mm)

Bore size (mm) \ Stroke / Symbol	1 to 50		51 to 100		101 to 150		151 to 200		201 to 250	
	S	**ZZ**	**S**	**ZZ**	**S**	**ZZ**	**S**	**ZZ**	**S**	**ZZ**
20	87	141	112	166	137	191	—	—	—	—
25	87	145	112	170	137	195	—	—	—	—
32	89	147	114	172	139	197	164	222	—	—
40	113	179	138	204	163	229	188	254	213	279

Single Acting/Spring Extend

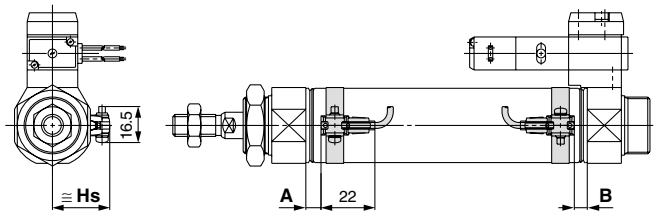
(mm)

Bore size (mm)	HX	Q	QY
20	65.3	19.8	14
25	70.5	22	14
32	76.5	25.8	16
40	84.5	29.8	16

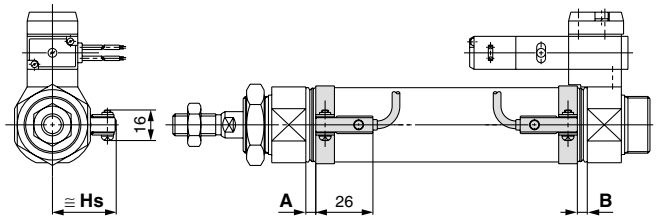
Auto Switch Proper Mounting Position (Detection at Stroke End) and Its Mounting Height

Reed auto switch

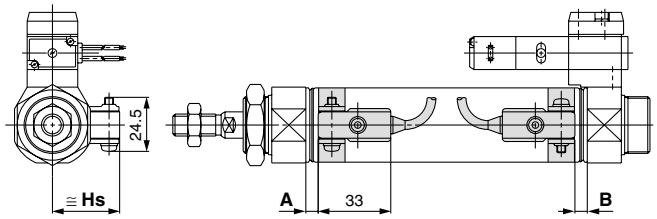
D-A9□



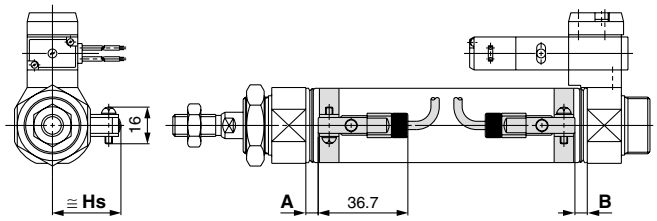
D-C7/C8



D-B5/B6/B59W

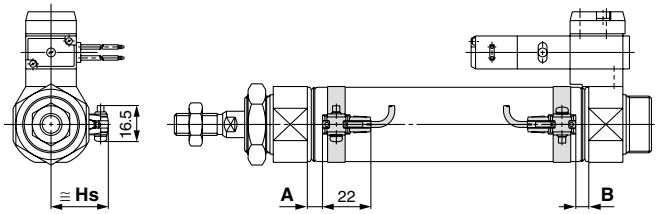


D-C73C/C80C

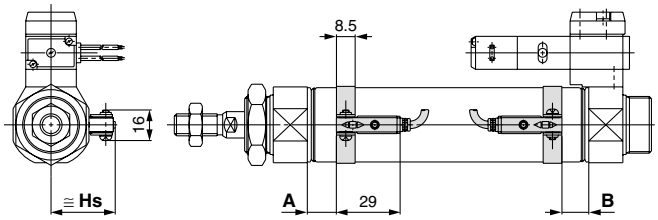


Solid state auto switch

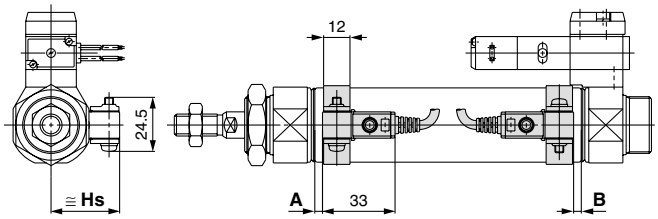
D-M9□
D-M9□W



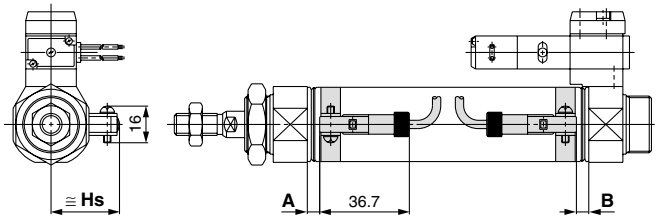
D-H7□/H7□W/H7NF



D-G5NTL



D-H7C



Auto Switch Proper Mounting Position (Detection at Stroke End) and Its Mounting Height: Single Acting, Spring Return (S)/Spring Extend (T)

Auto Switch Proper Mounting Position: Standard, Spring Return (S)

Non-Rotating, Spring Return (S)

(mm)

Auto switch model	Bore size	A dimension					B
		to 15st	51 to 100st	101 to 150st	151 to 200st	201 to 250st	
D-A9□	20	31.5	56.5	81.5	—	—	5.5
	25	31.5	56.5	81.5	—	—	5.5
	32	32.5	57.5	82.5	107.5	—	6.5
	40	38.5	63.5	88.5	113.5	138.5	11.5
D-M9□ D-M9□W	20	35.5	60.5	85.5	—	—	9.5
	25	35.5	60.5	85.5	—	—	9.5
	32	36.5	61.5	86.5	111.5	—	10.5
	40	42.5	67.5	92.5	117.5	142.5	15.5
D-B5□ D-B64	20	26	51	76	—	—	0
	25	26	51	76	—	—	0
	32	27	52	77	102	—	1
	40	32	57	82	107	132	6
D-C7□ D-C80 D-C73C D-C80C	20	32	57	82	—	—	6
	25	32	57	82	—	—	6
	32	33	58	83	108	—	7
	40	38	63	88	113	138	12
D-B59W	20	29	54	79	—	—	3
	25	29	54	79	—	—	3
	32	30	55	80	105	—	4
	40	35	60	85	110	135	9
D-H7□ D-H7C D-H7□W D-H7NF	20	31	56	81	—	—	5
	25	31	56	81	—	—	5
	32	32	57	82	107	—	6
	40	37	62	87	112	137	11
D-G5NTL	20	27.5	52.5	77.5	—	—	1.5
	25	27.5	52.5	77.5	—	—	1.5
	32	28.5	53.5	78.5	103.5	—	2.5
	40	33.5	58.5	83.5	108.5	133.5	7.5

Auto Switch Proper Mounting Position: Standard, Spring Extend (T)

Non-Rotating, Spring Extend (T)

(mm)

Auto switch model	Bore size	A	B dimension				
			to 15st	51 to 100st	101 to 150st	151 to 200st	201 to 250st
D-A9□	20	6.5	30.5	55.5	80.5	—	—
	25	6.5	30.5	55.5	80.5	—	—
	32	7.5	31.5	56.5	81.5	106.5	—
	40	13.5	36.5	61.5	86.5	111.5	136.5
D-M9□ D-M9□W	20	10.5	34.5	59.5	84.5	—	—
	25	10.5	34.5	59.5	84.5	—	—
	32	11.5	35.5	60.5	85.5	110.5	—
	40	17.5	40.5	65.5	90.5	115.5	140.5
D-B5□ D-B64	20	1	25	50	75	—	—
	25	1	25	50	75	—	—
	32	2	26	51	76	101	—
	40	7	31	56	81	106	131
D-C7□ D-C80 D-C73C D-C80C	20	7	31	56	81	—	—
	25	7	31	56	81	—	—
	32	8	32	57	82	107	—
	40	13	37	62	87	112	137
D-B59W	20	4	28	53	78	—	—
	25	4	28	53	78	—	—
	32	5	29	54	79	104	—
	40	10	34	59	84	109	134
D-H7□ D-H7C D-H7□W D-H7NF	20	6	30	55	80	—	—
	25	6	30	55	80	—	—
	32	7	31	56	81	106	—
	40	12	36	61	86	111	136
D-G5NTL	20	2.5	26.5	51.5	76.5	—	—
	25	2.5	26.5	51.5	76.5	—	—
	32	3.5	27.5	52.5	77.5	102.5	—
	40	8.5	32.5	57.5	81.5	107.5	132.5

Note) Adjust the auto switch after confirming the operating conditions in the actual setting.

Auto Switch Proper Mounting Position (Detection at Stroke End) and Its Mounting Height

Auto Switch Mounting Height

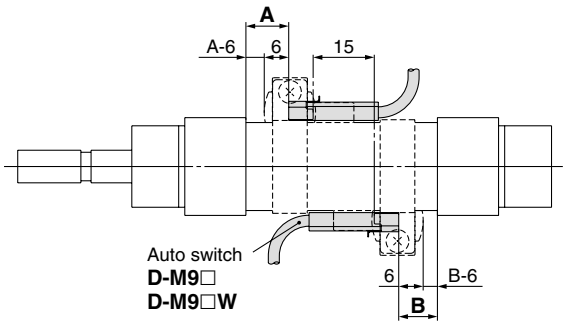
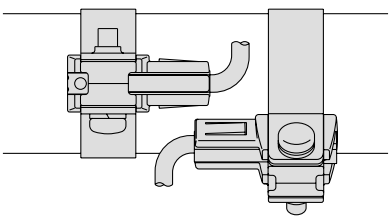
(mm)

Auto switch model / Bore size (mm)	D-A9□ D-M9□ D-M9□W	D-B5□ D-B64 D-B59W D-G5NTL D-H7C	D-C7□ D-C80 D-H7□ D-H7□W D-H7NF	D-C73C D-C80C
	Hs	Hs	Hs	Hs
20	22	25.5	22.5	25
25	24.5	28	25	27.5
32	28	31.5	28.5	31
40	32	35.5	32.5	35

Minimum Auto Switch Mounting Stroke

n: No. of auto switches (mm)

Auto switch model	No. of auto switch mounted				
	1	2		n	
		Different surfaces	Same surface	Different surfaces	Same surface
D-A9□ D-M9□ D-M9□W	10	15 Note)	45 Note)	$15 + 45\frac{(n-2)}{2}$ (n = 2, 4, 6···)	45 + 45 (n - 2)
D-C7□ D-C80	10	15	50	$15 + 45\frac{(n-2)}{2}$ (n = 2, 4, 6···)	50 + 45 (n - 2)
D-H7□ D-H7□W D-H7NF	10	15	60	$15 + 45\frac{(n-2)}{2}$ (n = 2, 4, 6···)	60 + 45 (n - 2)
D-C73C D-C80C D-H7C	10	15	65	$15 + 50\frac{(n-2)}{2}$ (n = 2, 4, 6···)	65 + 50 (n - 2)
D-B5□/B64 D-G5NTL	10	15	75	$15 + 50\frac{(n-2)}{2}$ (n=2, 4, 6···)	75 + 55 (n - 2)
D-B59W	15	20	75	$20 + 50\frac{(n-2)}{2}$ (n = 2, 4, 6···)	75 + 55 (n - 2)

Auto switch model	With 2 auto switches	
	Different surfaces	Same surface
	 The proper auto switch mounting position is 6 mm inward from the switch holder edge.	 The auto switch is mounted by slightly displacing it in a direction (cylinder tube circumferential exterior) so that the auto switch and lead wire do not interfere with each other.
D-A93	—	Less than 50 strokes
D-M9□ D-M9□W	Less than 20 strokes	Less than 55 strokes

Note) When two auto switches of D-A93/M9□/M9□W are mounted

Operating Range

(mm)

Auto switch model	Bore size (mm)			
	20	**25**	**32**	**40**
D-A9□	6	6	6	6
D-M9□/M9□W	3.5	3	3.5	3
D-C7□/C80 **D-C73C/C80C**	7	8	8	8
D-B5□/B64	8	8	9	9
D-B59W	12	12	13	13
D-H7□/H7□W **D-G5NTL/H7NF**	4	4	4.5	5
D-H7C	7	8.5	9	10

∗ Since the operating range is provided as a guideline including hysteresis, it cannot be guaranteed (assuming approximately ±30% dispersion).
It may vary substantially depending on an ambient environment.

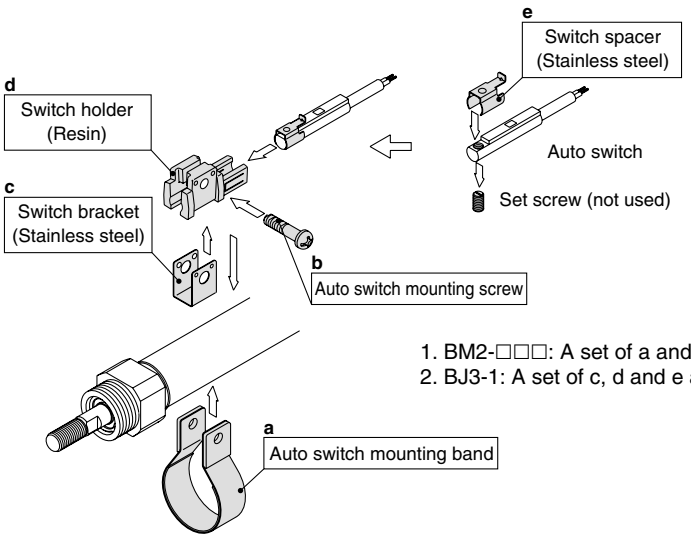
Auto Switch Mounting Bracket: Part No.

Auto switch mounting	Bore size (mm)			
	ø20	**ø25**	**ø32**	**ø40**
D-A9□ **D-M9□** **D-M9□W**	Note 1) ①BM2-020 ②BJ3-1	Note 1) ①BM2-025 ②BJ3-1	Note 1) ①BM2-032 ②BJ3-1	Note 1) ①BM2-040 ②BJ3-1
D-C7□/C80 **D-C73C/C80C** **D-H7□** **D-H7□W** **D-H7NF**	BM2-020	BM2-025	BM2-032	BM2-040
D-B5□/B64 **D-B59W** **D-G5NTL** **D-G5NBL**	BA2-020	BA2-025	BA2-032	BA2-040

Note 1) Two kinds of auto switch mounting brackets are used as a set.

[Mounting screw set made of stainless steel]

The following set of mounting screws made of stainless steel is available. Use it in accordance with the operating environment. (Please order the auto switch mounting bracket separately, since it is not included.)
BBA4: For D-C7/C8/H7 types
Note 2) Refer to page 1814 for the details of BBA4.



1. BM2-□□□: A set of a and b above.
2. BJ3-1: A set of c, d and e above.

Besides the models listed in How to Order, the following auto switches are applicable.
Refer to pages 1719 to 1827 for detailed specifications.

Auto switch type	Part no.	Electrical entry (Fetching direction)	Features
Reed	D-B53, C73, C76	Grommet (In-let)	—
	D-C80		Without indicator light
Solid state	D-H7A1, H7A2, H7B		—
	D-H7NW, H7PW, H7BW		Diagnostic indication (2-color)
	D-G5NTL		With timer

∗ For solid state auto switches, auto switches with a pre-wired connector are also available. Refer to pages 1784 and 1785 for details.
∗ Normally closed (NC = b contact) solid state auto switches (D-F9G/F9H types) are also available. Refer to page 1746 for details.
∗ Wide range detection type, solid state auto switches (D-G5NBL type) are also available. Refer to page 1776 for details.

Valve Mounted Cylinder
Double Acting
Series CV3
Lube/Non-lube Type: ø40, ø50, ø63, ø80, ø100

How to Order

Built-in Magnet Cylinder Model

If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) CDV3LN50-100-1

Suffix for cylinder

Nil	Rod extended when energized
B	Rod retracted when energized

∗ Symbol "B" is not required for double solenoid.

Electrical entry

Nil	Grommet
D	DIN terminal

Solenoid valve

Nil	2 position single
W	2 position double

Solenoid valve voltage

1	100 VAC (50/60 Hz)
2	200 VAC (50/60 Hz)
5	24 VDC
9	Other

Cylinder stroke (mm)
Refer to page 1605 for standard strokes.

CV3 L □ 50 □ – 100 □ — 1 □ □ – □ – □

With auto switch: CDV3 L □ 50 □ – 100 □ – M9BW □ – 1 □ □ – □ – □

With Auto Switch
(Built-in magnet)

Mounting style

B	Basic style
L	Axial foot style
F	Rod side flange style
C ∗	Single clevis style
D ∗	Double clevis style
T	Center trunnion style

∗ Except tubing I.D. ø40

Type

Nil	Lube type
N	Non-lube type
F ∗	Steel tube

∗ Auto switch is not mountable.

Bore size

40	40 mm
50	50 mm
63	63 mm
80	80 mm
100	100 mm

Port thread type

Nil	Rc
TN	NPT
TF	G

Auto switch

Nil	Without auto switch

∗ For the applicable auto switch model, refer to the table below.

Suffix for cylinder

Rod boot	J	Nylon tarpaulin
	K	Heat resistant tarpaulin
Cushion	N	Without cushion
	R	With cushion on rod end
	H	With cushion on head end
	Nil	With cushion on both ends

∗ When specifying symbol more than one, combine symbols alphabetically.

Number of auto switches

Nil	2 pcs.
S	1 pc.
n	"n" pcs.

Made to Order
Refer to page 1605 for details.

Applicable Auto Switch/Refer to pages 1719 to 1827 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC	Load voltage AC	Auto switch model: Tie-rod mounting	Auto switch model: Band mounting	Lead wire length (m): 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	Pre-wired connector	Applicable load:	
Solid state switch	——	Grommet	Yes	3-wire (NPN)	5 V, 12 V	—	M9N	—	●	●	●	○	○	IC circuit	Relay, PLC
							—	G59***	●	–	●	○	○		
				3-wire (PNP)			M9P	—	●	●	●	○	○		
							—	G5P***	●	–	●	○	○		
				2-wire	12 V		M9B	—	●	●	●	○	○	—	
							—	K59***	●	–	●	○	○		
					—	—	100 V, 200 V	J51	—	●	–	●	○	–	
		Terminal conduit		3-wire (NPN)	12 V			G39C	G39	–	–	–	–	–	
				2-wire				K39C	K39	–	–	–	–	–	
	Diagnostic indication (2-color indication)	Grommet		3-wire (NPN)	5 V, 12 V			M9NW	—	●	●	●	○	○	IC circuit
								—	G59W** ***	●	–	●	○	○	
				3-wire (PNP)				M9PW	—	●	●	●	○	○	
								—	G5PW** ***	●	–	●	○	○	
				2-wire	12V			M9BW	—	●	●	●	○	○	—
								—	K59W** ***	●	–	●	○	○	
	With diagnostic output (2-color indication)			4-wire (NPN)	5 V, 12 V			F59F	G59F** ***	●	–	●	○	○	IC circuit
Reed switch	——	Grommet	Yes	3-wire (NPN equivalent)	5 V	—		A96 [Z76] ****	—	●	–	●	–	–	IC circuit
			No	2-wire	12 V	100 V		A93 [Z73] ****	—	●	–	●	–	–	—
						100 V or less		A90 [Z80] ****	—	●	–	●	–	–	IC circuit
			Yes			100 V, 200 V		A54	B54***	●	–	●	●	–	—
			No			200 V or less		A64	B64***	●	–	●	–	–	
		Terminal conduit	Yes			—		A33C	A33	–	–	–	–	–	PLC
						100 V, 200 V		A34C	A34	–	–	–	–	–	Relay, PLC
		DIN terminal						A44C	A44	–	–	–	–	–	
	Diagnostic indication (2-color indication)	Grommet				—	–	A59W	B59W***	●	–	●	–	–	

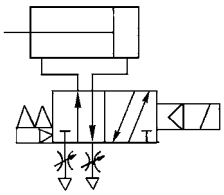
∗ Lead wire length symbols: 0.5 m ····· Nil (Example) M9NW
1 m ····· M (Example) M9NWM
3 m ····· L (Example) M9NWL
5 m ····· Z (Example) M9NWZ

∗ Since there are other applicable auto switches than listed, refer to page 1623 for details.
∗ For details about auto switches with pre-wired connector, refer to pages 1784 and 1785.
∗ D-A9□/M9□/M9□W auto switches are shipped together (not assembled). (Only auto switch mounting brackets are assembled before shipped.)

∗ Solid state auto switches marked with "○" are produced upon receipt of order.
∗∗ D-G5□W/K59W/G59F cannot be mounted on ø40 and ø50 lube style cylinder.
∗∗∗ D-B5□/B64/G5/K5□ types are mountable only upon a receipt of order. (Not mountable after the time of shipment)
∗∗∗∗ D-A9□ cannot be mounted on ø50. Select auto switches in brackets.

- **Operation type can be changed to rod extended when energized or rod retracted when energized.**
- **Ease of maintenance and inspection.**
  The solenoid valve can be separated easily and the cylinder can also be disassembled.
- **A manual operation mechanism is provided as standard equipment (non-locking).**

JIS Symbol



Made to Order Specifications

(For details, refer to pages 1836 and 1851 to 1954.)

Symbol	Specifications
-XA□	Change of rod end shape
-XC4	With heavy duty scraper
-XC6	Made of stainless steel
-XC7	Tie-rod, cushion valve, and tie-rod nut and similar parts made of stainless steel
-XC15	Change of tie-rod length
-XC22	Fluororubber seals
-XC29	Double knuckle joint with spring pin
-XC65	-XC6 + -XC7

⚠ Precautions

Minimum stroke for auto switch mounting

⚠ Caution

1. Each switch and mounting style of cylinder has different minimum mountable stroke. Be careful especially of the center trunnion style. (For details, refer to pages 1620 and 1621.)

Refer to pages 1618 to 1623 for cylinders with auto switches.

- Minimum auto switch mounting stroke
- Proper auto switch mounting position (detection at stroke end) and mounting height
- Operating range
- Switch mounting bracket: Part no.

Specifications

Applicable bore size (mm)	40	50	63	80	100
Lubrication	Lube/Non-lube				
Action	Double acting				
Fluid	Air				
Proof pressure	1.35 MPa				
Maximum operating pressure	0.9 MPa				
Minimum operating pressure	0.15 MPa				
Ambient and fluid temperature	–10 to 50°C (No freezing)				
Cushion	Air cushion				
Stroke length tolerance	Up to 250 st: $^{-1.0}_{0}$, 251 to 1000 st: $^{-1.4}_{0}$				
Port size	Rc 1/4				
Piston speed	50 to 500 mm/s*				50 to 350 mm/s*
Mouting	Basic style, Axial foot style, Rod side flange style Single clevis style, Double clevis style, Center trunnion style				
Allowable kinetic energy	2.4 J	4.4 J	7.8 J	11.7 J	20.5 J

* Operate within the range of absorbed energy.

Solenoid Valve Specifications

Applicable solenoid valve model	V3□08			
Coil rated voltage	100/200 VAC (50/60 Hz), 24 VDC			
Effective area of valve (Cv factor)	18 mm² (1.00)			
Electrical entry	Grommet, DIN terminal			
Allowable voltage	–15 to 10% of the rated voltage			
Coil insulation	Class B or equivalent (130°C)			
Apparent power Note)	**AC**	Inrush	50 Hz	8.5 VA
			60 Hz	7.5 VA
		Holding	50 Hz	7.0 VA
			60 Hz	5.5 VA
Power consumption Note)	**DC**	6 W		

Note) At the rated voltage.

Standard Stroke

(mm)

Bore size (mm)	Standard stroke (mm)
40	25, 50, 75, 100, 125, 150, 200, 250, 300, 350, 400, 450, 500
50, 63	25, 50, 75, 100, 125, 150, 200, 250, 300, 350, 400, 450, 500, 600
80, 100	25, 50, 75, 100, 125, 150, 200, 250, 300, 350, 400, 450, 500, 600, 700

Note) The cylinders with the standard strokes indicated above can be delivered in a short term. Intermediate stroke except mentioned above is manufactured upon receipt of order. When the auto switch is attached, the minimum stroke is going to be different. Refer to pages 1620 and 1621. The minimum stroke length is different in the trunnion style. For further information, refer to pages 1620 and 1621.

Rod Boot Material

Symbol	Rod boot material	Maximum ambient temperature
J	Nylon tarpaulin	70°C
K	Heat resistant tarpaulin	110°C*

* Maximum ambient temperature for the rod boot itself.

Accessory

Mounting		Basic style	Foot style	Rod side flange style	Single clevis style	Double* clevis style	Center trunnion style
Standard equipment	Rod end nut	●	●	●	●	●	●
	Clevis pin	—	—	—	—	●	—
Option	Single knuckle joint	●	●	●	●	●	●
	Double knuckle joint * (with pin)	●	●	●	●	●	●
	With rod boot	●	●	●	●	●	●

* Pin, plain washer and cotter pin are packaged together with double clevis and double knuckle joint.

Mass

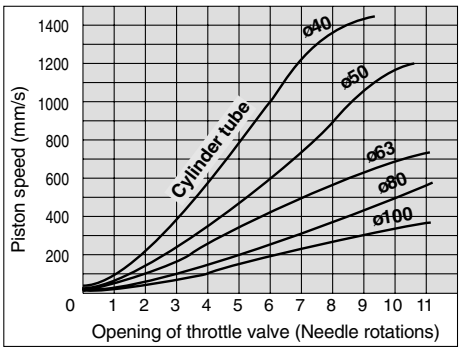
(kg)

Bore size (mm)		40	50	63	80	100
Basic mass	Basic style	1.30 (1.35)	1.73 (1.77)	2.57 (2.61)	4.29 (4.44)	6.01 (6.21)
	Axial foot style	1.47 (1.52)	1.93 (1.97)	2.86 (2.9)	5.08 (5.23)	6.94 (7.14)
	Rod side flange style	1.56 (1.61)	2.14 (2.18)	3.19 (3.23)	5.39 (5.54)	7.40 (7.6)
	Single clevis style	—	2.46 (2.5)	3.68 (3.72)	6.23 (6.38)	8.66 (8.86)
	Double clevis style	—	2.51 (2.55)	3.73 (3.77)	6.29 (6.44)	8.73 (8.93)
	Trunnion style	1.95 (2.05)	2.52 (3.52)	3.96 (4.16)	6.67 (6.96)	9.58 (9.97)
Additional mass per each 50 mm of stroke	All mounting brackets (Except trunnion style of iron tube)	0.22 (0.28)	0.28 (0.35)	0.37 (0.43)	0.52 (0.70)	0.65 (0.87)
	Trunnion style of steel	(0.36)	(0.46)	(0.65)	(0.86)	(1.07)
Accessory bracket	Single knuckle	0.23	0.26	0.26	0.60	0.83
	Double knuckle (with pin)	0.37	0.43	0.43	0.87	1.27

∗( ): Steel tube type.

Calculation: (Example) **CV3L40-100-1**
- Basic mass·····1.47 (kg)
- Additional mass·····0.22 (kg/50 st)
- Cylinder stroke·····100 (st) 1.47 + 0.22 x 100 ÷ 50 = 1.9 kg

Opening Range of Throttle Valve and Driving Speed



Conditions: Operating pressure 0.5 MPa, Horizontal mounting, No load, Spring return side
- Driving speeds indicated above are for reference.

Mounting Bracket Part No.

Mounting Bracket Part No.

Bore size (mm)	40	50	63	80	100
Axial foot *	CA1-L04	CA1-L05	CA1-L06	CA1-L08	CA1-L10
Flange	CA1-F04	CA1-F05	CA1-F06	CA1-F08	CA1-F10
Single clevis	–	CV3-C05	CV3-C06	CV3-C08	CV3-C10
Double clevis **	–	CV3-D05	CV3-D06	CV3-D08	CV3-D10

∗ Order two foot brackets per cylinder.
∗∗ For double clevis style, pin for clevis, plain washer and split pin are shipped together.

Series CV3
Specific Product Precautions

Be sure to read before handling. Refer to front matters 42 and 43 for Safety Instructions, pages 3 to 11 for Actuator and Auto Switch Precautions and 3/4/5 Port Solenoid Valve Precautions in Best Pneumatics No. 1.

Precautions

⚠Warning

1. Do not loosen the cushion valve more than 2 turns from the fully closed state.
Do not loosen it more than 2 turns because this could cause the cushion valve to be ejected.

⚠Caution

1. Do not use an air cylinder as an air-hydro cylinder, because this could result in oil leakage.

2. Do not twist the rod boot during installation.
If the cylinder is installed with its bellows twisted, it could damage the bellows.

3. Use a socket wrench when replacing mounting brackets.
The use of other tools could cause parts such as nuts to become deformed or affect their ease of service. For the sockets to be used, refer to the table below.

Bore size (mm)	Nut	Width across flats	Socket
40, 50	JIS B 1181 Class 3 Intermediate M8 x 1.25	13	JIS B 4636 + 2 point angle socket 13
63	JIS B 1181 Class 3 Intermediate M10 x 1.25	17	JIS B 4636 + 2 point angle socket 17
80, 100	JIS B 1181 Class 3 Intermediate M12 x 1.75	19	JIS B 4636 + 2 point angle socket 19

4. Do not replace the bushings or the cushion seals.
The bushings and the cushion seals are press-fitted. To replace them, they must be replaced together as a cover assembly.

5. To replace a seal, apply grease to the new seal before installing it.
If the cylinder is put into operation without applying grease to the seal, it could cause the seal to wear significantly, leading to premature air leakage.

6. Do not disassemble a trunnion style cylinder.
It is extremely difficult to align the axial center of the trunnion with the axial center of the cylinder. Thus, if this style of cylinder is disassembled and reassembled, there is the likelihood that the required dimensional accuracy cannot be attained, which could lead to a malfunction.

7. Operate the cylinder at a drive speed within the range of 50 and 500 mm/s.
(Operate within the range of absorbed energy. Refer to the front matters (Air cylinder model selection) of Best Pneumatics No. 2.)

Selection

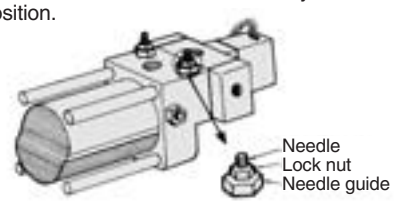
⚠Warning

1. Confirm the specifications.
Products in this catalog are designed to be used for compressed air systems. If not operated within the designated pressure or temperature, it may damage the products or cause malfunction. (Refer to specifications.)

2. Energizing continuously for a long period of time
When the valve is continuously energized for a long period of time, the performance may deteriorate or effect peripheral equipment adversely since temperature rises when coils generate heat.

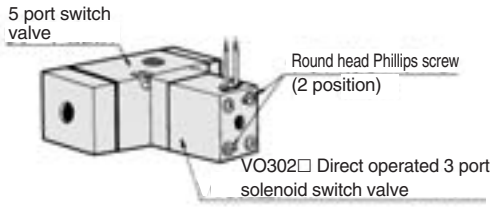
Piston Speed Adjustment

1. To slow down the piston speed, screw in the needle of the silencer exhaust throttle valve clockwise, to reduce the amount of air that is discharged.
2. The throttle valve needle opens fully when it is loosened 11 turns from its fully closed position.



3. After the specified speed has been set, secure the needle with the lock nut.

Change of Voltage Specifications



<Step>

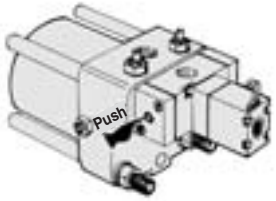
1. Loosen the Phillips screw with a screwdriver.
2. Detach the □VO302□ direct operated 3 port solenoid valve switch from the 5 port solenoid valve (V3108, V3208) and replace it.

How to order pilot valve:

1. For single solenoid valve
   1-1. Pilot valve only
   VO302A-00□□ 1 pc.
   1-2. With gasket
   VO302S-00□□ 1 pc.
2. For double solenoid valve
   2-1. Pilot valve only
   VO302A-00□□ 2 pcs.
   2-2. With gasket
   VO302D-00□□ 2 pcs.

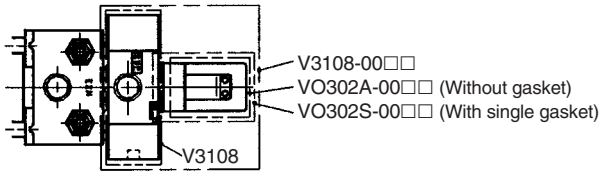
Manual Operation

Manual operation (non-locking) is possible by pushing the manual button about 3 mm.

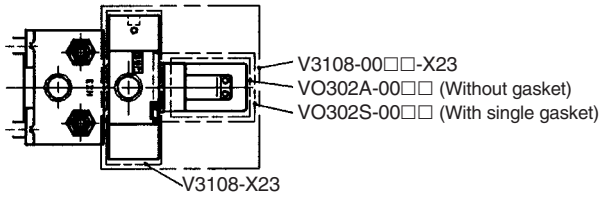


Solenoid Valve for CV3, Pilot Valve Part No.

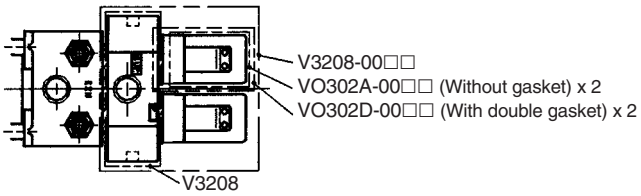
<Solenoid valve part no. for rod extension when energized>



<Solenoid valve part no. for rod retraction when energized>



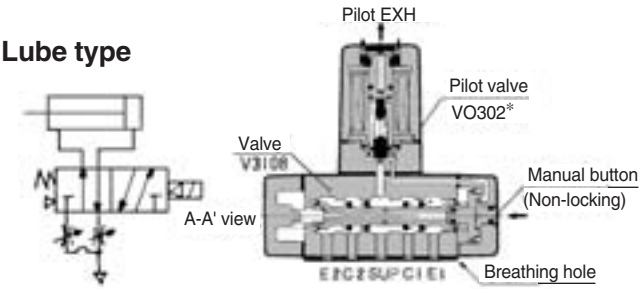
<Solenoid valve part no. for double solenoid>



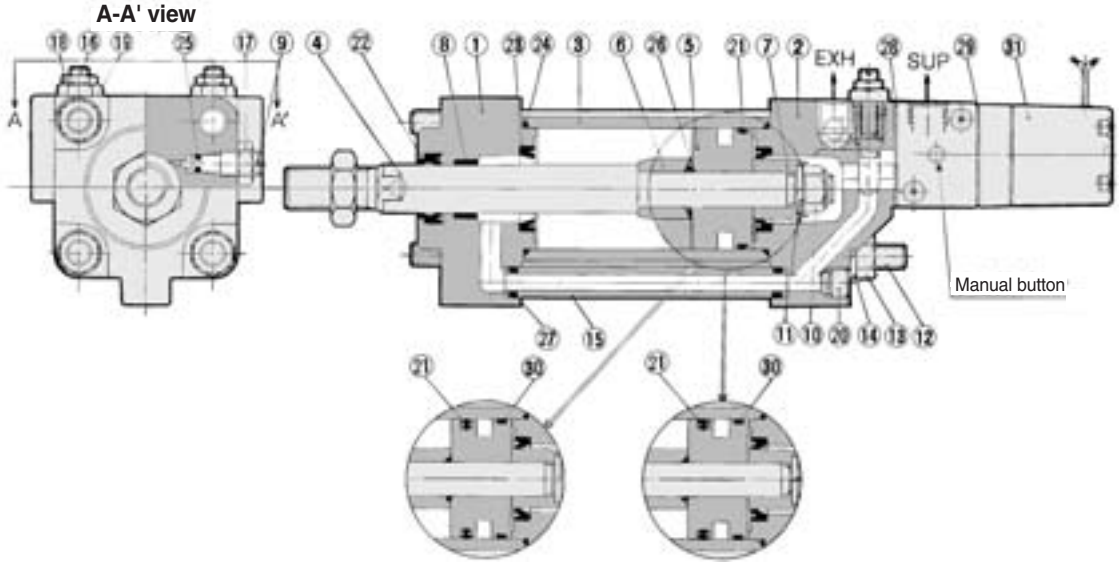
Note) Part number for the plate name of pilot valve is all VO302A.

Construction

Lube type



A-A' view



Non-lube type **Long stroke type**

Component Parts

No.	Description	Material	Note
1	**Rod cover**	Aluminum alloy	Matt black painted
2	**Head cover**	Aluminum alloy	Matt black painted
3	**Cylinder tube**	Aluminum alloy	Hard anodized
4	**Piston rod**	Carbon steel	Hard chrome plated
5	**Piston**	Aluminum alloy	Chromated
6	**Cushion ring A**	Rolled steel	Zinc chromated
7	**Cushion ring B**	Rolled steel	Zinc chromated
8*	**Bushing**	Lead-bronze casted	
9	**Cushion valve**	Rolled steel	Electroless nickel plated
10	**Piston nut**	Rolled steel	Zinc chromated
11	**Spring washer**	Steel wire	Zinc chromated
12	**Tie-rod**	Carbon steel	Zinc chromated
13	**Tie-rod nut**	Carbon steel	Black zinc chromated
14	**Spring washer**	Steel wire	Black zinc chromated
15	**Pipe**	Carbon steel tube	Chromated
16	**Needle**	Sulfur easy chipping steel	Electroless nickel plated
17	**Lock nut**	Carbon steel	Nickel plated
18	**Lock nut**	Carbon steel	Nickel plated
19	**Needle guide**	Sulfur easy chipping steel	Electroless nickel plated
20	**Plug**	Chromium molybdenum steel	Black zinc chromated
30	**Wear ring**	Resin	

No.	Description	No. of solenoids	Rod extended when energized	Rod retracted when energized
31	**Solenoid valve**	Single	(1)	(2)
		Double	(3)	

* How to order solenoid valves

Note 1) V3108-00 Voltage Electrical entry

Note 2) V3108-00 Voltage Electrical entry x 23

Note 3) V3208-00 Voltage Electrical entry

Component Parts

	Description	Material	Note
21	**Piston seal**	NBR	
22	**Rod seal**	NBR	
23*	**Cushion seal**	NBR	
24	**Cylinder tube gasket**	NBR	
25	**Cushion valve seal**	NBR	
26*	**Piston gasket**	NBR	
27	**Pipe gasket**	NBR	
28	**Head cover gasket**	NBR	
29	**Single solenoid gasket**	NBR	
	Double solenoid gasket	NBR	

* Not replaceable.

Replacement Parts: Seal Kit

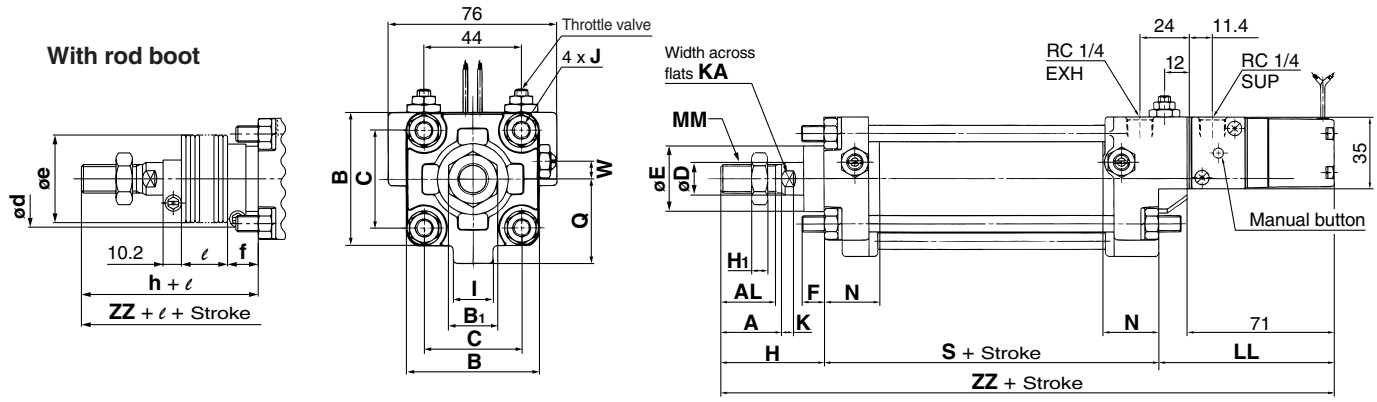
Lube Type			Non-lube Type		
Bore size (mm)	Kit no.	Contents	Bore size (mm)	Kit no.	Contents
40	CV3-40-PS	Set of nos. above ㉑, ㉒, ㉔, ㉕, ㉗, ㉘	**40**	CV3N40-PS	Set of nos. above ㉑, ㉒, ㉔, ㉕, ㉗, ㉘
50	CV3-50-PS		**50**	CV3N50-PS	
63	CV3-63-PS		**63**	CV3N63-PS	
80	CV3-80-PS		**80**	CV3N80-PS	
100	CV3-100-PS		**100**	CV3N100-PS	

* Seal kit includes ㉑, ㉒, ㉔, ㉕, ㉗, ㉘. Order the seal kit, based on each bore size. (The parts indicated with numbers ㉓ and ㉖ are not replaceable.)
* Seal kit includes a grease pack (ø40, ø50: 10 g, ø63, ø80: 20 g, ø100: 30 g). Order with the following part number when only the grease pack is needed.
Grease pack part no.: GR-S-010 (10 g), **GR-S-020** (20 g)

For the dimensions of DIN terminal, refer to page 1613.

Basic Style: CV3B□

Lube type (CV3B), Non-lube type (CV3BN)



(mm)

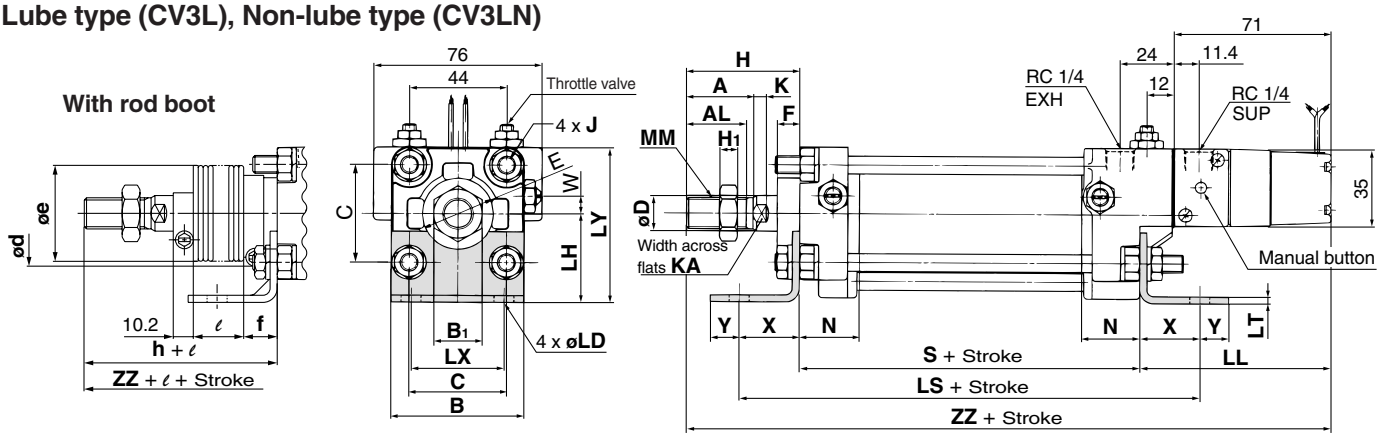
Bore size (mm)	Stroke range* (mm)	A	AL	B	B_1	C	D	E	F	H_1	I	J	K	KA	LL	MM	N	Q	S
40	Up to 500	30	27	60	22	44	16	32	10	8	18	M8 x 1.25	6	14	86	M14 x 1.5	27	38	84
50	Up to 600	35	32	70	27	52	20	40	10	11	18	M8 x 1.25	7	18	83	M18 x 1.5	30	43.5	90
63	Up to 600	35	32	85	27	64	20	40	10	11	18	M10 x 1.25	7	18	83	M18 x 1.5	31	49	98
80	Up to 750	40	37	102	32	78	25	52	14	13	20	M12 x 1.75	11	22	84	M22 x 1.5	37	63	116
100	Up to 750	40	37	116	41	92	30	52	14	16	20	M12 x 1.75	11	26	85	M26 x 1.5	40	73	126

Bore size (mm)	W	Without rod boot		With rod boot					
		H	ZZ	d	e	f	h	ℓ	ZZ
40	8	51	221	55	43	11.2	59	1/4 stroke	229
50	0	58	231	62	52	11.2	66	1/4 stroke	239
63	0	58	239	62	52	11.2	66	1/4 stroke	247
80	0	71	271	74	65	12.5	80	1/4 stroke	280
100	0	72	283	74	65	14.0	81	1/4 stroke	292

* The minimum stroke of the one with rod boot is 20 mm or more.

Axial Foot Style: CV3L□

Lube type (CV3L), Non-lube type (CV3LN)



(mm)

Bore size (mm)	Stroke range* (mm)	A	AL	B	B_1	C	D	E	F	H_1	J	K	KA	LD	LH	LL	LS	LT	LX	LY
40	Up to 500 501 to 800**	30	27	60	22	44	16	32	10	8	M8 x 1.25	6	14	9	40	86	138	3.2	42	70
50	Up to 600 601 to 1000**	35	32	70	27	52	20	40	10	11	M8 x 1.25	7	18	9	45	83	144	3.2	50	80
63	Up to 600 611 to 1000**	35	32	85	27	64	20	40	10	11	M10 x 1.25	7	18	11.5	50	83	166	3.2	59	93
80	Up to 750 751 to 1000**	40	37	102	32	78	25	52	14	13	M12 x 1.75	11	22	13.5	65	84	204	4.5	76	116
100	Up to 750 751 to 1000**	40	37	116	41	92	30	52	14	16	M12 x 1.75	11	26	13.5	75	85	212	6	92	133

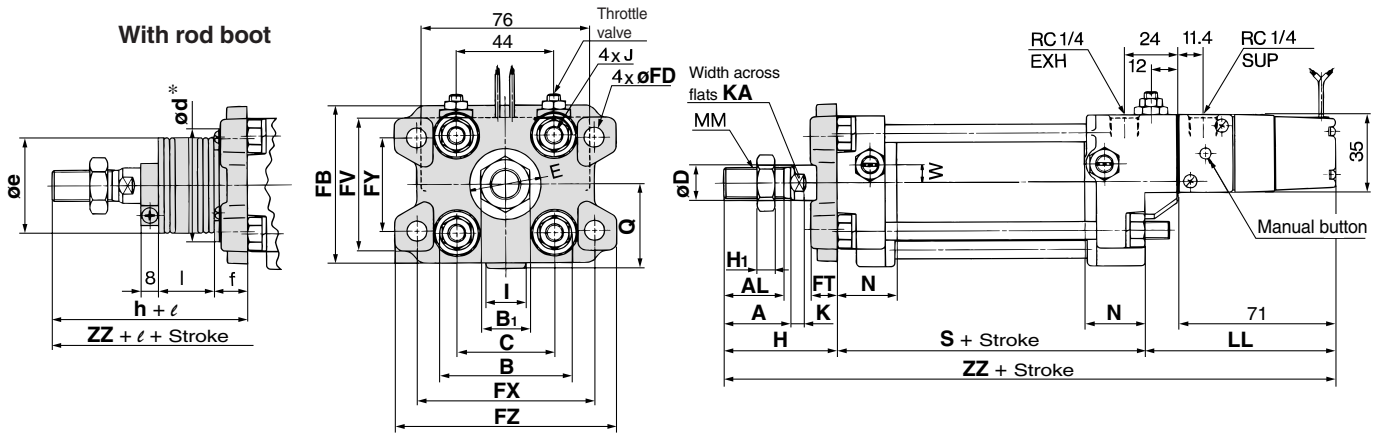
Bore size (mm)	MM	N	S	W	X	Y	Without rod boot		With rod boot					
							H	ZZ	d	e	f	h	ℓ	ZZ
40	M14 x 1.5	27	84	8	27	13	51	221	55	43	11.2	59	1/4 stroke	229
50	M18 x 1.5	30	90	0	27	13	58	231	62	52	11.2	66	1/4 stroke	239
63	M18 x 1.5	31	98	0	34	16	58	239	62	52	11.2	66	1/4 stroke	247
80	M22 x 1.5	37	116	0	44	16	71	271	74	65	12.5	80	1/4 stroke	280
100	M26 x 1.5	40	126	0	43	17	72	283	74	65	14.0	81	1/4 stroke	292

* The minimum stroke of the one with rod boot is 20 mm or more. ** Long stroke

Rod Side Flange Style: CV3F□

Lube type (CV3F), Non-lube type (CV3FN)

With rod boot



(mm)

Bore size (mm)	Stroke range* (mm)	A	AL	FB	B	B1	C	D	E	FD	FT	FV	FX	FY	FZ	H1	I	J	K	KA
40	Up to 500 501 to 800**	30	27	71	60	22	44	16	32	9	12	60	80	42	100	8	18	M8 x 1.25	6	14
50	Up to 600 601 to 1000**	35	32	81	70	27	52	20	40	9	12	70	90	50	110	11	18	M8 x 1.25	7	18
63	Up to 600 611 to 1000**	35	32	101	85	27	64	20	40	11.5	15	86	105	59	130	11	18	M10 x 1.25	7	18
80	Up to 750 751 to 1000**	40	37	119	102	32	78	25	52	13.5	18	102	130	76	160	13	20	M12 x 1.75	11	22
100	Up to 750 751 to 1000**	40	37	133	116	41	92	30	52	13.5	18	116	150	92	180	16	20	M12 x 1.75	11	26

Bore size (mm)	LL	MM	N	Q	S	W	Without rod boot		With rod boot					
							H	ZZ	d★	e	f	h	ℓ	ZZ
40	86	M14 x 1.5	27	38	84	8	51	221	52	43	15	59	1/4 stroke	229
50	83	M18 x 1.5	30	43.5	90	0	58	231	58	52	15	66	1/4 stroke	239
63	83	M18 x 1.5	31	49	98	0	58	239	58	52	17.5	66	1/4 stroke	247
80	84	M22 x 1.5	37	63	116	0	71	271	80	65	21.5	80	1/4 stroke	280
100	85	M26 x 1.5	40	73	126	0	72	283	80	65	21.5	81	1/4 stroke	292

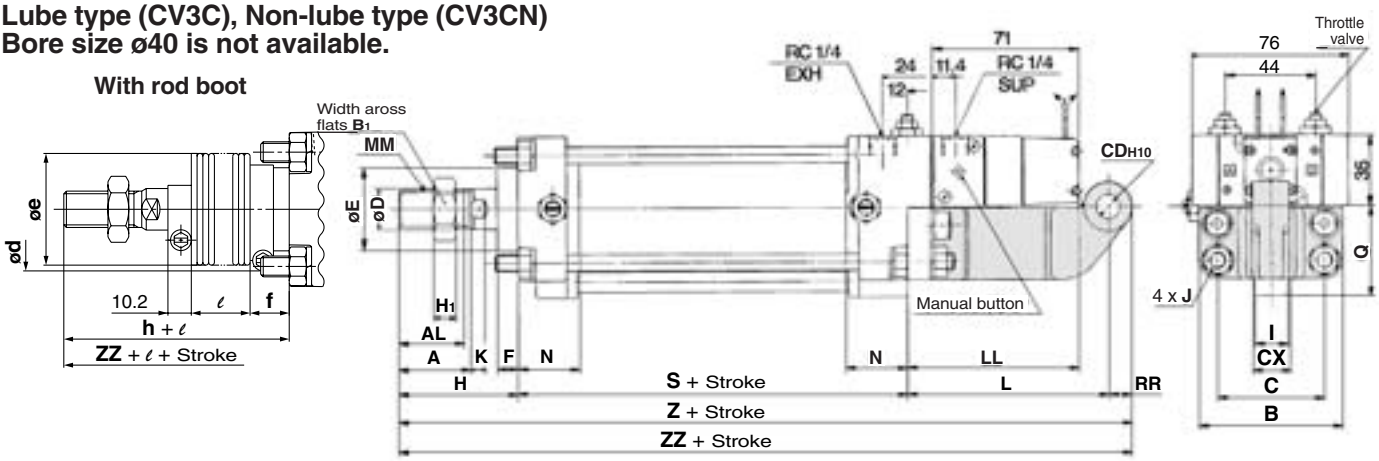
* The minimum stroke of the one with rod boot is 20 mm or more.
** Long stroke

★ When drilling holes to get through the rod boot for the purpose of mounting, make the holes larger than the outer diameter (ød) of the rod boot mounting bracket.

Single Clevis Style: CV3C□

Lube type (CV3C), Non-lube type (CV3CN)
Bore size ø40 is not available.

With rod boot



** Bore size ø40 is not available.

(mm)

Bore size ** (mm)	Stroke range * (mm)	A	AL	B	B1	C	CDH10	CX	D	E	F	H1	I	J	K	KA	L	LL
50	Up to 600	35	32	70	27	52	$12^{+0.070}_{0}$	$18^{-0.1}_{-0.3}$	20	40	10	11	18	M8 x 1.25	7	18	98	83
63	Up to 600	35	32	85	27	64	$16^{+0.070}_{0}$	$25^{-0.1}_{-0.3}$	20	40	10	11	18	M10 x 1.25	7	18	100	83
80	Up to 750	40	37	102	32	78	$20^{+0.084}_{0}$	$31.5^{-0.1}_{-0.3}$	25	52	14	13	20	M12 x 1.75	11	22	105	84
100	Up to 750	40	37	116	41	92	$25^{+0.084}_{0}$	$35.5^{-0.1}_{-0.3}$	30	52	14	16	20	M12 x 1.75	11	26	110	85

Bore size ** (mm)	MM	N	Q	RR	S	Without rod boot			With rod boot						
						H	Z	ZZ	d	e	f	h	ℓ	Z	ZZ
50	M18 x 1.5	30	43.5	12	90	58	246	258	62	52	11.2	66	1/4 stroke	254	266
63	M18 x 1.5	31	49	16	98	58	256	272	62	52	11.2	66	1/4 stroke	264	280
80	M22 x 1.5	37	63	20	116	71	292	312	74	65	12.5	80	1/4 stroke	301	321
100	M26 x 1.5	40	73	25	126	72	308	333	74	65	14.0	81	1/4 stroke	317	342

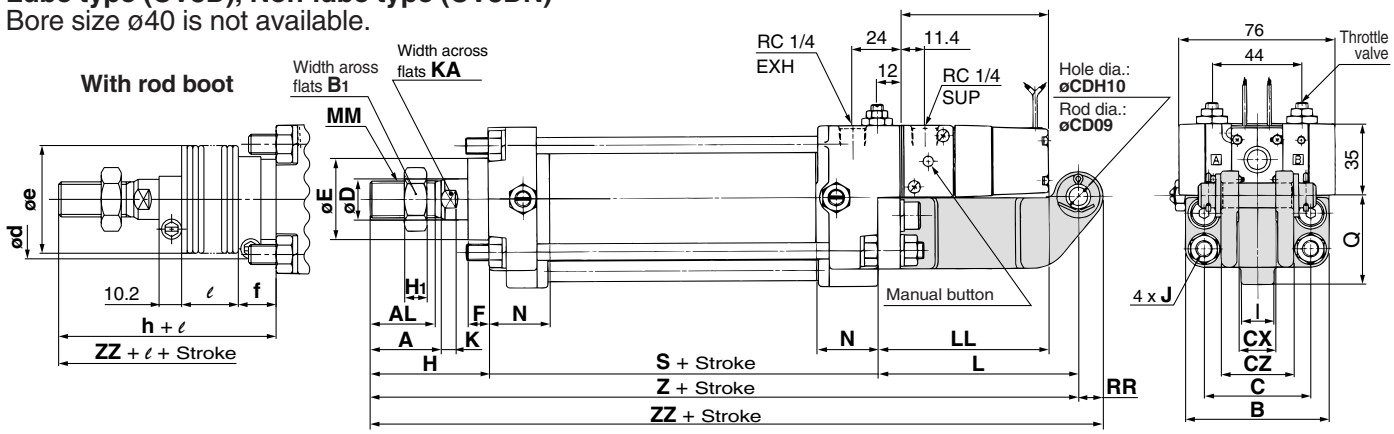
* The minimum stroke of the one with rod boot is 20 mm or more.

Double Clevis Style: CV3D□

Lube type (CV3D), Non-lube type (CV3DN)

Bore size ø40 is not available.

With rod boot



∗∗ Bore size ø40 is not available.

(mm)

Bore size ∗∗ (mm)	Stroke range ∗ (mm)	A	AL	B	B1	C	CD	CX	CZ	D	E	F	H1	I	J	K	KA	L
50	Up to 600	35	32	70	27	52	12	$18^{+0.3}_{+0.1}$	35.5	20	40	10	11	18	M8 x 1.25	7	18	98
63	Up to 600	35	32	85	27	64	16	$25^{+0.3}_{+0.1}$	50	20	40	10	11	18	M10 x 1.25	7	18	100
80	Up to 750	40	37	102	32	78	20	$31.5^{+0.3}_{+0.1}$	63	25	52	14	13	20	M12 x 1.75	11	22	105
100	Up to 750	40	37	116	41	92	25	$35.5^{+0.3}_{+0.1}$	71	30	52	14	16	20	M12 x 1.75	11	26	110

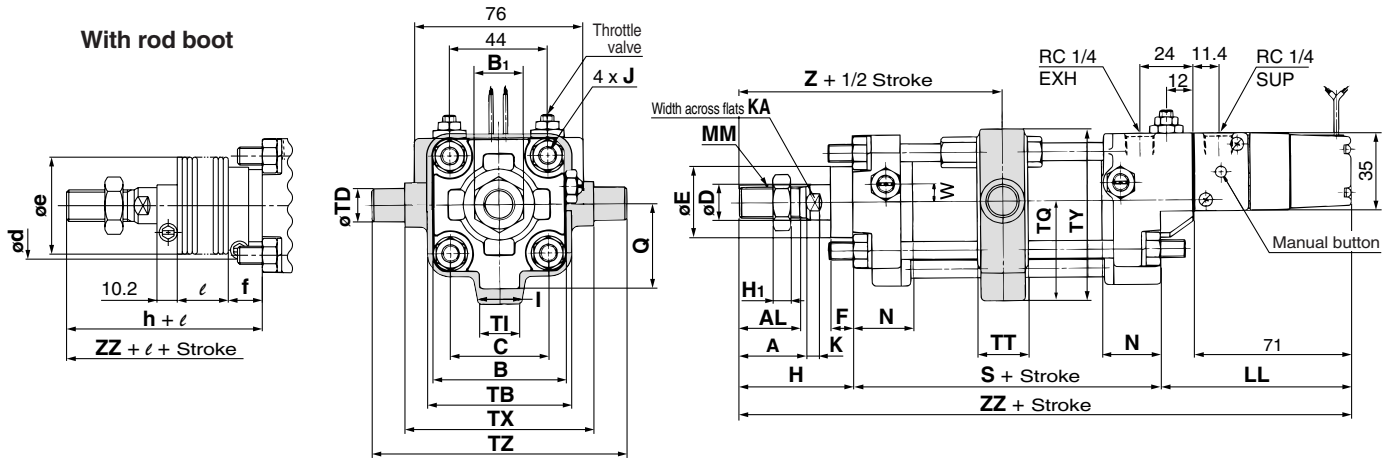
Bore size ∗∗ (mm)	LL	MM	N	Q	RR	S	Without rod boot			With rod boot						
							H	Z	ZZ	d	e	f	h	ℓ	Z	ZZ
50	83	M18 x 1.5	30	43.5	12	90	58	246	258	62	52	11.2	66	1/4 stroke	254	266
63	83	M18 x 1.5	31	49	16	98	58	256	272	62	52	11.2	66	1/4 stroke	264	280
80	84	M22 x 1.5	37	63	20	116	71	292	312	74	65	12.5	80	1/4 stroke	301	321
100	85	M26 x 1.5	40	73	25	126	72	308	333	74	65	14.0	81	1/4 stroke	317	342

∗ Clevis pin, flat washer and cotter pin are shipped together. The minimum stroke with rod boot is 20 mm or more.

Center Trunnion Style: CV3T□

Lube type (CV3T), Non-lube type (CV3TN)

With rod boot



(mm)

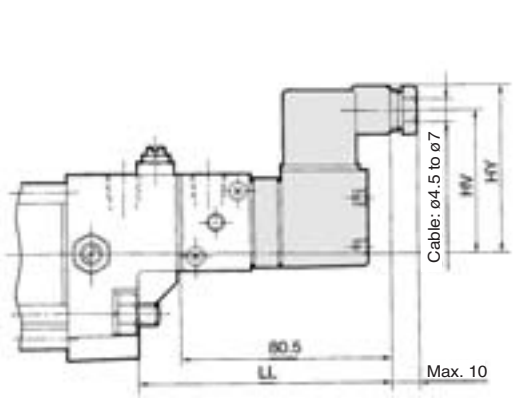
Bore size (mm)	Stroke range ∗ (mm)	A	AL	B	B1	C	D	E	F	H1	J	K	KA	LL	MM	N	S	TB
40	25 to 500	30	27	60	22	44	16	32	10	8	M8 x 1.25	6	14	86	M14 x 1.5	27	84	65
50	25 to 600	35	32	70	27	52	20	40	10	11	M8 x 1.25	7	18	83	M18 x 1.5	30	90	75
63	50 to 600	35	32	85	27	64	20	40	10	11	M10 x 1.25	7	18	83	M18 x 1.5	31	98	90
80	50 to 750	40	37	102	32	78	25	52	14	13	M12 x 1.75	11	22	84	M22 x 1.5	37	116	110
100	50 to 750	40	37	116	41	92	30	52	14	16	M12 x 1.75	11	26	85	M26 x 1.5	40	126	130

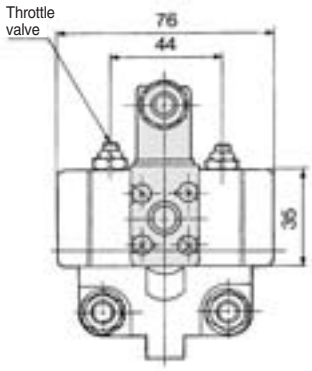
Bore size (mm)	øTD e8	TI	TQ	TT	TX	TY	TZ	W	I	Q	Without rod boot			With rod boot						
											H	Z	ZZ	d	e	f	h	ℓ	Z	ZZ
40	$15^{-0.032}_{-0.059}$	20	45	23	85	77.5	115	8	18	38	51	93	221	55	43	11.2	59	1/4 stroke	101	229
50	$15^{-0.032}_{-0.059}$	20	50	23	95	87.5	125	0	18	43.5	58	103	231	62	52	11.2	66	1/4 stroke	111	239
63	$18^{-0.032}_{-0.059}$	20	57	28	110	102	146	0	18	49	58	107	239	62	52	11.2	66	1/4 stroke	115	247
80	$25^{-0.040}_{-0.073}$	24	69.5	35	140	124.5	190	0	20	63	71	129	271	74	65	12.5	80	1/4 stroke	138	280
100	$25^{-0.040}_{-0.073}$	24	79.5	43	162	144.5	212	0	20	73	72	135	283	74	65	14.0	81	1/4 stroke	144	292

∗ The minimum stroke of the one with rod boot is 20 mm or more.

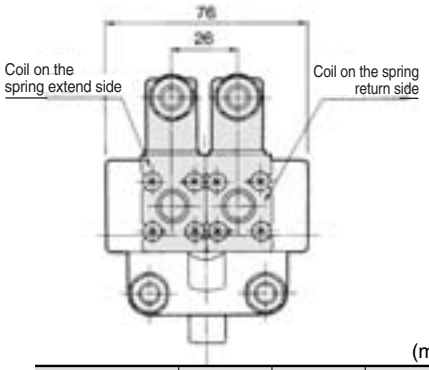
Electrical Entry: Dimensions for DIN Terminal

Single





Double

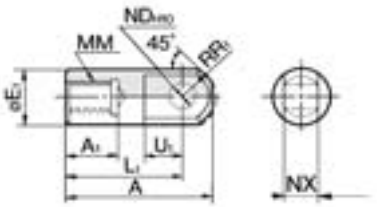


(mm)

Bore size (mm)	LL	HV	HY
40	95.5	55	64
50	92.5	60	69
63	92.5	68	77
80	93.5	76	85
100	94.5	83	92

Accessory Dimensions

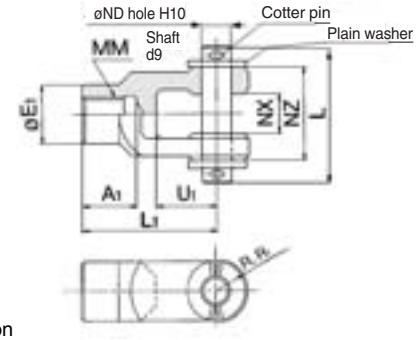
I Type Single Knuckle Joint



Material: Free cutting sulfur steel (mm)

Part no.	Applicable bore size (mm)	A	A_1	$øE_1$	L_1	MM	R_1	U_1	$øND_{H10}$	NX
I-04	**40**	69	22	24	55	M14 x 1.5	15.5	20	$12^{+0.070}_{0}$	$16^{-0.1}_{-0.3}$
I-05	**50, 63**	74	27	28	60	M18 x 1.5	15.5	20	$12^{+0.070}_{0}$	$16^{-0.1}_{-0.3}$
I-08	**80**	91	37	36	71	M22 x 1.5	22.5	26	$18^{+0.070}_{0}$	$28^{-0.1}_{-0.3}$
I-10	**100**	105	37	40	83	M26 x 1.5	24.5	28	$20^{+0.084}_{0}$	$30^{-0.1}_{-0.3}$

Y Type Double Knuckle Joint

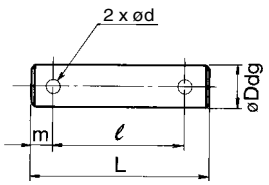


Material: Cast iron (mm)

Part no.	Applicable bore size (mm)	A_1	E_1	L_1	MM	R_1	U_1	ND	NX	NZ	L	Cotter pin size	Plain washer size
Y-04C	**40**	22	24	55	M14 x 1.5	13	25	12	$16^{+0.3}_{+0.1}$	38	55.5	ø3 x 18ℓ	Polished round 12
Y-05C	**50, 63**	27	28	60	M18 x 1.5	15	27	12	$16^{+0.3}_{+0.1}$	38	55.5	ø3 x 18ℓ	Polished round 12
Y-08C	**80**	37	36	71	M22 x 1.5	19	28	18	$28^{+0.3}_{+0.1}$	55	76.5	ø4 x 25ℓ	Polished round 18
Y-10C	**100**	37	40	83	M26 x 1.5	21	38	20	$30^{+0.3}_{+0.1}$	61	83	ø4 x 30ℓ	Polished round 20

∗ Knuckle pin, cotter pin, and plain washer are shipped together.

Clevis Pin

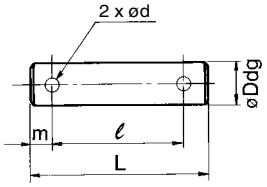


Material: Carbon steel (mm)

Part no.	Applicable bore size (mm)	ødD9	L	ød	ℓ	m	Applicable plain washer	Applicable cotter pin
CDP-3A	**50**	$12^{-0.050}_{-0.093}$	55.5	3	47.5	4.0	Polished round 12	3 x 18
CVD-06	**63**	$16^{-0.050}_{-0.093}$	75	4	65	5.0	Polished round 16	4 x 22
CVD-08	**80**	$20^{-0.065}_{-0.117}$	94	5	79	7.5	Polished round 20	5 x 30
CVD-10	**100**	$25^{-0.065}_{-0.117}$	105	5	90	7.5	Polished round 24	5 x 35

∗ Cotter pins and flat washers are included.

Knuckle Pin

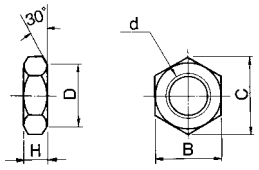


Material: Carbon steel (mm)

Part no.	Applicable bore size (mm)	ødD9	L	ℓ	m	ød (Drill through)	Applicable cotter pin	Applicable plain washer
CDP-3A	**40, 50, 63**	$12^{-0.050}_{-0.093}$	55.5	47.5	4	3	ø3 x 18ℓ	Polished round 12
CDP-5A	**80**	$18^{-0.050}_{-0.093}$	76.5	66.5	5	4	ø4 x 25ℓ	Polished round 18
CDP-6A	**100**	$20^{-0.065}_{-0.117}$	83	73	5	4	ø4 x 30ℓ	Polished round 20

∗ Cotter pins and flat washers are included.

Rod End Nut



Material: Rolled steel (mm)

Part no.	Applicable bore size (mm)	d	H	B	C	D
NT-04	**40**	M14 x 1.5	8	22	25.4	21
NT-05	**50, 63**	M18 x 1.5	11	27	31.2	26
NT-08	**80**	M22 x 1.5	13	32	37	31
NT-10	**100**	M26 x 1.5	16	41	47.3	39

Valve Mounted Cylinder: Non-rotating Rod Type Double Acting

Series CV3K

Non-lube Type: ø40, ø50, ø63

How to Order

Built-in Magnet Cylinder Model

If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) CDV3KL40-100-1

Suffix for cylinder

Rod boot	J	Nylon tarpaulin
	K	Heat resistant tarpaulin
Cushion	N	Without cushion
	R	With cushion on rod end
	H	With cushion on head end
	Nil	With cushion on both ends

∗ When specifying symbol more than one, combine symbols alphabetically.

Made to Order
Refer to page 1615 for details.

Solenoid valve

Nil	2 position single
W	2 position double

Solenoid valve voltage

1	100 VAC (50/60 Hz)
2	200 VAC (50/60 Hz)
5	24 VDC
9	Other

Cylinder stroke (mm)
Refer to page 1615 for standard strokes.

	CV3K	L	50		–	100						1		D	–	
With auto switch	CDV3K	L	50		–	100		–	M9BW		–	1		D	–	

With Auto Switch
(Built-in magnet)

Non-rotating rod type

Mounting style

B	Basic style
L	Axial foot style
F	Rod side flange style
C∗	Single clevis style
D∗	Double clevis style
T	Center trunnion style

∗ Except tubing I.D. ø40

Bore size

40	40 mm
50	50 mm
63	63 mm

Port thread type

Nil	Rc
TN	NPT
TF	G

Auto switch

Nil	Without auto switch

∗ For the applicable auto switch model, refer to the table below.

Number of auto switches

Nil	2 pcs.
3	3 pcs.
S	1 pc.
n	"n" pcs.

Electrical entry

Nil	Grommet
D	DIN terminal

Applicable Auto Switch/Refer to pages 1719 to 1827 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC	Load voltage DC	Load voltage AC	Auto switch model: Tie-rod mounting	Auto switch model: Band mounting	Lead wire length (m): 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	Pre-wired connector	Applicable load	
Solid state switch	——	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	M9N	—	●	●	●	○	○	IC circuit	Relay, PLC
								—	G59***	●	—	●	○	○		
				3-wire (PNP)				M9P	—	●	●	●	○	○		
								—	G5P***	●	—	●	○	○		
				2-wire		12 V		M9B	—	●	●	●	○	○	—	
								—	K59***	●	—	●	○	○		
					—	—	100 V, 200 V	J51	—	●	—	●	○	—		
		Terminal conduit		3-wire (NPN)	24 V	12 V	—	G39C	G39	—	—	—	—	—		
				2-wire				K39C	K39	—	—	—	—	—		
	Diagnostic indication (2-color indication)	Grommet		3-wire (NPN)		5 V, 12 V		M9NW	—	●	●	●	○	○	IC circuit	
								—	G59W***	●	—	●	○	○		
				3-wire (PNP)				M9PW	—	●	●	●	○	○		
								—	G5PW***	●	—	●	○	○		
				2-wire		12V		M9BW	—	●	●	●	○	○	—	
								—	K59W***	●	—	●	○	○		
	With diagnostic output (2-color indication)			4-wire (NPN)		5 V, 12 V		F59F	G59F***	●	—	●	○	○	IC circuit	
Reed switch	——	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	A96 [Z76] ****	—	●	—	●	—	—	IC circuit	—
			No	2-wire	24 V	12 V	100 V	A93 [Z73] ****	—	●	—	●	—	—	—	Relay, PLC
			Yes				100 V or less	A90 [Z80] ****	—	●	—	●	—	—	IC circuit	
			No				100 V, 200 V	A54	B54***	●	—	●	●	—	—	
							200 V or less	A64	B64***	●	—	●	—	—		
		Terminal conduit	Yes				—	A33C	A33	—	—	—	—	—	—	PLC
							100 V, 200 V	A34C	A34	—	—	—	—	—		Relay, PLC
		DIN terminal						A44C	A44	—	—	—	—	—		
	Diagnostic indication (2-color indication)	Grommet				—	–	A59W	B59W***	●	—	●	—	—		

∗ 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

∗ Since there are other applicable auto switches than listed, refer to page 1623 for details.
∗ For details about auto switches with pre-wired connector, refer to pages 1784 and 1785.
∗ D-A9□/M9□/M9□W auto switches are shipped together (not assembled). (Only auto switch mounting brackets are assembled before shipped.)

∗ Solid state auto switches marked with "○" are produced upon receipt of order.
∗∗∗ D-B5□/B64/G5/K5□ types are mountable only upon a receipt of order. (Not mountable after the time of shipment)
∗∗∗∗ D-A9□ cannot be mounted on ø50. Select auto switches in brackets.

SMC

Adjustable speed.

Built-in throttle valves are provided to enable speed adjustments in each direction.

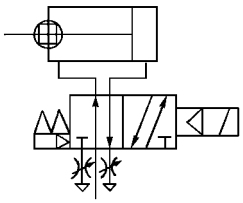
Operation type can be changed to rod extended when energized or rod retracted when energized.

A manual operation mechanism is provided as standard equipment (non-locking).

An auto switch cylinder with the switch installed can also be manufactured.

PAT.PEND.

JIS Symbol



Made to Order Specifications

(For details, refer to pages 1836, 1846 and 1885)

Symbol	Specifications
-XA□	Change of rod end shape
-XC7	Tie-rod, cushion valve, and tie-rod nut made of stainless steel
-XC15	Change of tie-rod length

Refer to pages 1618 to 1623 for cylinders with auto switches.

- Minimum auto switch mounting stroke
- Proper auto switch mounting position (detection at stroke end) and mounting height
- Operating range
- Switch mounting bracket: Part no.

Specifications

Applicable bore size (mm)	40	50	63
Action	Double acting		
Fluid	Air		
Proof pressure	1.35 MPa		
Maximum operating pressure	0.9 MPa		
Minimum operating pressure	0.15 MPa		
Ambient and fluid temperature	–10 to 50°C (No freezing)		
Cushion	Air cushion		
Stroke length tolerance	Up to 250 st $^{+1.0}_{0}$, 251 to 600 st $^{+1.4}_{0}$		
Port size	Rc 1/4		
Lubrication	Not required (Non-lube)		
Piston speed	50 to 500 mm/s *		
Rod non-rotating accuracy	±0.8°		
Allowable rotational torque	0.44 N·m or less		
Mouting	Basic style, Axial foot style, Rod side flange style, Single clevis style, Double clevis style, Center trunnion style		
Allowable kinetic energy	2.4 J	4.4 J	7.8 J

∗ Operate within the range of absorbed energy.

Solenoid Valve Specifications

Applicable solenoid valve model	V3□08			
Coil rated voltage	100/200 VAC (50/60 Hz), 24 VDC			
Effective area of valve (Cv factor)	18 mm² (1.0)			
Electrical entry	Grommet, DIN terminal			
Allowable voltage	–15 to 10% of the rated voltage			
Coil insulation	Class B or equivalent (130°C)			
Apparent power Note)	AC	Inrush	50 Hz	8.5 VA
			60 Hz	7.5 VA
		Holding	50 Hz	7.0 VA
			60 Hz	5.5 VA
Power consumption Note)	DC	6 W		

Note) At the rated voltage.

Standard Stroke

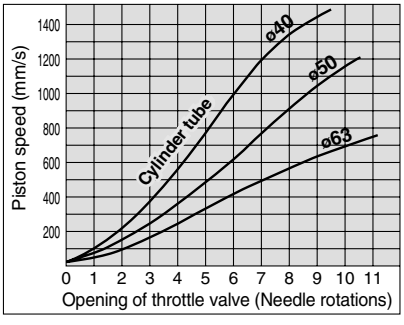
Bore size (mm)	Standard stroke (mm)
40	25, 50, 75, 100, 125, 150, 200, 250, 300, 350, 400, 450, 500*
50, 63	25, 50, 75, 100, 125, 150, 200, 250, 300, 350, 400, 450, 500, 600*

Note) The cylinders with the standard strokes indicated above can be delivered in a short term. Intermediate stroke except mentioned above is manufactured upon receipt of order.

- When the auto switch is attached, the minimum stroke is going to be different. Refer to pages 1620 and 1621.
  The minimum stroke length is different in the trunnion style. Refer to pages 1620 and 1621 for further information.

Please consult with SMC for longer strokes than the strokes marked with ∗.

Opening Range of Throttle Valve and Driving Speed



Conditions: Operating pressure 0.5 MPa, Horizontal mounting, No load, Spring return side

- The speeds shown in the graph are for reference.

Rod Boot Material

Symbol	Rod boot material	Max. ambient temperature
J	Nylon tarpaulin	70°C
K	Heat resistant tarpaulin	110°C*

∗ Maximum ambient temperature for the rod boot itself.

Mass

(kg)

Bore size (mm)		40	50	63
Basic mass	Basic style	1.30	1.73	2.57
	Foot style	1.47	1.93	2.86
	Rod side flange style	1.56	2.14	3.19
	Single clevis style	—	2.46	3.68
	Double clevis style	—	2.51	3.73
	Trunnion style	1.95	2.52	3.96
Additional mass per each 50 mm of stroke		0.22	0.28	0.37
Accessory bracket	Single knuckle	0.23	0.26	0.26
	Double knuckle (with pin)	0.37	0.43	0.43

Calculation: (Example) **CV3KL40-100-1**
- Basic mass·····1.47 (kg)
- Additional mass·····0.22 (kg/50 st)
- Cylinder stroke·····100 (st) 1.47 + 0.22 x 100 ÷ 50 = 1.91 kg

Accessory

Mounting		Basic style	Foot style	Rod side flange style	Single clevis style	Double * clevis style	Center trunnion style
Standard equipment	Rod end nut	●	●	●	●	●	●
	Clevis pin	–	–	–	–	●	–
Option	Single knuckle joint	●	●	●	●	●	●
	Double knuckle joint * (with pin)	●	●	●	●	●	●
	With rod boot	●	●	●	●	●	●

* Pin, plain washer and cotter pin are shipped together with double clevis and double knuckle joint.

Handling

1. **Adjusting of the piston speed**
2. **Change of voltage specifications**
3. **Manual operation**
4. **Changing between rod extended when energized and rod retracted when energized.**

Since the operations above **1.** to **4.** are the same as Series CV3, refer to page 1608.

⚠ Precautions

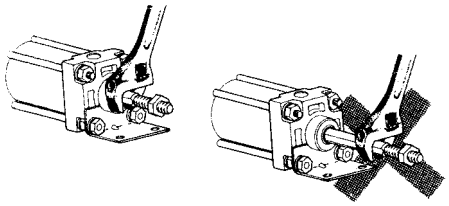
Be sure to read before handling. For Safety Instructions and Actuator Precautions, refer to front matters 42 and 43. For Series CV3K, refer to page 1607.

Operating Precautions

⚠Caution

1. Avoid using the air cylinder in such a way that rotational torque would be applied to the piston rod.

If rotational torque is applied, the non-rotating guide will become deformed, causing a loss of non-rotating accuracy. Also, to screw a bracket or a nut onto the threaded portion at the end of the piston rod, make sure the retract the piston rod entirely, and place a wrench on the parallel sections of the rod that protrudes. To tighten, take precautions to prevent the tightening torque from being applied to the non-rotating guide.



Disassembly/Replacement

⚠Caution

1. When replacing rod seals, please contact SMC.

Air leakage may be happened, depending on the position in which a rod seal is fitted. Thus, please contact SMC when replacing them.

Selection

⚠Warning

1. Confirm the specifications.

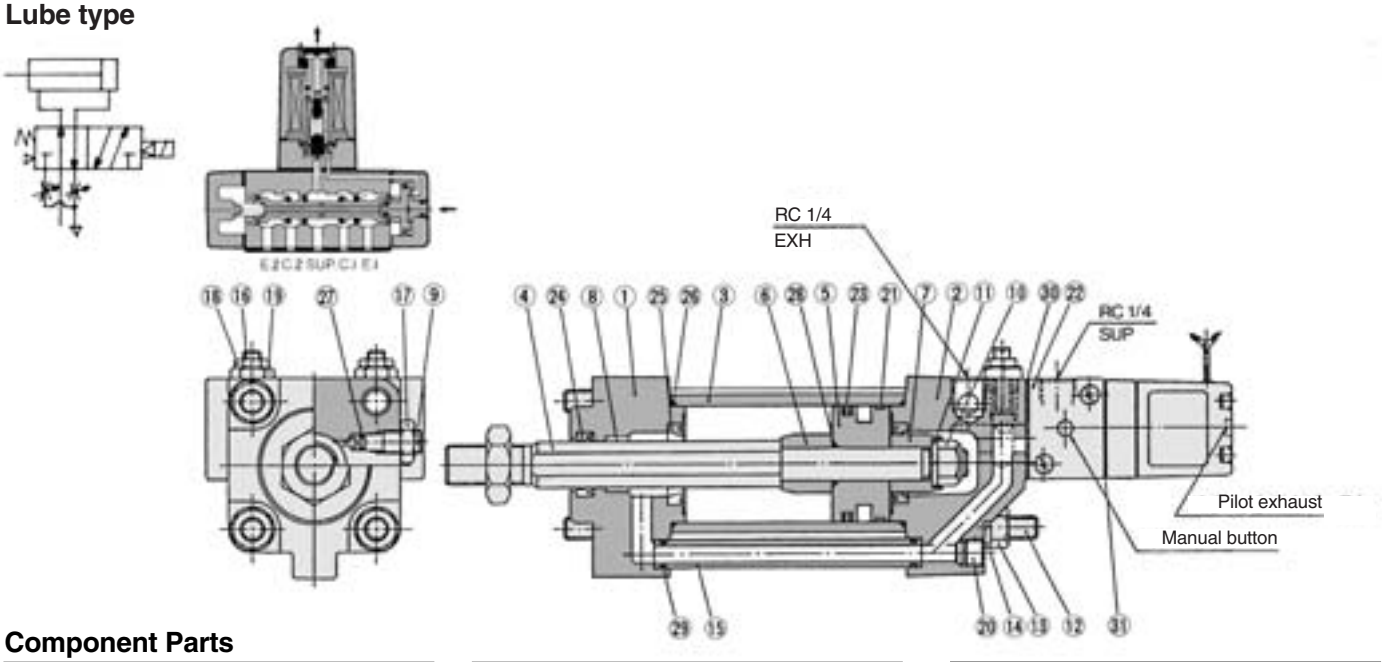
Products in this catalog are designed to be used for compressed air systems. If not operated within the designated pressure or temperature, it may damage the products or cause malfunction. (Refer to specifications.)

2. Energizing continuously for a long period of time

When the valve is continuously energized for a long period of time, the performance may deteriorate or effect peripheral equipment adversely since temperature rises when coils generate heat.

Construction

Lube type



Component Parts

No.	Description	Material	Note
1	**Rod cover**	Aluminum alloy	Matt black painted
2	**Head cover**	Aluminum alloy	Matt black painted
3	**Cylinder tube**	Aluminum alloy	Hard anodized
4	**Piston rod**	Carbon steel	Hard chrome plated
5	**Piston**	Aluminum alloy	Chromated
6	**Cushion ring A**	Rolled steel	Zinc chromated
7	**Cushion ring B**	Rolled steel	Zinc chromated
8 *	**Non-rotating guide**	Oil impregnated sintered alloy	
9	**Cushion valve**	Rolled steel	Electroless nickel plated
10	**Piston nut**	Rolled steel	Zinc chromated
11	**Spring washer**	Steel wire	Zinc chromated
12	**Tie-rod**	Carbon steel	Zinc chromated
13	**Tie-rod nut**	Carbon steel	Black zinc chromated
14	**Spring washer**	Steel wire	Black zinc chromated
15	**Pipe**	Caron steel tube	Uni-chromated
16	**Needle**	Sulfur easy chipping steel	Electroless nickel plated
17	**lock nut**	Carbon steel	Nickel plated
18	**lock nut**	Carbon steel	Nickel plated

No.	Description	Material	Note
19	**Needle guide**	Sulfur easy chipping steel	Electroless nickel plated
20	**Plug**	Chromium molybdenum steel	Black zinc chromated
21	**Wear ring**	Resin	

No.	Description	No. of solenoids	Rod extended when energized	Rod retracted when energized
22	**Solenoid valve**	Single	(1)	(2)
		Double	(3)	

* How to order solenoid valves

Note 1) V3108-00 | Voltage | Electrical entry |
Note 2) V3108-00 | Voltage | Electrical entry | -X23
Note 3) V3208-00 | Voltage | Electrical entry |

No.	Description	Material	Note
23	**Piston seal**	NBR	
24	**Rod seal**	NBR	
25 *	**Cushion seal**	NBR	
26	**Cylinder tube gasket**	NBR	
27	**Cushion valve seal**	NBR	

No.	Description	Material	Note
28 *	**Piston gasket**	NBR	
29	**Pipe gasket**	NBR	
30	**Head cover gasket**	NBR	
31	**Single solenoid gasket**	NBR	
	Double solenoid gasket	NBR	

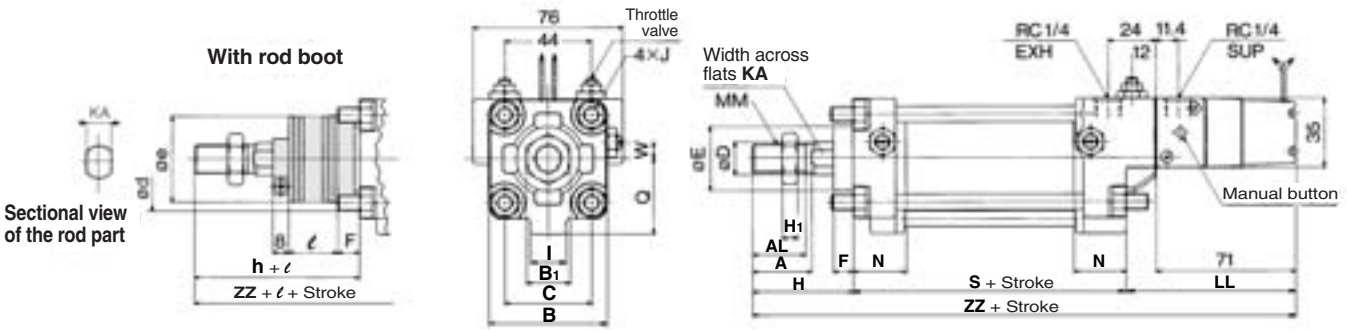
* Not replaceable.

Replacement Parts: Seal Kit

Bore size (mm)	Kit no.	Contents
40	CV3K40-PS	Set of nos. above ㉓, ㉔, ㉖, ㉗, ㉙, ㉚.
50	CV3K50-PS	
63	CV3K63-PS	

* Seal kit includes ㉓, ㉔, ㉖, ㉗, ㉙, ㉚. Order the seal kit, based on each bore size. (Not possible to replace ㉕, ㉘.)
* Seal kit includes a grease pack (ø40, ø50: 10 g, ø63 or more: 20 g).
Order with the following part number when only the grease pack is needed.
Grease pack part no.: GR-S-010 (10 g), **GR-S-020** (20 g)

Basic Style: CV3KB□



Bore size (mm)	Stroke range (mm)*	A	AL	B	B_1	C	D	E	F	H_1	I	J	KA	LL	MM	N	Q	S
40	Up to 500	30	27	60	22	44	16	32	10	8	18	M8 x 1.25	14	86	M14 x 1.5	27	38	84
50	Up to 600	35	32	70	27	52	20	40	10	11	18	M8 x 1.25	18	83	M18 x 1.5	30	43.5	90
63	Up to 600	35	32	85	27	64	20	40	10	11	18	M10 x 1.25	18	83	M18 x 1.5	31	49	98

Bore size (mm)	W	Without rod boot	With rod boot						
		H	ZZ	d	e	f	h	l	ZZ
40	8	51	221	55	43	11.2	59	1/4 stroke	229
50	0	58	231	62	52	11.2	66	1/4 stroke	239
63	0	58	239	62	52	11.2	66	1/4 stroke	247

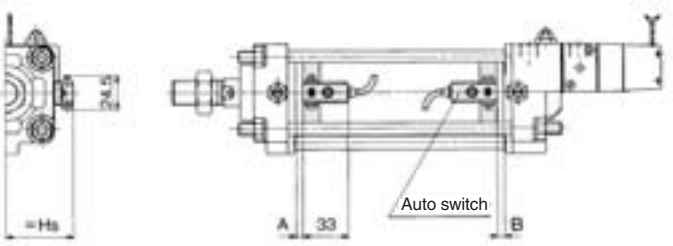
* The minimum stroke of the one with rod boot is 20 mm or more.
** For dimensions of DIN terminal, refer to page 1613.

- External dimensions of each mounting bracket other than basic style are the same, except KA dimension. Refer to pages 1610 to 1613.
- For accessory, refer to page 1613.

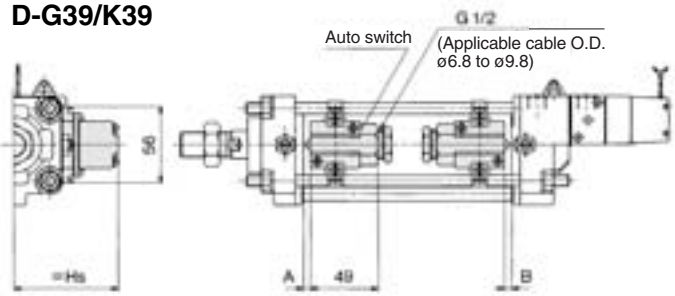
Auto Switch Proper Mounting Position (Detection at Stroke End) and Its Mounting Height

<Band mounting style>

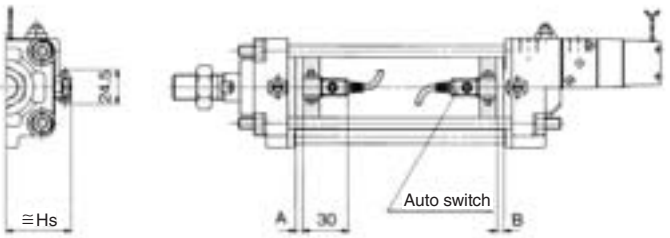
D-B5□/B64/B59W



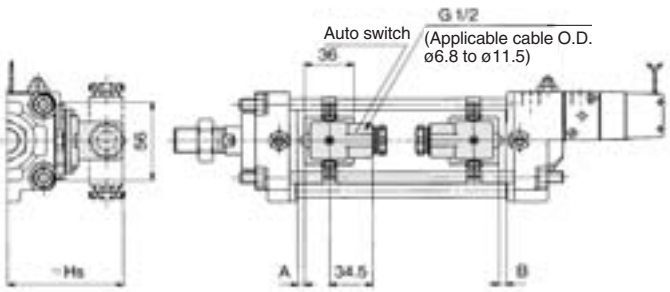
D-A3□
D-G39/K39



D-G5□/K59
D-G5□W/K59W
D-G59F/G5NTL

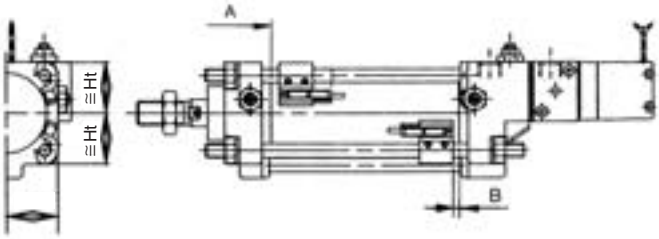


D-A44

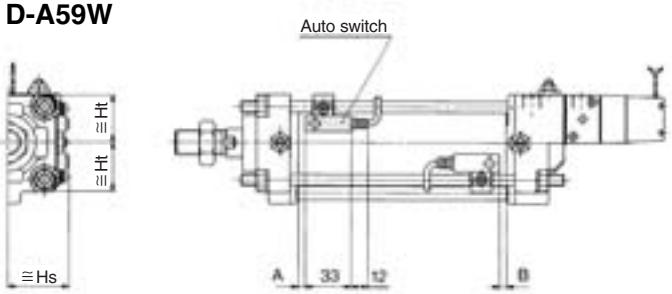


<Tie-rod mounting style>

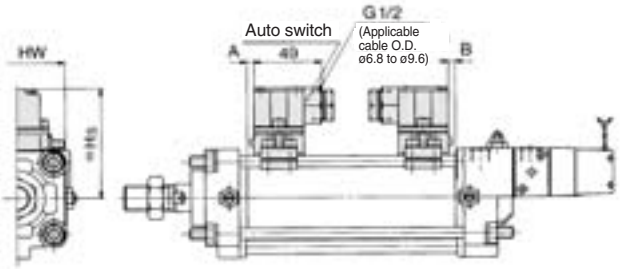
D-A9□/A9□V
D-M9□/M9□V
D-M9□W/M9□WV
D-Z7□/Z80
D-Y59□/Y69□/Y7P/Y7PV
D-Y7□W/Y7□WV



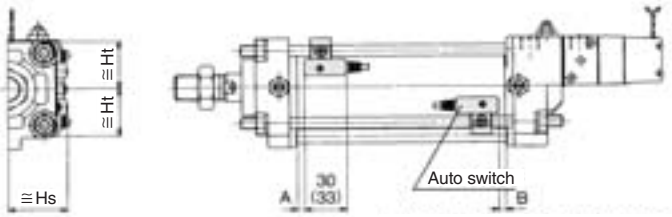
D-A5□/A6□
D-A59W



D-A3□C
D-G39C/K39C

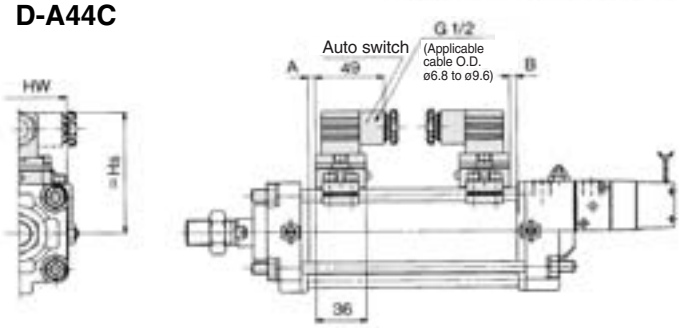


D-F5□/J5□
D-F5NTL
D-F5□W/J59W
D-F59F



( ): Denotes the values of D-F5LF.

D-A44C



Auto Switch Proper Mounting Position (Detection at Stroke End) and Its Mounting Height

Auto Switch Proper Mounting Position

(mm)

Bore size (mm) \ Auto switch model	D-A9□ D-A9□V		D-M9□ D-M9□V D-M9□W D-M9□WV		D-A5□ D-A6□ D-A3□ D-A3□C D-A44/A44C D-G39/G39C D-K39/K39C		D-B5□ D-B64		D-F5□ D-J5□ D-F5□W D-J59W D-F59F		D-G5□W D-K59W D-G59F D-G5□ D-K59 D-G5NTL		D-A59W		D-F5NTL		D-B59W D-Z7□ D-Z80 D-Y59□ D-Y69□ D-Y7P D-Y7PV D-Y7□W D-Y7□WV	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
40	3 (6)	7 (4)	7 (10)	11 (8)	0 (0)	1 (0)	0 (0.5)	1.5 (0)	3.5 (6.5)	7.5 (4.5)	0 (2)	3 (0)	1 (4)	5 (2)	8.5 (11.5)	12.5 (9.5)	0.5 (3.5)	4.5 (1.5)
50	—	—	7 (10)	11 (8)	0 (0)	1 (0)	0 (0.5)	1.5 (0)	3.5 (6.5)	7.5 (4.5)	0 (2)	3 (0)	1 (4)	5 (2)	8.5 (11.5)	12.5 (9.5)	0.5 (3.5)	4.5 (1.5)
63	5 (8.5)	11 (7.5)	9 (12.5)	15 (11.5)	0 (2.5)	5.5 (1.5)	0 (3)	6 (2)	5.5 (9)	12 (8)	1 (4.5)	7.5 (3.5)	3 (6.5)	9.5 (5.5)	10.5 (14)	17 (13)	2.5 (6)	9 (5)
80	8 (12)	14 (10)	12 (16)	18 (14)	2 (6)	8.5 (4)	2.5 (6.5)	9 (4.5)	8.5 (12.5)	15 (10.5)	4 (8)	10.5 (6)	6 (10)	12.5 (8)	13.5 (17.5)	20 (15.5)	5.5 (9.5)	12 (7.5)
100	10 (13.5)	16 (12.5)	14 (17.5)	20 (16.5)	4 (7.5)	10.5 (6.5)	4.5 (8)	11 (7)	10.5 (14)	17 (13)	6 (9.5)	12.5 (8.5)	8 (11.5)	14.5 (10.5)	15.5 (19)	22 (18)	7.5 (11)	14 (10)

Note 1) ( ): Denotes the values of non-lube type.
Note 2) D-G5□W/K59W/G59F types cannot be mounted on the ø40 or ø50 lube type.
Note 3) D-B5□, D-G5□ and D-K5□ types are mountable only upon a receipt of order. (Not mountable after the time of shipment)
Note 4) D-A9□ and D-A9□V types cannot be mounted on ø50
Note 5) Adjust the auto switch after confirming the operating conditions in the actual setting.

Auto Switch Mounting Height

(mm)

Bore size (mm) \ Auto switch model	D-A9□ D-M9□ D-M9□W		D-A9□V		D-M9□V D-M9□WV		D-B5□ D-B64 D-B59W D-G5□ D-K59 D-G5NTL D-G5□W D-K59W D-G59F	D-A3□ D-G39 D-K39	D-A44	D-A5□ D-A6□ D-A59W		D-F5□ D-J5□ D-F5□W D-J59W D-F59F D-F5NTL		D-A3□C D-G39C D-K39C		D-A44C		D-Z7□ D-Z80 D-Y59□ D-Y7P D-Y7□W		D-Y69□ D-Y7PV D-Y7□WV	
	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Hs	Hs	Hs	Ht	Hs	Ht	Hs	Hw	Hs	Hw	Hs	Ht	Hs	Ht
40	30	30	32	30	35	30	38	72.5	80.5	40	31	38.5	31	73	69	81	69	30	30	30.5	30
50	34	34	—	—	39	34	43.5	78	86	43.5	35	42.5	35	78.5	77	86.5	77	34	34	35	34
63	41	41	43.5	41	46	41	50.5	85	93	49	42	48	42	85.5	91	93.5	91	41	41	42.5	41
80	49.5	49	51.5	49	54	49	59	93.5	101.5	55.5	50	54	50	94	107	102	107	49.5	48.5	51	48.5
100	57	56	59.5	56	62.5	56	69.5	104	112	63	57.5	62	57.5	104	121	112	121	58.5	56	59	56

∗ D-A9□ and D-A9□V types cannot be mounted on ø50

Minimum Stroke For Auto Switch Mounting

n: Number of auto switches (mm)

Auto switch model	No. of auto switches mounted		Mounting brackets other than center trunnion	Center trunnion				
				ø40	ø50	ø63	ø80	ø100
D-A9□	2 (Different surfaces, Same surface), 1		15	80	—	90	105	115
	n		$15 + 40\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···)	$80 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)		$90 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$105 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$115 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)
D-A9□V	2 (Different surfaces, Same surface), 1		10	80	—	90	105	115
	n		$10 + 30\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···)	$80 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)		$90 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$105 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$115 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)
D-M9□ D-M9□W	2 (Different surfaces, Same surface), 1		15	85		100	115	120
	n		$15 + 40\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···)	$85 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)		$100 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$115 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$120 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)
D-M9□V D-M9□WV	2 (Different surfaces, Same surface), 1		10	85		100	115	120
	n		$10 + 30\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···)	$85 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)		$100 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$115 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$120 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)
D-A5□/A6□ D-F5□/J5□ D-F5□W/J59W D-F59F	2 (Different surfaces, Same surface), 1		15	90		100	110	120
	n (Same surface)		$15 + 55\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···)	$90 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)		$100 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$110 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$120 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)
D-A59W	2 (Different surfaces, Same surface)		20	90		100	110	120
	n (Same surface)		$20 + 55\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···)	$90 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)		$100 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$110 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$120 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)
	1		15	90		100	110	120
D-F5NTL	2 (Different surfaces, Same surface), 1		25	110		120	130	140
	n (Same surface)		$25 + 55\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···)	$110 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)		$120 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$130 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$140 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)
D-B5□/B64 D-G5□/K59 D-G5□W D-K59W D-G59F D-G5NTL	2	Different surfaces	15	90		100	110	
		Same surface	75					
	n	Different surfaces	$15 + 50\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···)	$90 + 50\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)		$100 + 50\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$110 + 50\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	
		Same surface	75 + 50 (n – 2) (n = 2, 4, 6, 8···)	90 + 50 (n – 2) (n = 2, 4, 6, 8···)		100 + 50 (n – 2) (n = 2, 4, 6, 8···)	110 + 50 (n – 2) (n = 2, 4, 6, 8···)	
	1		10	90		100	110	
D-B59W	2	Different surfaces	20	90		100	110	
		Same surface	75					
	n	Different surfaces	$20 + 50\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···)	$90 + 50\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)		$100 + 50\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$110 + 50\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	
		Same surface	75 + 50 (n – 2) (n = 2, 3, 4, ···)	90 + 50 (n – 2) (n = 2, 4, 6, 8···)		100 + 50 (n – 2) (n = 2, 4, 6, 8···)	110 + 50 (n – 2) (n = 2, 4, 6, 8···)	
	1		15	90		100	110	
D-A3□ D-G39 D-K39	2	Different surfaces	35	100		100	110	
		Same surface	100					
	n	Different surfaces	35 + 30 (n – 2) (n = 2, 3, 4, ···)	100 + 30 (n – 2) (n = 2, 4, 6, 8···)		100 + 30 (n – 2) (n = 2, 4, 6, 8···)	110 + 30 (n – 2) (n = 2, 4, 6, 8···)	
		Same surface	100 + 100 (n – 2) (n = 2, 3, 4, ···)	100 + 100 (n – 2) (n = 2, 4, 6, 8···)			110 + 100 (n – 2) (n = 2, 4, 6, 8···)	
	1		10	100		100	110	
D-A44	2	Different surfaces	35	90		100	110	
		Same surface	55					
	n	Different surfaces	35 + 30 (n – 2) (n = 2, 3, 4, ···)	90 + 30 (n – 2) (n = 2, 4, 6, 8···)		100 + 30 (n – 2) (n = 2, 4, 6, 8···)	110 + 30 (n – 2) (n = 2, 4, 6, 8···)	
		Same surface	55 + 50 (n – 2) (n = 2, 3, 4, ···)	90 + 50 (n – 2) (n = 2, 4, 6, 8···)		100 + 50 (n – 2) (n = 2, 4, 6, 8···)	110 + 50 (n – 2) (n = 2, 4, 6, 8···)	
	1		10	90		100	110	

Minimum Stroke For Auto Switch Mounting

n: Number of auto switches (mm)

Auto switch model	No. of auto switches mounted		Mounting brackets other than center trunnion	Center trunnion				
				ø40	ø50	ø63	ø80	ø100
D-A3□C D-G39C D-K39C	2	Different surfaces	20	100		100	110	
		Same surface	100					
	n	Different surfaces	20 + 35 (n – 2) (n = 2, 3, 4, ···)	100 + 35 (n – 2) (n = 2, 4, 6, 8···)		100 + 35 (n – 2) (n = 2, 4, 6, 8···)	110 + 35 (n – 2) (n = 2, 4, 6, 8···)	
		Same surface	100 + 100 (n – 2) (n = 2, 3, 4, 5, ···)	100 + 100 (n – 2) (n = 2, 4, 6, 8···)			110 + 100 (n – 2) (n = 2, 4, 6, 8···)	
	1		10	100		100	110	
D-A44C	2	Different surfaces	20	90		100	110	
		Same surface	55					
	n	Different surfaces	25 + 35 (n – 2) (n = 2, 3, 4, ···)	90 + 35 (n – 2) (n = 2, 4, 6, 8···)		100 + 35 (n – 2) (n = 2, 4, 6, 8···)	110 + 35 (n – 2) (n = 2, 4, 6, 8···)	
		Same surface	55 + 50 (n – 2) (n = 2, 3, 4, ···)	90 + 50 (n – 2) (n = 2, 4, 6, 8···)		100 + 35 (n – 2) (n = 2, 4, 6, 8···)	110 + 50 (n – 2) (n = 2, 4, 6, 8···)	
	1		10	90		100	110	
D-Z7□/Z80 D-Y59□/Y7P D-Y7□W	2 (Different surfaces, Same surface), 1		15	80	85	90	95	105
	n		$15 + 40\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···)	$80 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$85 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$90 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$95 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$105 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)
D-Y69□/Y7PV D-Y7□WV	2 (Different surfaces, Same surface), 1		10	65		75	80	90
	n		$10 + 30\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···)	$65 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)		$75 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$80 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$90 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)

Operating Range

(mm)

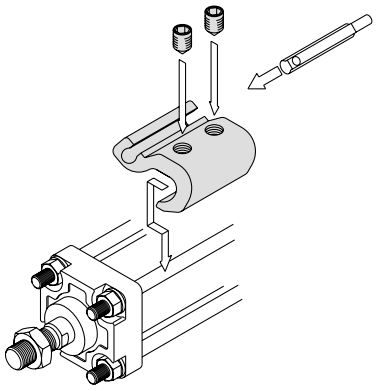
Auto switch model	Bore size (mm)				
	40	50	63	80	100
D-A9□/A9□V	7	—	9	9	9
D-M9□/M9□V D-M9□W/M9□WV	4.5	5	5.5	5	6
D-Z7□/Z80	8	7	9	9.5	10.5
D-A3□/A44 D-A3□C/A44C	9	10	11	11	11
D-A5□/A6□					
D-B5□/B64					
D-A59W	13	13	14	14	15
D-B59W	14	14	17	16	18
D-Y59□/Y69□ D-Y7P/Y7PV D-Y7□W/Y7□WV	8	7	5.5	6.5	6.5
D-F5□/J5□ D-F5□W/J59W D-F5NTL/F59F	4	4	4.5	4.5	4.5
D-G5□/K59 D-G5□W/K59W D-G5NTL/G59F	5	6	6.5	6.5	7
D-G39/K39 D-G39C/K39C	9	9	10	10	11

∗ D-A9□ and D-A9□V types cannot be mounted on ø50.
∗ Since this is a guideline including hysteresis, not meant to be guaranteed. (Assuming approximately ±30% dispersion.) There may be the case it will vary substantially depending on an ambient environment.

Auto Switch Mounting Bracket Part No.

<Tie-rod mounting style>

Auto switch model	Bore size (mm)				
	ø40	ø50	ø63	ø80	ø100
D-A9□/A9□V D-M9□/M9□V D-M9□W/M9□WV	BA7-040	BA7-040	BA7-063	BA7-080	BA7-080
D-A5□/A6□/A59W D-F5□/J5□/F5□W/J59W D-F5NTL/F59F	BT-04	BT-04	BT-06	BT-08	BT-08
D-A3□C/A44C/G39C/K39C	BA3-040	BA3-050	BA3-063	BA3-080	BA3-100
D-Z7□/Z80 D-Y59□/Y69□ D-Y7P/Y7PV D-Y7□W/Y7□WV	BA4-040	BA4-040	BA4-063	BA4-080	BA4-080



• Mounting example of D-A9□(V)/M9□(V)/M9□W(V)

<Band mounting style>

Auto switch model	Bore size (mm)				
	ø40	ø50	ø63	ø80	ø100
D-A3□/A44/G39/K39	BD1-04M	BD1-05M	BD1-06M	BD1-08M	BD1-10M
D-B5□/B64/B59W D-G5□/K59/G5□W/K59W D-G59F/G5NTL	BA-04	BA-05	BA-06	BA-08	BA-10

∗ D-A9□ and D-A9□V types cannot be mounted on ø50.
∗ Auto switch mounting brackets are included in D-A3□C/A44C/G39C/K39C. When the auto switch mounting bracket is needed separately, order it with the above part number. When ordering an auto switch alone, specify it as shown below according to the cylinder size.
Ex.) ø40: D-A3□C-4, ø50: D-A3□C-5
ø63: D-A3□C-6, ø80: D-A3□C-8, ø100: D-A3□C-10

Other than the models listed in “How to Order”, the following auto switches are applicable.
For detailed specifications, refer to pages 1719 to 1827.

Auto switch type	Model	Electrical entry (Fetching direction)	Features
Reed	D-A93V, A96V	Grommet (Perpendicular)	–
	D-A90V		Without indicator light
	D-A53, A56, B53, Z73, Z76	Grommet (In-line)	–
	D-A67, Z80		Without indicator light
Solid state	D-M9NV, M9PV, M9BV	Grommet (Perpendicular)	–
	D-Y69A, Y69B, Y7PV		
	D-M9NWV, M9PWV, M9BWV		Diagnostic indication (2-color indication)
	D-Y7NWV, Y7PWV, Y7BWV		
	D-Y59A, Y59B, Y7P	Grommet (In-line)	–
	D-F59, F5P, J59		
	D-Y7NW, Y7PW, Y7BW		Diagnostic indication (2-color indication)
	D-F59W, F5PW, J59W		
	D-F5BAL, Y7BAL		Water resistant (2-color indication)
	D-F5NTL, G5NTL		With timer

∗ With pre-wired connector is also available in solid state auto switches.
For details, refer to pages 1784 and 1785.
∗ Normally closed (NC = b contact), solid state auto switch (D-F9G/F9H/Y7G/Y7H type) are also available. For details, refer to pages 1746 and 1748.
∗ Wide range detection type, solid state auto switches (D-G5NBL type) are also available. Refer to page 1776 for details.

Valve Mounted Cylinder
Double Acting
Series CVS1
Lube/Non-lube Type: ø40, ø50, ø63, ø80, ø100

How to Order

Mounting style

B	Basic style
L	Axial foot style
F	Rod side flange style
G	Head side flange style
C	Single clevis style
D	Double clevis style
T	Center trunnion style

Port thread type

Nil	Rc
TN	NPT
TF	G

Cylinder stroke (mm)
Refer to page 1625 for standard strokes.

Bore size

40	40 mm
50	50 mm
63	63 mm
80	80 mm
100	100 mm

Electrical entry

Nil	Grommet
T	Conduit terminal
D	DIN terminal
DL	DIN terminal with indicator light
TZ	Conduit terminal with surge voltage suppressor

Solenoid valve

Nil	2 position single (VS4124-00□□-X46)
W	2 position double (VS4224-00□□)
Y	3 position closed center (VS4324-00□□)
Z	3 position exhaust center (VS4424-00□□)

Made to Order
Refer to page 1625 for details.

CVS1 L N 40 □ – 100 □ 1 W D – □

With auto switch **CDVS1 L N 40 □ – 100 □ – M9BW □ – 1 W D – □**

With Auto Switch
(Built-in magnet)

Built-in Magnet Cylinder Model

If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) CDVS1LN40-100-1

Cushion

Nil	Lube type
N	Non-lube type
F*	Steel tube

* Auto switches are not available with steel tube.

Suffix for cylinder

Rod boot	J	Nylon tarpaulin
	K	Heat resistant tarpaulin
Cushion	N	Without cushion
	R	With cushion on rod end
	H	With cushion on head end
	Nil	With cushion on both ends

* When specifying symbol more than one, combine symbols alphabetically.

Auto switch

Nil	Without auto switch

* For the applicable auto switch model, refer to the table below.

Number of auto switches

Nil	2 pcs.	S	1 pc.
3	3 pcs.	n	"n" pcs.

Solenoid valve voltage

1	100 VAC (50/60 Hz)
2	200 VAC (50/60 Hz)
5	24 VDC
9	Other

Applicable Auto Switch/Refer to pages 1719 to 1827 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC	Load voltage DC	Load voltage AC	Auto switch model: Tie-rod mounting	Auto switch model: Band mounting	Lead wire length (m): 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	Pre-wired connector	Applicable load	
Solid state switch	——	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	M9N	—	●	●	●	○	○	IC circuit	Relay, PLC
								—	G59	●	—	●	○	○		
				3-wire (PNP)				M9P	—	●	●	●	○	○		
								—	G5P	●	—	●	○	○		
				2-wire		12 V		M9B	—	●	●	●	○	○	—	
								—	K59	●	—	●	○	○		
					—	—	100 V, 200 V	J51	—	●	—	●	○	—		
		Terminal conduit		3-wire (NPN)	24 V	12 V	—	G39C	G39	—	—	—	—	—		
				2-wire				K39C	K39	—	—	—	—	—		
	Diagnostic indication (2-color indication)	Grommet		3-wire (NPN)		5 V, 12 V		M9NW	—	●	●	●	○	○	IC circuit	
								—	G59W**	●	—	●	○	○		
				3-wire (PNP)				M9PW	—	●	●	●	○	○		
								—	G5PW**	●	—	●	○	○		
				2-wire		12 V		M9BW	—	●	●	●	○	○	—	
								—	K59W**	●	—	●	○	○		
	With diagnostic output (2-color indication)			4-wire (NPN)		5V,12V		F59F	G59F**	●	—	●	○	○	IC circuit	
Reed switch	——	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	A96 [Z76] ****	—	●	—	●	—	—	IC circuit	—
			No	2-wire	24 V	12 V	100 V	A93 [Z73] ****	—	●	—	●	—	—	—	Relay, PLC
							100 V or less	A90 [Z80] ****	—	●	—	●	—	—	IC circuit	
			Yes				100 V, 200 V	A54	B54	●	—	●	●	—	—	
			No				200 V or less	A64	B64	●	—	●	—	—		
		Terminal conduit	Yes				—	A33C	A33	—	—	—	—	—	—	PLC
							100 V, 200 V	A34C	A34	—	—	—	—	—		Relay, PLC
		DIN terminal						A44C	A44	—	—	—	—	—		
	Diagnostic indication (2-color indication)	Grommet				—	–	A59W	B59W	●	—	●	—	—		

* 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

* Solid state auto switches marked with "○" are produced upon receipt of order.
** D-G5□W/K59W/G59F cannot be mounted on ø40 and ø50 lube style cylinder.
**** D-A9□ cannot be mounted on ø50. Select auto switches in brackets.

* Since there are other applicable auto switches than listed, refer to page 1641 for details.
* For details about auto switches with pre-wired connector, refer to pages 1784 and 1785.
* D-A9□/M9□/M9□W auto switches are shipped together (not assembled). (Only auto switch mounting brackets are assembled before shipped.)

SMC

Speed controller installed

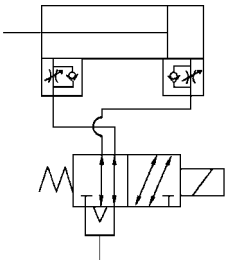
Operation type can be changed to rod extended when energized or rod retracted when energized.

A selection of solenoid valves is possible.

Single, double and 3 position solenoid valves are mountable.

An auto switch cylinder with the switch installed can also be manufactured.

JIS Symbol



Specifications

Bore size (mm)	40	50	63	80	100
Lubrication	Lube/Non-lube				
Action	Double acting				
Fluid	Air				
Proof pressure	1.5 MPa				
Maximum operating pressure	1.0 MPa				
Minimum operating pressure	0.05 MPa				
Ambient and fluid temperature	–10 to 60°C (No freezing)				
Cushion	Air cushion				
Stroke length tolerance	Up to 250 st: $^{-1.0}_{0}$, 251 to 1000 st: $^{-1.4}_{0}$				
Port size	Rc 1/4				
Electrical entry	Grommet, Conduit terminal, DIN terminal, DIN terminal with indicator light, Conduit terminal with surge voltage suppressor				
Piston speed	50 to 500 mm/s* Note)				
Allowable kinetic energy	2.4 J	4.4 J	7.8 J	11.7 J	20.5 J
Mounting	Basic style, Axial foot style, Rod side flange style, Head side flange style, Single clevis style, Double clevis style, Center trunnion style				

* Operate within the range of absorbed energy.
Note) For operating piston speed for each size, refer to page 1626.

Solenoid Valve Specifications

Applicable solenoid valve model	VS4□24			
Coil rated voltage	100/200 VAC (50/60 Hz), 24 VDC			
Allowable voltage	–15 to 10% of the rated voltage			
Effective area of valve (Cv factor)	Single 26.5 mm² (1.47)			
Coil insulation	Class B or equivalent (130°C)			
Apparent power Note)	**AC**	Inrush	50 Hz	100 VA
			60 Hz	90 VA
		Holding	50 Hz	20 VA
			60 Hz	14 VA
Power consumption Note)	**DC**	13.2 W		

Note) At the rated voltage.

Standard Stroke (mm)

Bore size (mm)	Standard stroke (mm)
40	25, 50, 75, 100, 125, 150, 200, 250, 300, 350, 400, 450, 500
50, **63**	25, 50, 75, 100, 125, 150, 200, 250, 300, 350, 400, 450, 500, 600
80, **100**	25, 50, 75, 100, 125, 150, 200, 250, 300, 350, 400, 450, 500, 600, 700

Rod Boot Material

Symbol	Rod boot material	Max. ambient temperature
J	Nylon tarpaulin	70°C
K	Heat resistant tarpaulin	110°C*

* Maximum ambient temperature for the rod boot itself.

Made to Order Specifications

(For details, refer to pages 1829 to 1954.)

Symbol	Specifications
-XA□	Change of rod end shape
-XC4	With heavy duty scraper
-XC6	Made of stainless steel
-XC7	Tie-rod, cushion valve, and tie-rod nut made of stainless steel
-XC14	Change of trunnion bracket mounting position
-XC15	Change of tie-rod length
-XC22	Fluororubber seals
-XC27	Double clevis and double knuckle joint pins made of stainless steel
-XC28	Compact flange made of SS400
-XC29	Double knuckle joint with spring pin
-XC35	With coil scraper
-XC65	-XC6 + -XC7

Refer to pages 1636 to 1641 for cylinders with auto switches.

- Minimum auto switch mounting stroke
- Proper auto switch mounting position (detection at stroke end) and mounting height
- Operating range
- Switch mounting bracket: Part no.

Accessory

Mounting		Basic style	Axial foot style	Rod side flange style	Head side flange style	Single clevis style	Double* clevis style	Center trunnion style
Standard equipment	Rod end nut	●	●	●	●	●	●	●
	Clevis pin	–	–	–	–	–	●	–
Option	Single knuckle joint	●	●	●	●	●	●	●
	Double knuckle joint * (with pin)	●	●	●	●	●	●	●
	With rod boot	●	●	●	●	●	●	●

* Pin, plain washer and cotter pin are packaged together with double clevis and double knuckle joint.

Mass

(kg)

Bore size (mm)		40	50	63	80	100
Basic mass	Basic style	2.48 (2.53)	3.04 (3.08)	4.12 (4.16)	5.81 (5.96)	7.66 (7.86)
	Axial foot style	2.65 (2.7)	3.24 (3.28)	4.41 (4.45)	6.6 (6.75)	8.59 (8.79)
	Rod side flange style	2.88 (2.93)	3.64 (3.68)	5.08 (5.12)	7.65 (7.8)	9.98 (10.18)
	Head side flange style	2.98 (3.03)	3.78 (3.82)	5.08 (5.12)	7.65 (7.8)	9.98 (10.18)
	Single clevis style	2.74 (2.79)	3.48 (3.52)	4.87 (4.91)	7.19 (7.34)	9.96 (10.16)
	Double clevis style	2.73 (2.78)	3.46 (3.5)	4.89 (4.93)	7.18 (7.33)	9.98 (10.18)
	Trunnion style	3.08 (3.18)	3.78 (3.88)	5.46 (5.66)	8.14 (8.43)	11.18 (11.57)
Additional mass per each 50 mm of stroke	All mounting brackets (Except trunnion style of steel tube)	0.22 (0.28)	0.28 (0.35)	0.37 (0.43)	0.52 (0.70)	0.65 (0.87)
	Steel tube trunnion	(0.36)	(0.46)	(0.65)	(0.86)	(1.07)
Accessory bracket	Single knuckle	0.23	0.26	0.26	0.60	0.83
	Double knuckle (with pin)	0.37	0.43	0.43	0.87	1.27

Calculation: (Example) **CVS1L40-100-1** * ( ): Steel tube type

- Basic mass·····2.65 (kg)
- Additional mass·····0.22 (kg/50 st)
- Cylinder stroke·····100 (st) 2.65 + 0.22 x 100 ÷ 50 = 3.09 kg

* Add 0.34 kg for the double solenoid style.

Mounting Bracket Part No.

Bore size (mm)	40	50	63	80	100
Axial foot *	CA1-L04	CA1-L05	CA1-L06	CA1-L08	CA1-L10
Flange	CA1-F04	CA1-F05	CA1-F06	CA1-F08	CA1-F10
Single clevis	CA1-C04	CA1-C05	CA1-C06	CA1-C08	CA1-C10
Double clevis **	CA1-D04	CA1-D05	CA1-D06	CA1-D08	CA1-D10

* Order two foot brackets per cylinder.
** For double clevis style, pin for clevis, plain washer and cotter pin are shipped together.

⚠ Precautions

Be sure to read before handling. For Safety Instructions and Actuator Precautions, refer to front matters 42 and 43. For Series CVS1, refer to page 1607 since precaution are the same as series CV3.

Selection

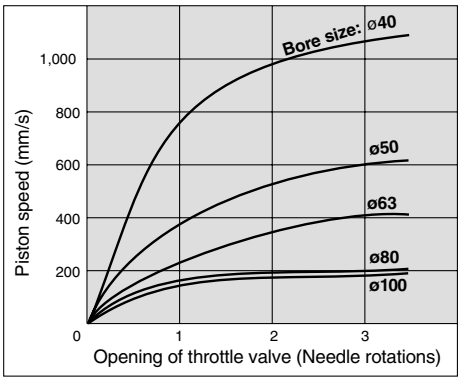
⚠Warning

1. Confirm the specifications.
Products in this catalog are designed to be used for compressed air systems. If not operated within the designated pressure or temperature, it may damage the products or cause malfunction. (Refer to specifications.)

2. Energizing continuously for a long period of time
- When the valve is continuously energized for a long period of time, the performance may deteriorate or effect peripheral equipment adversely since temperature rises when coils generate heat.

3. Mounting orientation
Metal seal: For single solenoids, mounting orientation is flexible. For double solenoids and 3 position valves, mount a spool valve horizontally.

Opening Range of Throttle Valve and Piston Speed

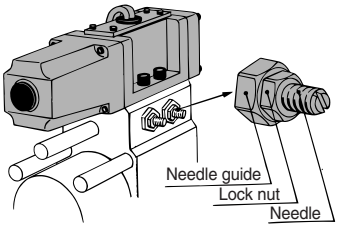


Conditions: Operating pressure 0.5 MPa,
Horizontal mounting, No load, Extending stroke
- The speed shown above are for reference.

Piston Speed Adjustment Procedure

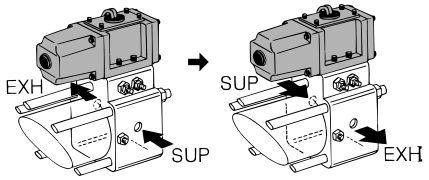
1. To slow down the piston speed, screw in the speed controller needle clockwise, which reduces the amount of air that is discharged.

2. The speed controller needle opens fully when it is loosened 3 1/2 turns from its fully closed position. After the specified speed has been set, secure the needle with the lock nut.



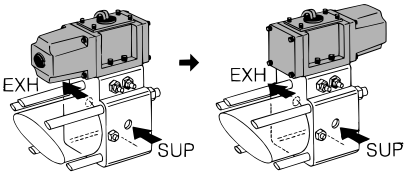
Changing between Rod Extended when Energized and Rod Retracted when Energized

1. This is possible by reversing the SUP port and EXH port piping.



Rod extended when energized **Rod retracted when energized**

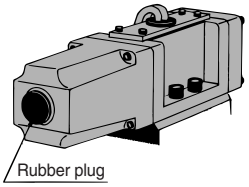
2. This is possible by inverting the solenoid valve direction 180°.



Rod extended when energized **Rod retracted when energized**

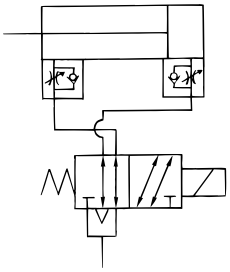
Manual Operation

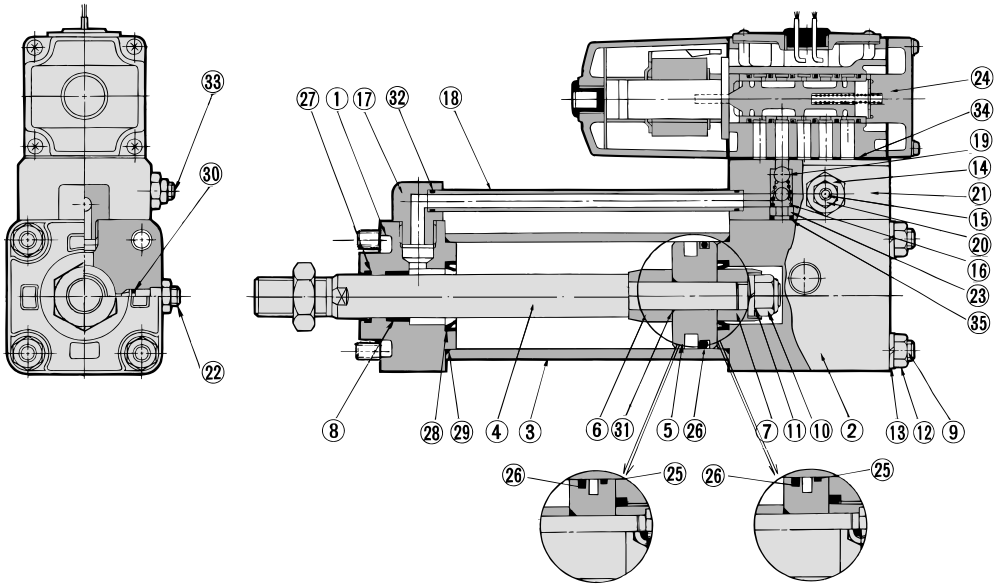
Using a screwdriver or its equivalent, push the center of the rubber plug on the head of the solenoid cap of the solenoid valve.
(It is not necessary to remove the rubber plug.)



Construction

Lube type





Non-lube type **Long stroke**

Component Parts

No.	Description	Material	Note
1	**Rod cover**	Aluminum alloy	Matt black painted
2	**Head cover**	Aluminum alloy	Matt black painted
3	**Cylinder tube**	Aluminum alloy	Hard anodized
4	**Piston rod**	Carbon steel	Hard chrome plated
5	**Piston**	Aluminum alloy	Chromated
6	**Cushion ring A**	Rolled steel	Zinc chromated
7	**Cushion ring B**	Rolled steel	Zinc chromated
8 *	**Bushing**	Lead-bronze casted	
9	**Tie-rod**	Carbon steel	Zinc chromated
10	**Piston nut**	Rolled steel	Zinc chromated
11	**Spring washer**	Steel wire	Zinc chromated
12	**Tie-rod nut**	Carbon steel	Black zinc chromated
13	**Spring washer**	Steel wire	Black zinc chromated
14	**Needle guide**	Carbon steel	Electroless nickel plated
15	**Speed adjustment needle**	Carbon steel	Electroless nickel plated
16 *	**Check spring**	Steel wire	Zinc chromated
17 *	**Guide tube fitting**	Aluminum alloy	Platinum silver
18	**Pipe**	Carbon steel tube	Uni Chromated
19 *	**Check ball**	Polyurethane rubber	9/32
20	**Lock nut**	Carbon steel	Nickel plated
21	**Sub-plate**	Aluminum alloy	Platinum silver
22	**Cushion valve**	Rolled steel	Electroless nickel plated
23 *	**Valve port**	Brass	
24	**Solenoid valve** Note)	—	Refer to the note below.
25	**Wear ring**	Resin	

Note) Add "-X46" to the end of the part numbers for single solenoid type.
• How to order solenoid valves/VS4□24-00 Voltage Electrical entry

* Not replaceable.

No.	Description	Material	Note
26	**Piston seal**	NBR	
27	**Rod seal**	NBR	
28 *	**Cushion seal**	NBR	
29	**Cylinder tube gasket**	NBR	
30	**Cushion valve seal**	NBR	
31 *	**Piston gasket**	NBR	
32	**Pipe gasket**	NBR	
33	**Speed adjustment valve seal**	NBR	
34	**Gasket**	NBR	
35	**Valve port gasket**	NBR	

Replacement Parts: Seal Kit

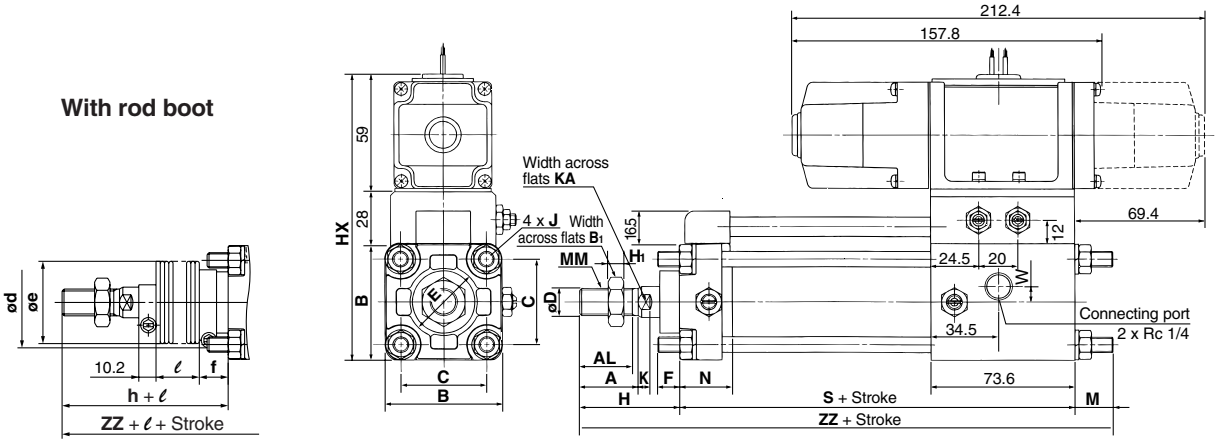
Lube Type			Non-lube Type		
Bore size (mm)	Kit no.	Contents	Bore size (mm)	Kit no.	Contents
40	CVS1-40-PS	Set of nos. above ㉖, ㉗, ㉙, ㉚, ㉜, ㉟.	**40**	CVS1N40-PS	Set of nos. above ㉖, ㉗, ㉙, ㉚, ㉜, ㉟
50	CVS1-50-PS		**50**	CVS1N50-PS	
63	CVS1-63-PS		**63**	CVS1N63-PS	
80	CVS1-80-PS		**80**	CVS1N80-PS	
100	CVS1-100-PS		**100**	CVS1N100-PS	

* Seal kit includes ㉖, ㉗, ㉙, ㉚, ㉜, ㉟. Order the seal kit, based on each bore size.
(The parts indicated with numbers ㉘ and ㉛ are not replaceable.)
* Seal kit includes a grease pack (ø40, ø50: 10 g, ø63, ø80: 20 g, ø100: 30 g).
Order with the following part number when only the grease pack is needed.
Grease pack part no.: GR-S-010 (10 g), **GR-S-020** (20 g)

Basic Style: CVS1B□

Lube type (CVS1B), Non-lube type (CVS1BN)

With rod boot



(mm)

Bore size (mm)	Stroke range* (mm)	A	AL	B	B_1	C	D	E	F	H_1	HX	J	K	KA	M	MM	N	S
40	Up to 500	30	27	60	22	44	16	32	10	8	147	M8 x 1.25	6	14	19.4	M14 x 1.5	27	130.6
50	Up to 600	35	32	70	27	52	20	40	10	11	157	M8 x 1.25	7	18	16.4	M18 x 1.5	30	133.6
63	Up to 600	35	32	86	27	64	20	40	10	11	173	M10 x 1.25	7	18	18.4	M18 x 1.5	31	140.6
80	Up to 750	40	37	102	32	78	25	52	14	13	189	M12 x 1.75	11	22	21.4	M22 x 1.5	37	152.6
100	Up to 750	40	37	116	41	92	30	52	14	16	203	M12 x 1.75	11	26	21.4	M26 x 1.5	40	159.6

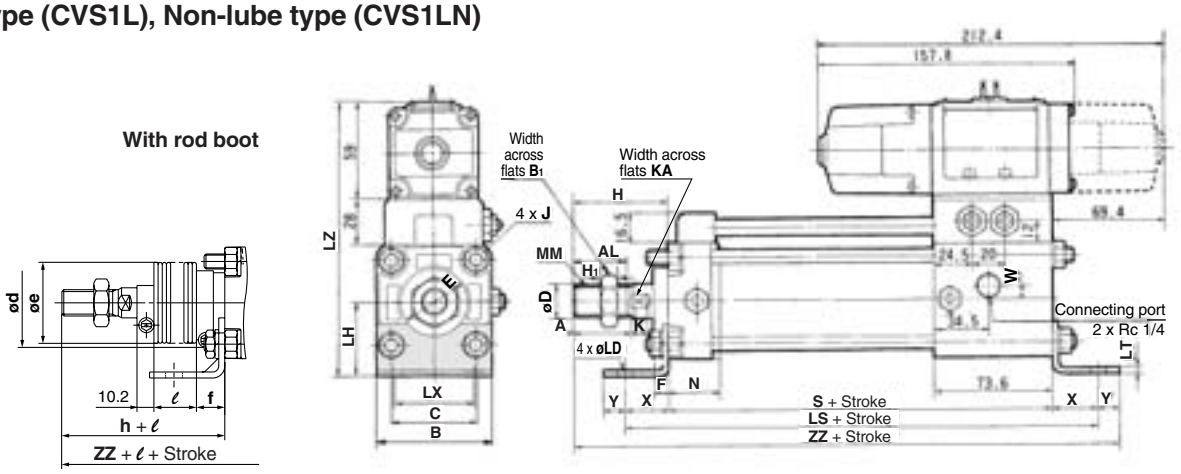
Bore size (mm)	W	Without rod boot		With rod boot					
		H	ZZ	d	e	f	h	ℓ	ZZ
40	8	51	201	55	43	11.2	59	1/4 stroke	209
50	8	58	208	62	52	11.2	66	1/4 stroke	216
63	8	58	217	62	52	11.2	66	1/4 stroke	225
80	0	71	245	74	65	12.5	80	1/4 stroke	254
100	0	72	253	74	65	14	81	1/4 stroke	262

* The minimum stroke of the one with rod boot is 20 mm or more.

Axial Foot Style: CVS1L□

Lube type (CVS1L), Non-lube type (CVS1LN)

With rod boot



(mm)

Bore size (mm)	Stroke range ** (mm)	A	AL	B	B_1	C	D	E	H_1	F	J	K	KA	LD	LH	LS	LT	LX	LZ	MM
40	Up to 500 501 to 800*	30	27	60	22	44	16	32	8	10	M8 x 1.25	6	14	9	40	184.6	3.2	42	157	M14 x 1.5
50	Up to 600 601 to 1000*	35	32	70	27	52	20	40	11	10	M8 x 1.25	7	18	9	45	187.6	3.2	50	167	M18 x 1.5
63	Up to 600 601 to 1000*	35	32	86	27	64	20	40	11	10	M10 x 1.25	7	18	11.5	50	208.6	3.2	59	180	M18 x 1.5
80	Up to 750 751 to 1000*	40	37	102	32	78	25	52	13	14	M12 x 1.75	11	22	13.5	65	240.6	4.5	76	203	M22 x 1.5
100	Up to 750 751 to 1000*	40	37	116	41	92	30	52	16	14	M12 x 1.75	11	26	13.5	75	245.6	6	92	220	M26 x 1.5

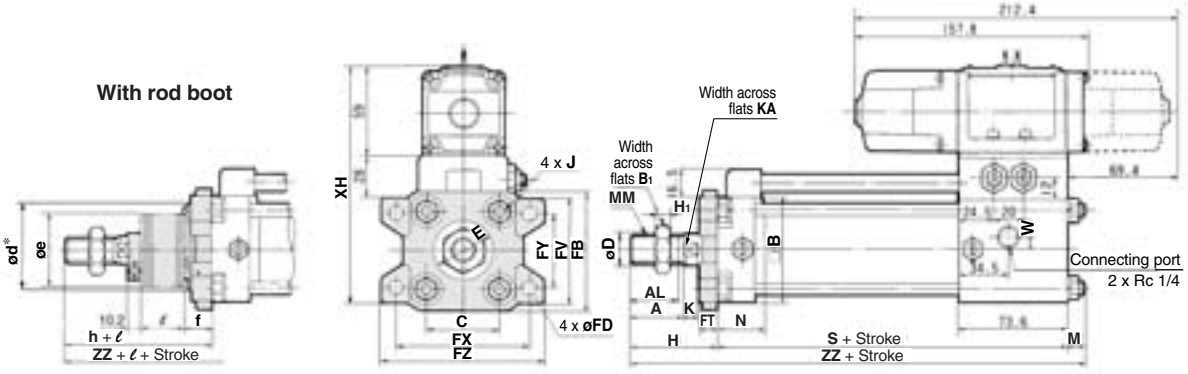
Bore size (mm)	N	S	W	X	Y	Without rod boot		With rod boot					
						H	ZZ	d	e	f	h	ℓ	ZZ
40	27	130.6	8	27	13	51	221.6	55	43	11.2	59	1/4 stroke	229.6
50	30	133.6	8	27	13	58	231.6	62	52	11.2	66	1/4 stroke	239.6
63	31	140.6	8	34	16	58	248.6	62	52	11.2	66	1/4 stroke	256.6
80	37	152.6	0	44	16	71	283.6	74	65	12.5	80	1/4 stroke	292.6
100	40	159.6	0	43	17	72	291.6	74	65	14	81	1/4 stroke	300.6

* Long stroke
** The minimum stroke of the one with rod boot is 20 mm or more.

Rod Side Flange Style: CVS1F□

Lube type (CVS1F), Non-lube type (CVS1FN)

With rod boot



(mm)

Bore size (mm)	Stroke range ** (mm)	A	AL	B	B1	C	D	E	FB	FD	FT	FV	FX	FY	FZ	H1	HX	J	K	KA
40	Up to 500 501 to 800*	30	27	60	22	44	16	32	71	9	12	60	80	42	100	8	147	M8 x 1.25	6	14
50	Up to 600 601 to 1000*	35	32	70	27	52	20	40	81	9	12	70	90	50	110	11	157	M8 x 1.25	7	18
63	Up to 600 601 to 1000*	35	32	86	27	64	20	40	101	11.5	15	86	105	59	130	11	173	M10 x 1.25	7	18
80	Up to 750 751 to 1000*	40	37	102	32	78	25	52	119	13.5	18	102	130	76	160	13	189	M12 x 1.75	11	22
100	Up to 750 751 to 1000*	40	37	116	41	92	30	52	133	13.5	18	116	150	92	180	16	203	M12 x 1.75	11	26

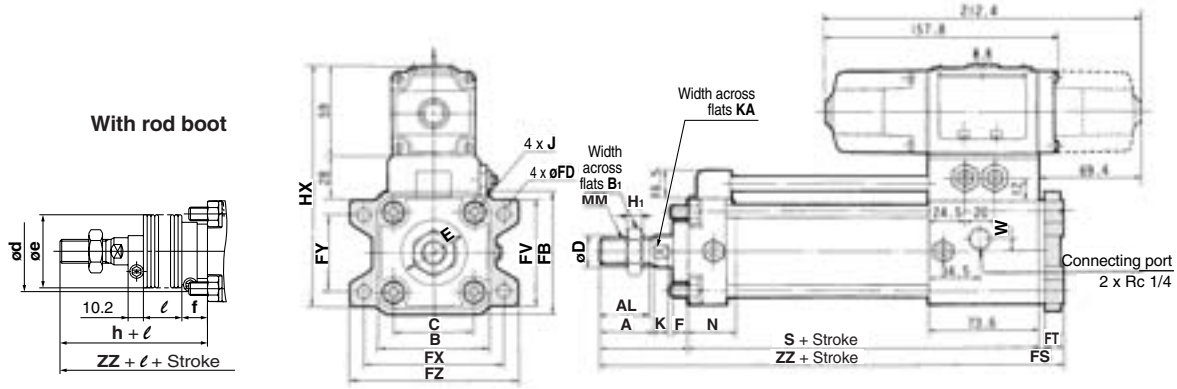
Bore size (mm)	M	MM	N	S	W	Without rod boot		d★	With rod boot				
						H	ZZ		e	f	h	ℓ	ZZ
40	19.4	M14 x 1.5	27	130.6	8	51	201	52	43	15	59	1/4 stroke	209
50	16.4	M18 x 1.5	30	133.6	8	58	208	58	52	15	66	1/4 stroke	216
63	18.4	M18 x 1.5	31	140.6	8	58	217	58	52	17.5	66	1/4 stroke	225
80	21.4	M22 x 1.5	37	152.6	0	71	245	80	65	21.5	80	1/4 stroke	254
100	21.4	M26 x 1.5	40	159.6	0	72	253	80	65	21.5	81	1/4 stroke	262

* Long stroke
** The minimum stroke of the one with rod boot is 20 mm or more.
★ Machine larger holes than the outside diameter ød of the mounting bracket for rod boot when mounting the rod boot part to the through for mounting.

Head Side Flange Style: CVS1G□

Lube type (CVS1G), Non-lube type (CVS1GN)

With rod boot



(mm)

Bore size (mm)	Stroke range* (mm)	A	AL	B	B1	C	D	E	F	FB	FD	FS	FT	FV	FX	FY	FZ	H1	HX	J
40	Up to 500	30	27	60	22	44	16	32	10	71	9	4	12	60	80	42	100	8	147	M8 x 1.25
50	Up to 600	35	32	70	27	52	20	40	10	81	9	4	12	70	90	50	110	11	157	M8 x 1.25
63	Up to 600	35	32	86	27	64	20	40	10	101	11.5	0	15	86	105	59	130	11	173	M10 x 1.25
80	Up to 750	40	37	102	32	78	25	52	14	119	13.5	0	18	102	130	76	160	13	189	M12 x 1.75
100	Up to 750	40	37	116	41	92	30	52	14	133	13.5	0	18	116	150	92	180	16	203	M12 x 1.75

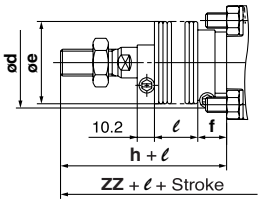
Bore size (mm)	K	KA	MM	N	S	W	Without rod boot		With rod boot					
							H	ZZ	d	e	f	h	ℓ	ZZ
40	6	14	M14 x 1.5	27	130.6	8	51	197.6	55	43	11.2	59	1/4 stroke	205.6
50	7	18	M18 x 1.5	30	133.6	8	58	207.6	62	52	11.2	66	1/4 stroke	215.6
63	7	18	M18 x 1.5	31	140.6	8	58	213.6	62	52	11.2	66	1/4 stroke	221.6
80	11	22	M22 x 1.5	37	152.6	0	71	241.6	74	65	12.5	80	1/4 stroke	250.6
100	11	26	M26 x 1.5	40	159.6	0	72	249.6	74	65	14	81	1/4 stroke	258.6

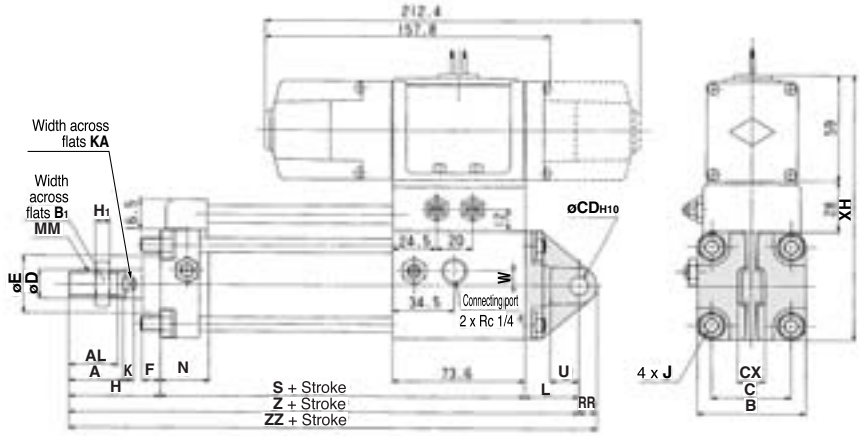
* The minimum stroke of the one with rod boot is 20 mm or more.

Single Clevis Style: CVS1C□

Lube type (CVS1C), Non-lube type (CVS1CN)

With rod boot





(mm)

Bore size (mm)	Stroke range* (mm)	A	AL	B	B1	C	CDH10	CX	D	E	F	H1	HX	J	K	KA	L	MM
40	Up to 500	30	27	60	22	44	$10^{+0.058}_{0}$	$15^{-0.1}_{-0.3}$	16	32	10	8	147	M8 x 1.25	6	14	30	M14 x 1.5
50	Up to 600	35	32	70	27	52	$12^{+0.070}_{0}$	$18^{-0.1}_{-0.3}$	20	40	10	11	157	M8 x 1.25	7	18	35	M18 x 1.5
63	Up to 600	35	32	86	27	64	$16^{+0.070}_{0}$	$25^{-0.1}_{-0.3}$	20	40	10	11	173	M10 x 1.25	7	18	40	M18 x 1.5
80	Up to 750	40	37	102	32	78	$20^{+0.084}_{0}$	$31.5^{-0.1}_{-0.3}$	25	52	14	13	189	M12 x 1.75	11	22	48	M22 x 1.5
100	Up to 750	40	37	116	41	92	$25^{+0.084}_{0}$	$35.5^{-0.1}_{-0.3}$	30	52	14	16	203	M12 x 1.75	11	26	58	M26 x 1.5

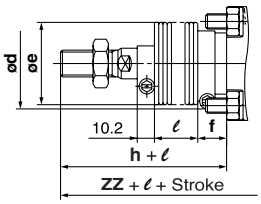
Bore size (mm)	N	RR	S	U	W	Without rod boot			With rod boot						
						H	Z	ZZ	d	e	f	h	ℓ	Z	ZZ
40	27	10	130.6	16	8	51	211.6	221.6	55	43	11.2	59	1/4 stroke	219.6	229.6
50	30	12	133.6	19	8	58	226.6	238.6	62	52	11.2	66	1/4 stroke	234.6	246.6
63	31	16	140.6	23	8	58	238.6	254.6	62	52	11.2	66	1/4 stroke	246.6	262.6
80	37	20	152.6	28	0	71	271.6	291.6	74	65	12.5	80	1/4 stroke	280.6	300.6
100	40	25	159.6	36	0	72	289.6	314.6	74	65	14	81	1/4 stroke	298.6	323.6

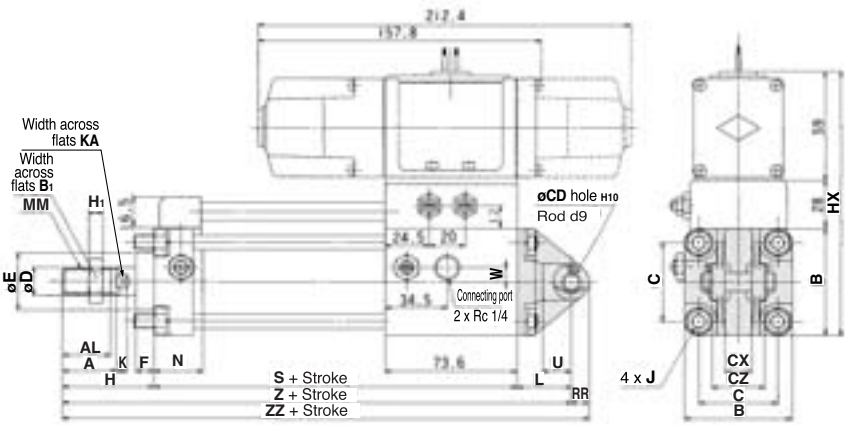
*The minimum stroke of the one with rod boot is 20 mm or more.

Double Clevis Style: CVS1D□

Lube type (CVS1D), Non-lube type (CVS1DN)

With rod boot





(mm)

Bore size (mm)	Stroke range* (mm)	A	AL	B	B1	C	CDH10	CX	CZ	D	E	F	H1	HX	J	K	KA	L
40	Up to 500	30	27	60	22	44	$10^{+0.059}_{0}$	$15^{+0.3}_{+0.1}$	29.5	16	32	10	8	147	M8 x 1.25	6	14	30
50	Up to 600	35	32	70	27	52	$12^{+0.070}_{0}$	$18^{+0.3}_{+0.1}$	38	20	40	10	11	157	M8 x 1.25	7	18	35
63	Up to 600	35	32	86	27	64	$16^{+0.070}_{0}$	$25^{+0.3}_{+0.1}$	49	20	40	10	11	173	M10 x 1.25	7	18	40
80	Up to 750	40	37	102	32	78	$20^{+0.084}_{0}$	$31.5^{+0.3}_{+0.1}$	61	25	52	14	13	189	M12 x 1.75	11	22	48
100	Up to 750	40	37	116	41	92	$25^{+0.084}_{0}$	$35.5^{+0.3}_{+0.1}$	64	30	52	14	16	203	M12 x 1.75	11	26	58

Bore size (mm)	MM	N	RR	S	U	W	Without rod boot			With rod boot						
							H	Z	ZZ	d	e	f	h	ℓ	Z	ZZ
40	M14 x 1.5	27	10	130.6	16	8	51	211.6	221.6	55	43	11.2	59	1/4 stroke	219.6	229.6
50	M18 x 1.5	30	12	133.6	19	8	58	226.6	238.6	62	52	11.2	66	1/4 stroke	234.6	246.6
63	M18 x 1.5	31	16	140.6	23	8	58	238.6	254.6	62	52	11.2	66	1/4 stroke	246.6	262.6
80	M22 x 1.5	37	20	152.6	28	0	71	271.6	291.6	74	65	12.5	80	1/4 stroke	280.6	300.6
100	M26 x 1.5	40	25	159.6	36	0	72	289.6	314.6	74	65	14	81	1/4 stroke	298.6	323.6

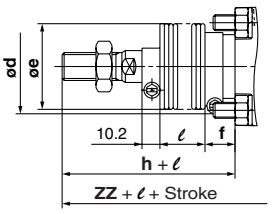
* The minimum stroke of the one with rod boot is 20 mm or more.

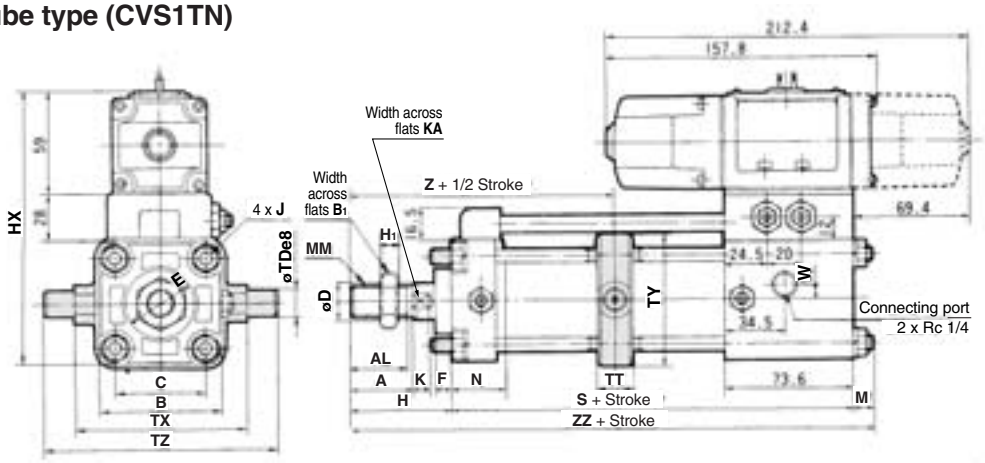
* Clevis pin, flat washer and cotter pin are shipped together.

Center Trunnion Style: CVS1T□

Lube type (CVS1T), Non-lube type (CVS1TN)

With rod boot





(mm)

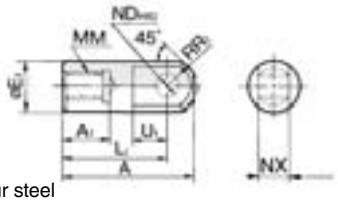
Bore size (mm)	Stroke range* (mm)	A	AL	B	B_1	C	D	E	F	H_1	HX	J	K	KA	M	MM	N	S	TDe8
40	Up to 500	30	27	60	22	44	16	32	10	8	147	M8 x 1.25	6	14	11.4	M14 x 1.5	27	130.6	15 $^{-0.032}_{-0.059}$
50	Up to 600	35	32	70	27	52	20	40	10	11	157	M8 x 1.25	7	18	11.4	M18 x 1.5	30	133.6	15 $^{-0.032}_{-0.059}$
63	Up to 600	35	32	86	27	64	20	40	10	11	173	M10 x 1.25	7	18	13.4	M18 x 1.5	31	140.6	18 $^{-0.032}_{-0.059}$
80	Up to 750	40	37	102	32	78	25	52	14	13	189	M12 x 1.75	11	22	18.4	M22 x 1.5	37	152.6	25 $^{-0.040}_{-0.073}$
100	Up to 750	40	37	116	41	92	30	52	14	16	203	M12 x 1.75	11	26	16.4	M26 x 1.5	40	159.6	25 $^{-0.040}_{-0.073}$

Bore size (mm)	TT	TX	TY	TZ	W	Without rod boot			With rod boot						
						H	Z	ZZ	d	e	f	h	ℓ	Z	ZZ
40	22	85	62	117	8	51	93	193	55	43	11.2	59	1/4 stroke	101	201
50	22	95	74	127	8	58	103	203	62	52	11.2	66	1/4 stroke	111	211
63	28	110	90	148	8	58	107	212	62	52	11.2	66	1/4 stroke	115	220
80	34	140	110	192	0	71	129	242	74	65	12.5	80	1/4 stroke	138	251
100	40	162	130	214	0	72	135	248	74	65	14	81	1/4 stroke	144	257

* The minimum stroke of the one with rod boot is 20 mm or more.

Accessory Dimensions

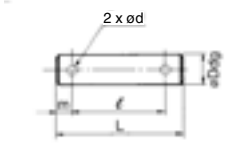
I Type Single Knuckle Joint



Material: Free cutting sulfur steel (mm)

Part no.	Applicable bore size (mm)	A	A_1	øE1	L_1	MM	R_1	U_1	øND H10	NX
I-04	**40**	69	22	24	55	M14 x 1.5	15.5	20	12 $^{+0.070}_{0}$	16 $^{-0.1}_{-0.3}$
I-05	**50, 63**	74	27	28	60	M18 x 1.5	15.5	20	12 $^{+0.070}_{0}$	16 $^{-0.1}_{-0.3}$
I-08	**80**	91	37	36	71	M22 x 1.5	22.5	26	18 $^{+0.070}_{0}$	28 $^{-0.1}_{-0.3}$
I-10	**100**	105	37	40	83	M26 x 1.5	24.5	28	20 $^{+0.084}_{0}$	30 $^{-0.1}_{-0.3}$

Knuckle Pin, Clevis Pin



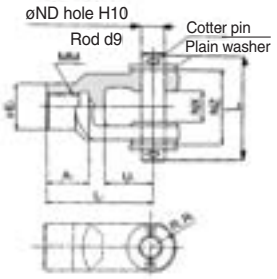
Material: Carbon steel (mm)

Part no.	Applicable bore size (mm)		øDd9	L	ℓ	m	ød (Drill through)	Applicable cotter pin
	Clevis	Knuckle						
CDP-2A	**40**	—	10 $^{-0.046}_{-0.076}$	46	38	4	3	ø3 x 18ℓ
CDP-3A	**50**	**40, 50, 63**	12 $^{-0.050}_{-0.093}$	55.5	47.5	4	3	ø3 x 18ℓ
CDP-4A	**63**	—	16 $^{-0.050}_{-0.093}$	71	61	5	4	ø4 x 25ℓ
CDP-5A	—	**80**	18 $^{-0.050}_{-0.093}$	76.5	66.5	5	4	ø4 x 25ℓ
CDP-6A	**80**	**100**	20 $^{-0.065}_{-0.117}$	83	73	5	4	ø4 x 30ℓ
CDP-7A	**100**	—	25 $^{-0.065}_{-0.117}$	88	78	6	4	ø4 x 36ℓ

* Cotter pin and plain washer are shipped together.

Y Type Double Knuckle Joint

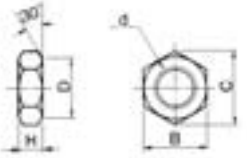
* Knuckle pin, cotter pin and plain washer are shipped together.



Material: Cast iron (mm)

Part no.	Applicable bore size (mm)	A_1	E_1	L_1	MM	RR_1	U_1	ND	NX	NZ	L	Cotter pin size	flat washer size
Y-04C	**40**	22	24	55	M14 x 1.5	13	25	12	16 $^{+0.3}_{+0.1}$	38	55.5	ø3 x 18ℓ	Polished round 12
Y-05C	**50, 63**	27	28	60	M18 x 1.5	15	27	12	16 $^{+0.3}_{+0.1}$	38	55.5	ø3 x 18ℓ	Polished round 12
Y-08C	**80**	37	36	71	M22 x 1.5	19	28	18	28 $^{+0.3}_{+0.1}$	55	76.5	ø4 x 25ℓ	Polished round 18
Y-10C	**100**	37	40	83	M26 x 1.5	21	38	20	30 $^{+0.3}_{+0.1}$	61	83	ø4 x 30ℓ	Polished round 20

Rod End Nut



Material: Rolled steel (mm)

Part no.	Applicable bore size (mm)	d	H	B	C	D
NT-04	**40**	M14 x 1.5	8	22	25.4	21
NT-05	**50, 63**	M18 x 1.5	11	27	31.2	26
NT-08	**80**	M22 x 1.5	13	32	37	31
NT-10	**100**	M26 x 1.5	16	41	47.3	39

Valve Mounted Cylinder: Non-rotating Rod Type Double Acting

Series CVS1K

Non-lube Type: ø40, ø50, ø63

How to Order

Cylinder stroke (mm)
Refer to page 1633 for standard strokes.

Bore size

40	40 mm
50	50 mm
63	63 mm

Mounting style

B	Basic style	C	Single clevis style
L	Axial foot style	D	Double clevis style
F	Rod side flange style	T	Center trunnion style
G	Head side flange style		

Electrical entry

Nil	Grommet
T	Conduit terminal
D	DIN terminal
DL	DIN terminal with indicator light
TZ	Conduit terminal with surge voltage suppressor

Solenoid valve

Nil	2 position single (VS4124-00□□-X46)
W	2 position double (VS4224-00□□)
Y	3 position closed center (VS4324-00□□)
Z	3 position exhaust center (VS4424-00□□)

Made to Order
Refer to page 1633 for details.

CVS1K L 40 □ – 100 □ 1 □ □ – □

With auto switch **CDVS1K** L 40 □ – 100 □ – M9BW □ – 1 □ □ – □

With Auto Switch
(Built-in magnet)

Non-rotating rod type

Port thread type

Nil	Rc
TN	NPT
TF	G

Suffix for cylinder

Rod boot	J	Nylon tarpaulin
	K	Heat resistant tarpaulin
Cushion	N	Without cushion
	R	With cushion on rod end
	H	With cushion on head end
	Nil	With cushion on both ends

* When specifying symbol more than one, combine symbols alphabetically.

Number of auto switches

Nil	2 pcs.
3	3 pcs.
S	1 pc.
n	"n" pcs.

Auto switch

Nil	Without auto switch

* For the applicable auto switch model, refer to the table below.

Solenoid valve voltage

1	100 VAC (50/60 Hz)
2	200 VAC (50/60 Hz)
5	24 VDC
9	Other

Built-in Magnet Cylinder Model

If a built-in magnet cylinder without an auto switch is required, there is no need to enter the symbol for the auto switch.
(Example) CDVS1KL40-100-1

Applicable Auto Switch/Refer to pages 1719 to 1827 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC	Load voltage AC	Auto switch model: Tie-rod mounting	Auto switch model: Band mounting	Lead wire length (m): 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	Pre-wired connector	Applicable load	
Solid state switch	——	Grommet	Yes	3-wire (NPN)	5 V, 12 V	—	M9N	—	●	●	●	○	○	IC circuit	Relay, PLC
							—	G59	●	—	●	○	○		
				3-wire (PNP)			M9P	—	●	●	●	○	○		
							—	G5P	●	—	●	○	○		
				2-wire	12 V		M9B	—	●	●	●	○	○	—	
							—	K59	●	—	●	○	○		
					—	—	100 V, 200 V	J51	—	●	—	●	○	—	
		Terminal conduit		3-wire (NPN)	24 V	12 V		G39C	G39	—	—	—	—	—	
				2-wire				K39C	K39	—	—	—	—	—	
	Diagnostic indication (2-color indication)	Grommet		3-wire (NPN)		5 V, 12 V		M9NW	—	●	●	●	○	○	
								—	G59W	●	—	●	○	○	IC circuit
				3-wire (PNP)				M9PW	—	●	●	●	○	○	
								—	G5PW	●	—	●	○	○	
				2-wire		12 V		M9BW	—	●	●	●	○	○	—
								—	K59W	●	—	●	○	○	
	With diagnostic output (2-color indication)			4-wire (NPN)		5 V, 12 V		F59F	G59F	●	—	●	○	○	IC circuit
Reed switch	——	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	A96 [Z76] **	—	●	—	●	—	—	IC circuit
			No	2-wire	24 V	12 V	100 V	A93 [Z73] **	—	●	—	●	—	—	—
			Yes				100 V or less	A90 [Z80] **	—	●	—	●	—	—	IC circuit
			No				100 V, 200 V	A54	B54	●	—	●	●	—	Relay, PLC
							200 V or less	A64	B64	●	—	●	—	—	
		Terminal conduit	Yes				—	A33C	A33	—	—	—	—	—	PLC
							100 V, 200 V	A34C	A34	—	—	—	—	—	Relay, PLC
		DIN terminal						A44C	A44	—	—	—	—	—	
	Diagnostic indication (2-color indication)	Grommet				—	–	A59W	B59W	●	—	●	—	—	

* 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

* Solid state auto switches marked with "○" are produced upon receipt of order.
** D-A9□ cannot be mounted on ø50. Select auto switches in brackets.

* Since there are other applicable auto switches than listed, refer to page 1641 for details.
* For details about auto switches with pre-wired connector, refer to pages 1784 and 1785.
* D-A9□/M9□/M9□W auto switches are shipped together (not assembled). (Only auto switch mounting brackets are assembled before shipped.)

SMC

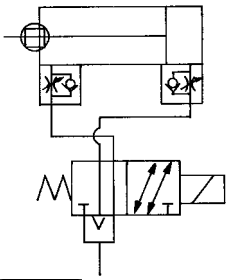
Speed controller installed

Operation type can be changed to rod extended when energized or rod retracted when energized.

A selection of solenoid valves is possible.

Single, double and 3 position solenoid valves are mountable.

JIS Symbol



Made to Order

Made to Order Specifications

(For details, refer to pages 1829 to 1954.)

Symbol	Specifications
-XA□	Change of rod end shape
-XC7	Tie-rod, cushion valve, and tie-rod nut made of stainless steel
-XC14	Change of trunnion bracket mounting position
-XC15	Change of tie-rod length
-XC27	Double clevis and double knuckle joint pins made of stainless steel
-XC28	Compact flange made of SS400

Refer to pages 1636 to 1641 for cylinders with auto switches.

- Minimum auto switch mounting stroke
- Proper auto switch mounting position (detection at stroke end) and mounting height
- Operating range
- Switch mounting bracket: Part no.

Specifications

Bore size (mm)	40	50	63
Type	Non-lube		
Action	Double acting		
Fluid	Air		
Proof pressure	1.5 MPa		
Maximum operating pressure	1.0 MPa		
Minimum operating pressure	0.05 MPa		
Ambient and fluid temperature	–10 to 60°C (No freezing)		
Cushion	Air cushion		
Stroke length tolerance	Up to 250 st $^{+1.0}_{0}$, 251 to 600 st $^{+1.4}_{0}$		
Port size	Rc 1/4		
Lubrication	Not required (Non-lube)		
Electrical entry	Grommet, Conduit terminal, DIN terminal, DIN terminal with indicator light, Conduit terminal with surge voltage suppressor		
Rod non-rotating accuracy	±0.8°		
Allowable rotational torque	0.44 N·m or less		
Piston speed	50 to 500 mm/s∗ Note)		
Allowable kinetic energy	2.4 J	4.4 J	7.8 J
Mounting style	Basic style, Axial foot style, Rod side flange style, Head side flange style, Single clevis style, Double clevis style, Center trunnion style		

∗ Operate within the range of absorbed energy.
Note) Refer to page 1634 for operating piston speed for each size.

Solenoid Valve Specifications

Applicable solenoid valve model	VS4□24			
Coil rated voltage	100/200 VAC (50/60 Hz), 24 VDC			
Effective area of valve (Cv factor)	Single 26.5 mm² (1.47)			
Allowable voltage	–15 to 10% of the rated voltage			
Coil insulation	Class B or equivalent (130°C)			
Apparent power Note)	**AC**	Inrush	50 Hz	100 VA
			60 Hz	90 VA
		Holding	50 Hz	20 VA
			60 Hz	14 VA
Power consumption Note)	**DC**	13.2 W		

Note) At the rated voltage.

Standard Stroke

Bore size (mm)	Standard stroke (mm)
40	25, 50, 75, 100, 125, 150, 200, 250, 300, 350, 400, 450, 500∗
50, 63	25, 50, 75, 100, 125, 150, 200, 250, 300, 350, 400, 450, 500, 600∗

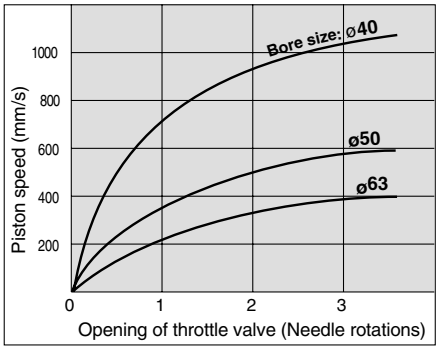
Please consult with SMC for longer strokes than the strokes marked with ∗.

Rod Boot Material

Symbol	Rod boot material	Max. ambient temperature
J	Nylon tarpaulin	70°C
K	Heat resistant tarpaulin	110°C∗

∗ Maximum ambient temperature for the rod boot itself.

Opening Range of Throttle Valve and Piston Speed



Conditions: Operating pressure 0.5 MPa, Horizontal mounting, No load, Spring return side

• The actuating speeds above are for reference.

Handling

1. Adjusting of the piston speed

2. Interchange between the spring return style and the spring extend style

3. Manual override

Since the operations above **1.** to **3.** are the same as Series **CVS1**, refer to page 1626.

Accessory

Mounting		Basic style	Foot style	Rod side flange style	Head side flange style	Single clevis style	Double * clevis style	Center trunnion style
Standard equipment	Rod end nut	●	●	●	●	●	●	●
	Clevis pin	–	–	–	–	–	●	–
Option	Single knuckle joint	●	●	●	●	●	●	●
	Double knuckle joint * (With pin)	●	●	●	●	●	●	●
	With rod boot	●	●	●	●	●	●	●

* Pin, plain washer and cotter pin are shipped together with double clevis and double knuckle joint.

Mass

(kg)

Bore size (mm)		40	50	63
Basic mass	Basic style	2.48	3.04	4.12
	Foot style	2.65	3.24	4.41
	Rod side flange style	2.88	3.64	5.08
	Head side flange style	2.98	3.78	5.08
	Single clevis style	2.74	3.48	4.87
	Double clevis style	2.73	3.46	4.89
	Trunnion style	3.08	3.78	5.46
Additional mass per each 50 mm of stroke		0.22	0.28	0.37
Accessory bracket	Single knuckle	0.23	0.26	0.26
	Double knuckle (With pin)	0.37	0.43	0.43

Calculation: (Example) **CVS1KL40-100-1**

- Standard mass·····2.65 (kg)
- Premium mass ·····0.22 (kg/50 st)
- Cylinder stroke·····100 (st) 2.65 + 0.22 x 100 ÷ 50 = 3.09 kg

* Add 0.34 kg for the double solenoid style.

⚠ Precautions

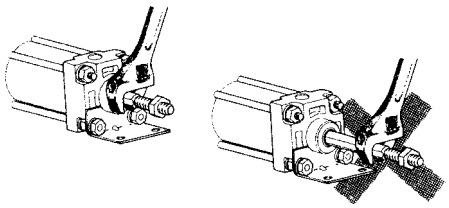
Be sure to read before handling. For Safety Instructions and Actuator Precautions, refer to front matters 42 and 43. For Series CVS1K, refer to page 1607.

Operating Precautions

⚠Caution

1. Avoid using the air cylinder in such a way that rotational torque would be applied to the piston rod.

• If rotational torque is applied, the non-rotating guide will become deformed, causing a loss of non-rotating accuracy. Also, to screw a bracket or a nut onto the threaded portion at the end of the piston rod, make sure the retract the piston rod entirely, and place a wrench on the parallel sections of the rod that protrudes. To tighten, take precautions to prevent the tightening torque from being applied to the non-rotating guide.



Disassembly/Replacement

⚠Caution

1. When replacing rod seals, please contact SMC.

Air leakage may be happened, depending on the position in which a rod seal is fitted. Thus, please contact SMC when replacing them.

Selection

⚠Warning

1. Confirm the specifications.

Products in this catalog are designed to be used for compressed air systems. If not operated within the designated pressure or temperature, it may damage the products or cause malfunction. (Refer to specifications.)

2. Energizing continuously for a long period of time

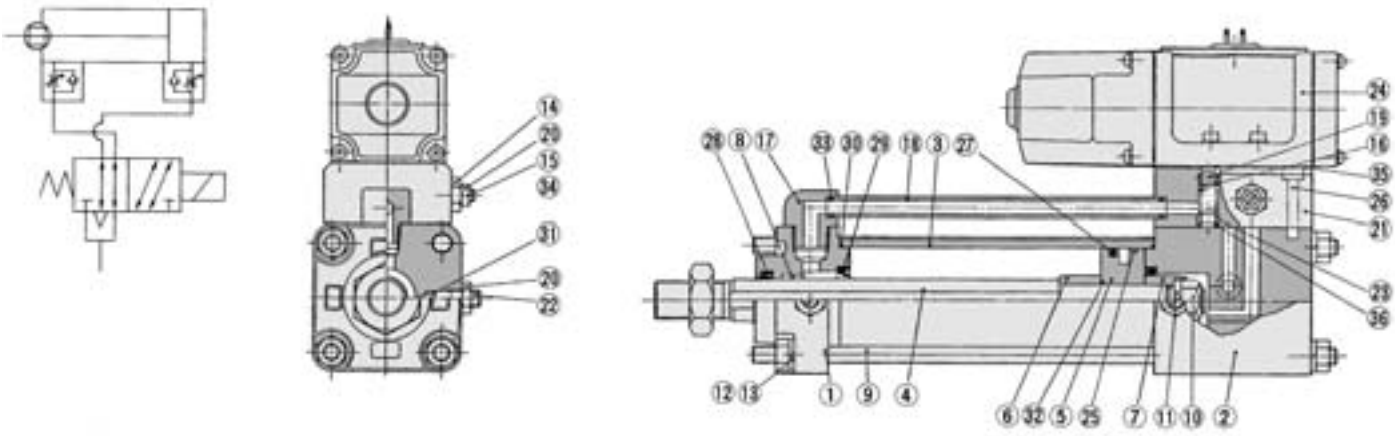
• When the valve is continuously energized for a long period of time, the performance may deteriorate or effect peripheral equipment adversely since temperature rises when coils generate heat.

3. Mounting orientation

Metal seal: For single solenoids, mounting orientation is flexible. For double solenoids and 3 position valves, mount a spool valve horizontally.

Construction

Lube type



Component Parts

No.	Description	Material	Note
1	**Rod cover**	Aluminum alloy	Matt black painted
2	**Head cover**	Aluminum alloy	Matt black painted
3	**Cylinder tube**	Aluminum alloy	Hard anodized
4	**Piston rod**	Carbon steel	Hard chrome plated
5	**Piston**	Aluminum alloy	Chromated
6	**Cushion ring A**	Rolled steel	Zinc chromated
7	**Cushion ring B**	Rolled steel	Zinc chromated
8 *	**Non-rotating guide**	Oil impregnated sintered alloy	
9	**Tie-rod**	Carbon steel	Zinc chromated
10	**Piston nut**	Rolled steel	Zinc chromated
11	**Spring washer**	Steel wire	Zinc chromated
12	**Tie-rod nut**	Carbon steel	Black zinc chromated
13	**Spring washer**	Steel wire	Black zinc chromated
14	**Needle guide**	Carbon steel	Electroless nickel plated
15	**Speed adjustment needle**	Carbon steel	Electroless nickel plated
16 *	**Check spring**	Steel wire	Zinc chromated
17 *	**Guide tube fitting**	Aluminum alloy	Platinum silver
18	**Pipe**	Carbon steel tube	Chromated

* Not replaceable

No.	Description	Material	Note
19 *	**Check ball**	Polyurethane rubber	9/32
20	**lock nut**	Carbon steel	Nickel plated
21	**Sub-plate**	Aluminum alloy	Platinum silver
22	**Cushion valve**	Rolled steel	Electroless nickel plated
23 *	**Valve port**	Brass	
24	**Solenoid valve**	—	Refer to the note below. *
25	**Wear ring**	Resin	
26	**Hexagon socket head cap screw**	Chromium molybdenum steel	Black zinc chromated

Note) Add "X46" at the end of the part number for single solenoid type.

* How to order solenoid valves

VS4□24- [Voltage] [Electrical entry]

No.	Description	Material	Note
27	**Piston seal**	NBR	
28	**Rod seal**	NBR	
29 *	**Cushion seal**	NBR	
30	**Cylinder tube gasket**	NBR	

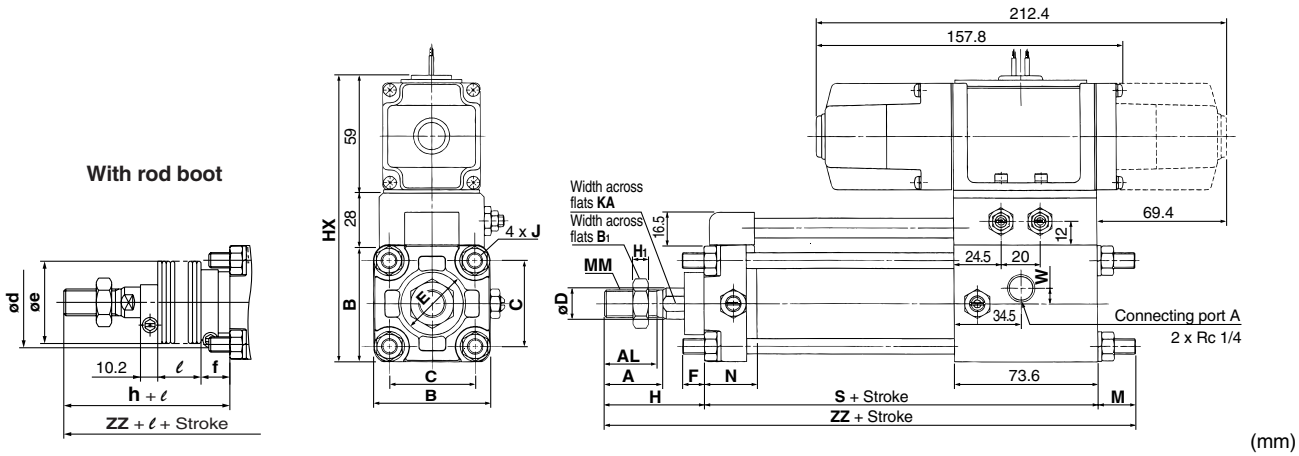
No.	Description	Material	Note
31	**Cushion valve seal**	NBR	
32 *	**Piston gasket**	NBR	
33	**Pipe gasket**	NBR	
34	**Speed adjustment valve seal**	NBR	
35	**Gasket**	NBR	
36	**Valve port gasket**	NBR	

Replacement Parts: Seal Kit

Bore size (mm)	Kit no.	Contents
40	CVS1K40-PS	Set of nos. above ㉗, ㉘, ㉚, ㉛, ㉝, ㊱
50	CVS1K50-PS	
63	CVS1K63-PS	

* Seal kit includes ㉗, ㉘, ㉚, ㉛, ㉝, ㊱. Order the seal kit, based on each bore size.
* Seal kit includes a grease pack (ø40, ø50: 10 g, ø63 or more: 20 g).
Order with the following part number when only the grease pack is needed.
Grease pack part no.: GR-S-010 (10 g), **GR-S-020** (20 g)

Basic Style: CVS1K



(mm)

Bore size (mm)	Stroke range (mm)*	A	AL	B	B_1	C	D	E	F	H_1	HX	J	KA	M	MM	N	S	W
40	to 500	30	27	60	22	44	16	32	10	8	147	M8 x 1.25	14	19.4	M14 x 1.5	27	130.6	8
50	to 600	35	32	70	27	52	20	40	10	11	157	M8 x 1.25	18	16.4	M18 x 1.5	30	133.6	8
63	to 600	35	32	86	27	64	20	40	10	11	173	M10 x 1.25	18	18.4	M18 x 1.5	31	140.6	8

Bore size (mm)	Without rod boot		With rod boot					
	H	ZZ	d	e	f	h	ℓ	ZZ
40	51	201	55	43	11.2	59	1/4 stroke	209
50	58	208	62	52	11.2	66	1/4 stroke	216
63	58	217	62	52	11.2	66	1/4 stroke	225

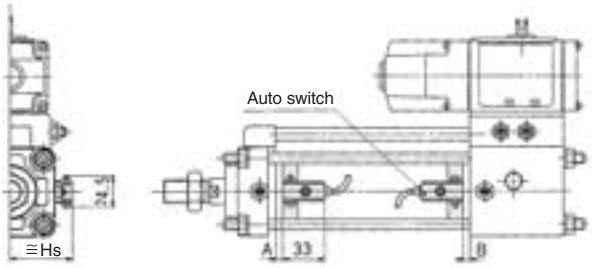
* The minimum stroke of the one with rod boot is 20 mm or more.

• External dimensions of each mounting bracket other than basic style are the same, except KA dimension. Refer to pages 1628 to 1631.

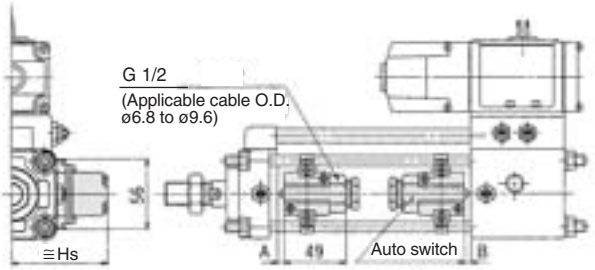
• For accessory, refer to page 1631.

Auto Switch Proper Mounting Position (Detection at Stroke End) and Its Mounting Height

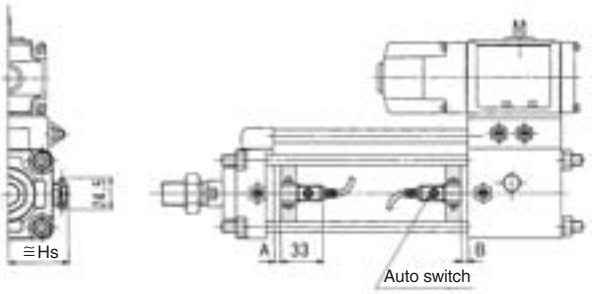
<Band mounting style>
D-B5□/B64/B59W



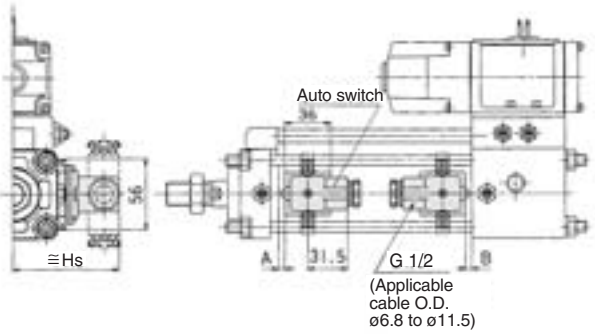
D-A3□/G39/K39



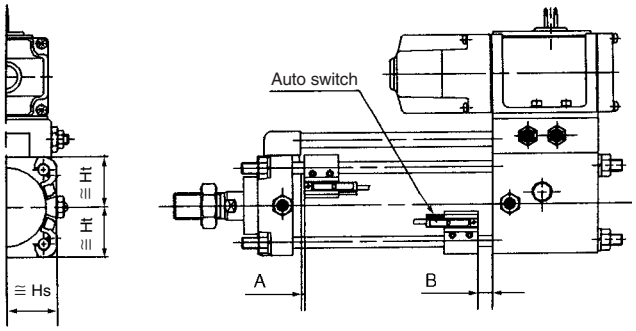
D-G5□/K59/G5□W/K59W
D-G59F/G5NTL



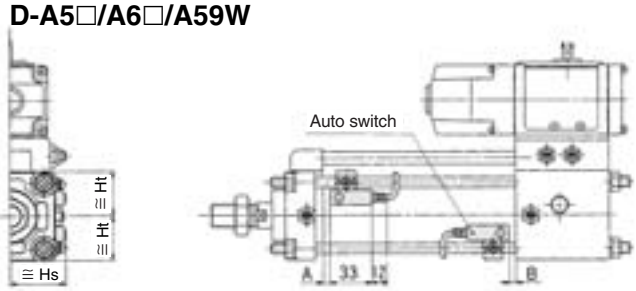
D-A44



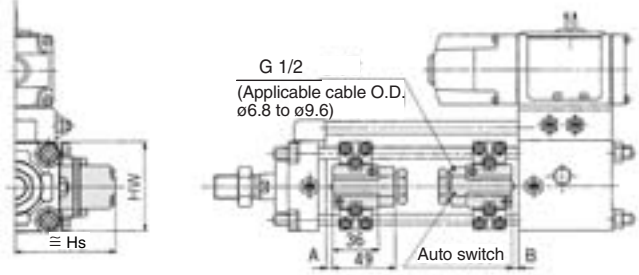
<Tie-rod mounting style>
D-A9□/A9□V **D-Z7□/Z80**
D-M9□/M9□V **D-Y59□/Y69□/Y7P/Y7PV**
D-M9□W/M9□WV **D-Y7□W/Y7□WV**



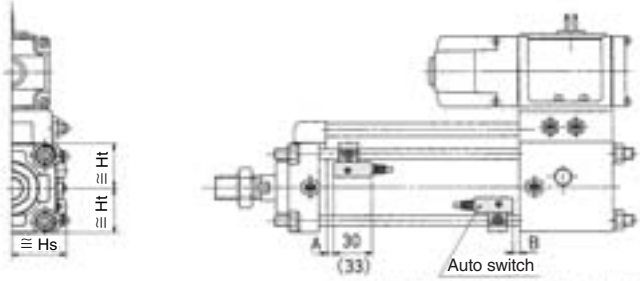
D-A5□/A6□/A59W



D-A3□C
D-G39C/K39C

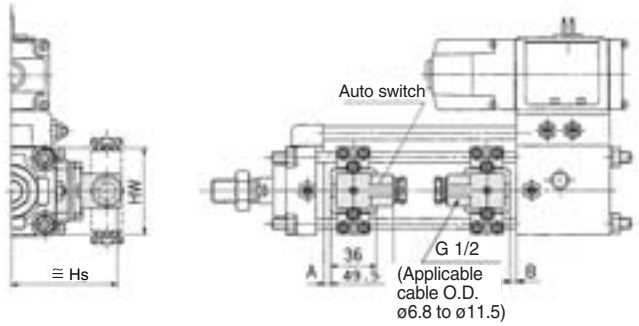


D-F5□/J5□
D-F5NTL
D-F5□W/J59W/F59F



D-A44C

( ): Denotes the values of D-F5LF.



Auto Switch Proper Mounting position (Detection at Stroke End) and Its Mounting Height

Auto Switch Proper Mounting Position

(mm)

Auto switch model / Bore size (mm)	D-A9□ D-A9□V		D-M9□ D-M9□V D-M9□W D-M9□WV		D-A5□ D-A6□ D-A3□ D-A3□C D-A44/A44C D-G39/G39C D-K39/K39C		D-B5□ D-B64		D-F5□ D-J5□ D-F5□W D-J59W D-F59F		D-G5□W D-K59W D-G59F D-G5□ D-K59 D-G5NTL		D-A59W		D-F5NTL		D-B59W D-Z7□ D-Z80 D-Y59□ D-Y69□ D-Y7P D-Y7PV D-Y7□W D-Y7□WV	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
40	3 (6)	7 (4)	7 (10)	11 (8)	0 (0)	1 (0)	0 (0.5)	1.5 (0)	3.5 (6.5)	7.5 (4.5)	0 (2)	3 (0)	1 (4)	5 (2)	8.5 (11.5)	12.5 (9.5)	0.5 (3.5)	4.5 (1.5)
50	—	—	7 (10)	11 (8)	0 (0)	1 (0)	0 (0.5)	1.5 (0)	3.5 (6.5)	7.5 (4.5)	0 (2)	3 (0)	1 (4)	5 (2)	8.5 (11.5)	12.5 (9.5)	0.5 (3.5)	4.5 (1.5)
63	5 (8.5)	11 (7.5)	9 (12.5)	15 (11.5)	0 (2.5)	5.5 (1.5)	0 (3)	6 (2)	5.5 (9)	12 (8)	1 (4.5)	7.5 (3.5)	3 (6.5)	9.5 (5.5)	10.5 (14)	17 (13)	2.5 (6)	9 (5)
80	8 (12)	14 (10)	12 (16)	18 (14)	2 (6)	8.5 (4)	2.5 (6.5)	9 (4.5)	8.5 (12.5)	15 (10.5)	4 (8)	10.5 (6)	6 (10)	12.5 (8)	13.5 (17.5)	20 (15.5)	5.5 (9.5)	12 (7.5)
100	10 (13.5)	16 (12.5)	14 (17.5)	20 (16.5)	4 (7.5)	10.5 (6.5)	4.5 (8)	11 (7)	10.5 (14)	17 (13)	6 (9.5)	12.5 (8.5)	8 (11.5)	14.5 (10.5)	15.5 (19)	22 (18)	7.5 (11)	14 (10)

Note 1) ( ): Denotes the values of non-lube type.
Note 2) D-G5□W, K59W and G59F can not be attached on ø40 and ø50 lube type cylinder.
Note 3) D-B5□ type, D-G5□type, D-K5□type are mountable only upon a receipt of order. (Not mountable after the time of shipment)
Note 4) D-A9□ and D-A9□V types cannot be mounted on ø50
Note 5) Adjust the auto switch after confirming the operating conditions in the actual setting.

Auto Switch Mounting Height

(mm)

Auto switch model / Bore size (mm)	D-A9□ D-M9□ D-M9□W		D-A9□V		D-M9□V D-M9□WV		D-B5□ D-B64 D-B59W D-G5□ D-K59 D-G5NTL D-G5□W D-K59W D-G59F	D-A3□ D-G39 D-K39	D-A44	D-A5□ D-A6□ D-A59W		D-F5□ D-J5□ D-F5□W D-J59W D-F59F D-F5NTL		D-A3□C D-G39C D-K39C		D-A44C		D-Z7□ D-Z80 D-Y59□ D-Y7P D-Y7□W		D-Y69□ D-Y7PV D-Y7□WV	
	Hs	Ht	Hs	Ht	Hs	Ht	Hs	Hs	Hs	Hs	Ht	Hs	Ht	Hs	Hw	Hs	Hw	Hs	Ht	Hs	Ht
40	30	30	32	30	35	30	38	72.5	80.5	40	31	38.5	31	73	69	81	69	30	30	30.5	30
50	34	34	—	—	39	34	43.5	78	86	43.5	35	42.5	35	78.5	77	86.5	77	34	34	35	34
63	41	41	43.5	41	46	41	50.5	85	93	49	42	48	42	85.5	91	93.5	91	41	41	42.5	41
80	49.5	49	51.5	49	54	49	59	93.5	101.5	55.5	50	54	50	94	107	102	107	49.5	48.5	51	48.5
100	57	56	59.5	56	62.5	56	69.5	104	112	63	57.5	62	57.5	104	121	112	121	58.5	56	59	56

∗ D-A9□ and D-A9□V types cannot be mounted on ø50

Minimum Stroke For Auto Switch Mounting

n: Number of auto switches (mm)

Auto switch model	No. of auto switches mounted		Mounting brackets other than center trunnion	Center trunnion				
				ø40	ø50	ø63	ø80	ø100
D-A9□	2 (Different surfaces, Same surface), 1		15	75	—	80	85	90
	n		$15 + 40\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···)	$75 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)		$80 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$85 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$90 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)
D-A9□V	2 (Different surfaces, Same surface), 1		10	50	—	55	60	65
	n		$10 + 30\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···)	$50 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)		$55 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$60 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$65 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)
D-M9□ D-M9□W	2 (Different surfaces, Same surface), 1		15	80		85	90	95
	n		$15 + 40\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···)	$80 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)		$85 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$90 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$95 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)
D-M9□V D-M9□WV	2 (Different surfaces, Same surface), 1		10	55		60	65	70
	n		$10 + 30\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···)	$55 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)		$60 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$65 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$70 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)
D-A5□/A6□ D-F5□/J5□ D-F5□W/J59W D-F59F	2 (Different surfaces, Same surface), 1		15	90		100	110	120
	n (Same surface)		$15 + 55\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···)	$90 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)		$100 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$110 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$120 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)
D-A59W	2 (Different surfaces, Same surface)		20	90		100	110	120
	n (Same surface)		$20 + 55\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···)	$90 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)		$100 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$110 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$120 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)
	1		15	90		100	110	120
D-F5NTL	2 (Different surfaces, Same surface), 1		25	110		120	130	140
	n (Same surface)		$25 + 55\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···)	$110 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)		$120 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$130 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$140 + 55\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)
D-B5□/B64 D-G5□/K59 D-G5□W D-K59W D-G59F D-G5NTL	2	Different surfaces	15	90		100	110	
		Same surface	75					
	n	Different surfaces	$15 + 50\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···)	$90 + 50\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)		$100 + 50\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$110 + 50\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	
		Same surface	75 + 50 (n – 2) (n = 2, 3, 4, ···)	90 + 50 (n – 2) (n = 2, 4, 6, 8···)		100 + 50 (n – 2) (n = 2, 4, 6, 8···)	110 + 50 (n – 2) (n = 2, 4, 6, 8···)	
	1		10	90		100	110	
D-B59W	2	Different surfaces	20	90		100	110	
		Same surface	75					
	n	Different surfaces	$20 + 50\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···)	$90 + 50\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)		$100 + 50\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$110 + 50\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	
		Same surface	75 + 50 (n – 2) (n = 2, 3, 4, ···)	90 + 50 (n – 2) (n = 2, 4, 6, 8···)		100 + 50 (n – 2) (n = 2, 4, 6, 8···)	110 + 50 (n – 2) (n = 2, 4, 6, 8···)	
	1		15	90		100	110	
D-A3□ D-G39 D-K39	2	Different surfaces	35	100		100	110	
		Same surface	100					
	n	Different surfaces	35 + 30 (n – 2) (n = 2, 3, 4, ···)	100 + 30 (n – 2) (n = 2, 4, 6, 8···)		100 + 30 (n – 2) (n = 2, 4, 6, 8···)	100 + 30 (n – 2) (n = 2, 4, 6, 8···)	
		Same surface	100 + 100 (n – 2) (n = 2, 3, 4, ···)	100 + 100 (n – 2) (n = 2, 4, 6, 8···)				
	1		10	75		80	90	
D-A44	2	Different surfaces	35	100		100	100	
		Same surface	55	75		80	90	
	n	Different surfaces	35 + 30 (n – 2) (n = 2, 3, 4, ···)	75 + 30 (n – 2) (n = 2, 4, 6, 8···)		80 + 30 (n – 2) (n = 2, 4, 6, 8···)	100 + 30 (n – 2) (n = 2, 4, 6, 8···)	
		Same surface	55 + 50 (n – 2) (n = 2, 3, 4, ···)	75 + 50 (n – 2) (n = 2, 4, 6, 8···)		80 + 50 (n – 2) (n = 2, 4, 6, 8···)	90 + 50 (n – 2) (n = 2, 4, 6, 8···)	
	1		10	75		80	90	

Minimum Stroke For Auto Switch Mounting

n: Number of auto switches (mm)

Auto switch model	No. of auto switches mounted		Mounting brackets other than center trunnion	Center trunnion				
				ø40	**ø50**	**ø63**	**ø80**	**ø100**
D-A3□C **D-G39C** **D-K39C**	2	Different surfaces	20	100		100	100	
		Same surface	100					
	n	Different surfaces	20 + 35 (n – 2) (n = 2, 3, 4, ···)	100 + 35 (n – 2) (n = 2, 4, 6, 8···)				
		Same surface	100 + 100 (n – 2) (n = 2, 3, 4, 5,···)	100 + 100 (n – 2) (n = 2, 4, 6, 8···)				
	1		10	75		80	90	
D-A44C	2	Different surfaces	20	75		80	90	
		Same surface	55					
	n	Different surfaces	20 + 35 (n – 2) (n = 2, 3, 4, ···)	75 + 35 (n – 2) (n = 2, 4, 6, 8···)		80 + 35 (n – 2) (n = 2, 4, 6, 8···)	90 + 35 (n – 2) (n = 2, 4, 6, 8···)	
		Same surface	55 + 50 (n – 2) (n = 2, 3, 4, ···)	75 + 50 (n – 2) (n = 2, 4, 6, 8···)		80 + 50 (n – 2) (n = 2, 4, 6, 8···)	90 + 50 (n – 2) (n = 2, 4, 6, 8···)	
	1		10	75		80	90	
D-Z7□/Z80 **D-Y59□/Y7P** **D-Y7□W**	2 (Different surfaces, Same surface), 1		15	80	85	90	95	105
	n		$15 + 40\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···)	$80 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$85 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$90 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$95 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$105 + 40\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)
D-Y69□/Y7PV **D-Y7□WV**	2 (Different surfaces, Same surface), 1		10	65		75	80	90
	n		$10 + 30\frac{(n-2)}{2}$ (n = 2, 4, 6, 8···)	$65 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)		$75 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$80 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)	$90 + 30\frac{(n-4)}{2}$ (n = 4, 8, 12, 16···)

Operating Range

(mm)

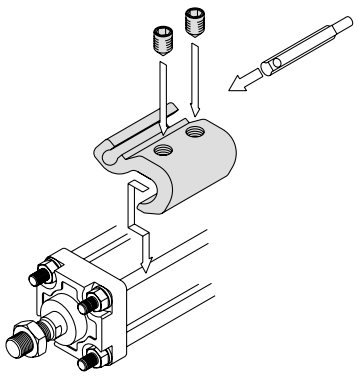
Auto switch model	Bore size (mm)				
	40	50	63	80	100
D-A9□/A9□V	7	—	9	9	9
D-M9□/M9□V D-M9□W/M9□WV	4.5	5	5.5	5	6
D-Z7□/Z80	8	7	9	9.5	10.5
D-A3□/A44 D-A3□C/A44C	9	10	11	11	11
D-A5□/A6□					
D-B5□/B64					
D-A59W	13	13	14	14	15
D-B59W	14	14	17	16	18
D-Y59□/Y69□ D-Y7P/Y7PV D-Y7□W/Y7□WV	8	7	5.5	6.5	6.5
D-F5□/J5□ D-F5□W/J59W D-F5NTL/F59F	4	4	4.5	4.5	4.5
D-G5□/K59 D-G5□W/K59W D-G5NTL/G59F	5	6	6.5	6.5	7
D-G39/K39 D-G39C/K39C	9	9	10	10	11

* D-A9□ and D-A9□V types cannot be mounted on ø50
* Since this is a guideline including hysteresis, not meant to be guaranteed. (Assuming approximately ±30% dispersion.) There may be the case it will vary substantially depending on an ambient environment.

Auto Switch Mounting Bracket Part No.

<Tie-rod mounting style>

Auto switch model	Bore size (mm)				
	ø40	ø50	ø63	ø80	ø100
D-A9□/A9□V D-M9□/M9□V D-M9□W/M9□WV	BA7-040	BA7-040	BA7-063	BA7-080	BA7-080
D-A5□/A6□/A59W D-F5□/J5□/F5□W/J59W D-F5NTL/F59F	BT-04	BT-04	BT-06	BT-08	BT-08
D-A3□C/A44C/G39C/K39C	BA3-040	BA3-050	BA3-063	BA3-080	BA3-100
D-Z7□/Z80 D-Y59□/Y69□ D-Y7P/Y7PV D-Y7□W/Y7□WV	BA4-040	BA4-040	BA4-063	BA4-080	BA4-080



• Mounting example of D-A9□(V)/M9□(V)/M9□W(V)

<Band mounting style>

Auto switch model	Bore size (mm)				
	ø40	ø50	ø63	ø80	ø100
D-A3□/A44/G39/K39	BD1-04M	BD1-05M	BD1-06M	BD1-08M	BD1-10M
D-B5□/B64/B59W D-G5□/K59/G5□W/K59W D-G59F/G5NTL	BA-04	BA-05	BA-06	BA-08	BA-10

* D-A9□ and D-A9□V types cannot be mounted on ø50.
* Auto switch mounting brackets are included in D-A3□C/A44C/G39C/K39C. When the auto switch mounting bracket is needed separately, order it with the above part number. When ordering an auto switch alone, specify it as shown below according to the cylinder size.
  Ex.) ø40: D-A3□C-4, ø50: D-A3□C-5
  ø63: D-A3□C-6, ø80: D-A3□C-8, ø100: D-A3□C-10

Other than the models listed in “How to Order”, the following auto switches are applicable.
For detailed specifications, refer to pages 1719 to 1827.

Auto switch type	Model	Electrical entry (Fetching direction)	Features
Reed	D-A93V, A96V	Grommet (Perpendicular)	–
	D-A90V		Without indicator light
	D-A53, A56, B53, Z73, Z76	Grommet (In-line)	–
	D-A67, Z80		Without indicator light
Solid state	D-M9NV, M9PV, M9BV	Grommet (Perpendicular)	–
	D-Y69A, Y69B, Y7PV		
	D-M9NWV, M9PWV, M9BWV		Diagnostic indication (2-color indication)
	D-Y7NWV, Y7PWV, Y7BWV		
	D-Y59A, Y59B, Y7P	Grommet (In-line)	–
	D-F59, F5P, J59		
	D-Y7NW, Y7PW, Y7BW		Diagnostic indication (2-color indication)
	D-F59W, F5PW, J59W		
	D-F5NTL, G5NTL		With timer

∗ With pre-wired connector is also available in solid state auto switches. For details, refer to pages 1784 and 1785.
∗ Normally closed (NC = b contact), solid state auto switch (D-F9G/F9H/Y7G/Y7H type) are also available. For details, refer to pages 1746 and 1748.
∗ Wide range detection type, solid state auto switches (D-G5NBL type) are also available. Refer to page 1776 for details.

Valve Mounted Guide Cylinder

Series MVGQ

ø12, ø16, ø20, ø25, ø32, ø40, ø50, ø63, ø80, ø100

Valve, Speed Controller, and Cylinder are formed into one unit.

Easy piping wiring work for Valve, Speed Controller and Cylinder can be formed into one unit, further can be equipped into a more compact design.

The optimum valve series for each bore size

ø12, ø16, ø20	ø25, ø32	ø40, ø50, ø63	ø80, ø100
Valve: SYJ3000	VZ3000	VZ5000	VF3000

Switching between rod extended when energized and rod retracted when energized is easy.

It is able to switch easily by changing the orientation of the switching plate for Series SYJ3000, VZ3000, VZ5000, and by changing the mounting orientation of the valve for Series VF3000.

Two kinds of guide rod bearings suited for individual use

Slide Bearing
Strength against side load is more than 2 times* as compared conventional stopper cylinder (round bar type).
Suitable for use with lateral loads accompanied by impact, as in stoppers.

Ball Bushing Bearing
Smooth operation is suitable for pushing, lifter and applications.
(*Comparison to SMC RSQ□ series, round bar type)

Can be mounted from two directions.

Non-rotating accuracy

Cylinder position can be detected.

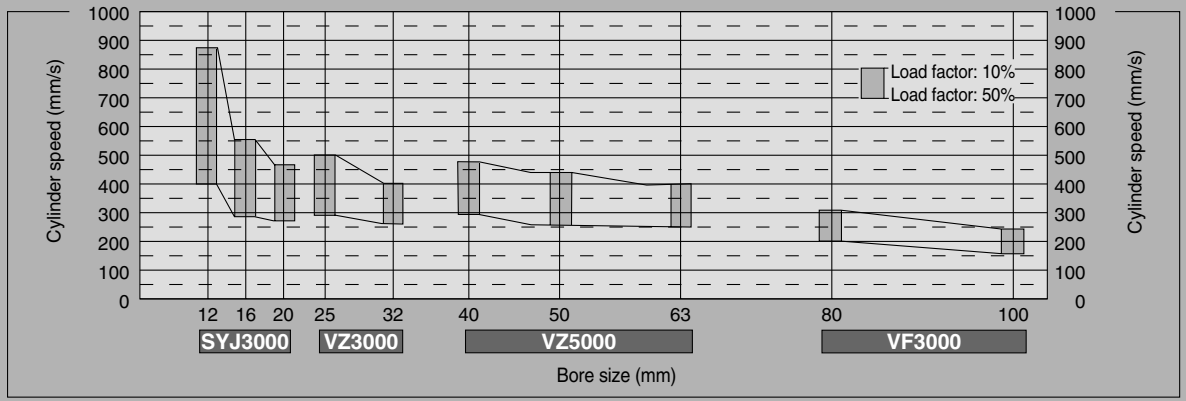
Built-in magnet for auto-switches

Built-in speed controller

Selection of meter-out or meter-in control is possible.

CV□
MVGQ

■ Maximum Driving Speed of Cylinders



■ Series Variations

Bore size (mm)	Standard stroke (mm)												Applicable valve series	Positions/No. of solenoid		Effective area (mm²) (Cv factor)	Detailed specifications
	10	20	25	30	40	50	75	100	125	150	175	200					
12	●	●		●	●	●	●	●					SYJ3000	2 position	Single	1.2 (0.067)	P.1648
16	●	●		●	●	●	●	●							Double		
20		●		●	●	●	●	●	●	●	●	●					
25		●		●	●	●	●	●	●	●	●	●	VZ3000	2 position	Single	4.5 (0.25)	P.1652
32			●			●	●	●	●	●	●	●			Double		
40			●			●	●	●	●	●	●	●	VZ5000	2 position	Single	12.5 (0.7)	
50			●			●	●	●	●	●	●	●			Double		
63			●			●	●	●	●	●	●	●					
80			●			●	●	●	●	●	●	●	VF3000	2 position	Single	16 (0.9)	P.1658
100			●			●	●	●	●	●	●	●			Double		

D-□
-X□
Individual -X□

Series MVGQ
Precautions 1
Be sure to read before handling.

Selection

⚠ Warning

1. Confirm the specifications.
Products in this catalog are designed to be used for compressed air systems (including vacuum). If not operated within the designated pressure or temperature, it may damage the products or cause malfunction. (Refer to specifications.)

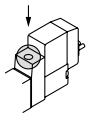
2. Energizing continuously for a long period of time.
When the valve is continuously energized for a long period of time, the performance may deteriorate, shorten the service life or effect peripheral equipment adversely since temperature rises when coils generate heat. Use the DC specification and energy saving circuit types when the valve is energized for a long period of time or energizing time becomes longer than non-energizing time during a day. Another way will be to make the valve N.O. (Normally Open), which shortens energizing time.

Manual Operation

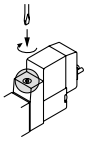
⚠ Warning

Since the devices in connection are operated by manual override, make sure that there is no danger.

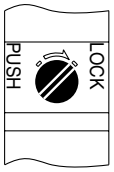
■ **Non-locking push type [Standard type]**
Push in the direction of the arrow.



■ **Push-turn locking slotted type [D type]**
Push and turn in the direction of the arrow.
If this is not turned, it can be used in the same way as the non-locking push type.



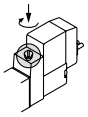
The position when locked



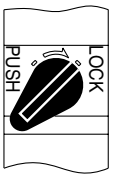
⚠ Caution

When operating D type with the driver, use a watchmaker's screwdriver and turn it lightly. [Torque: Less than 0.1 N•m]

■ **Push-turn locking lever type [E type]**
Push and turn in the direction of the arrow.
If this is not turned, it can be used in the same way as the non-locking push type.



The position when locked



⚠ Caution

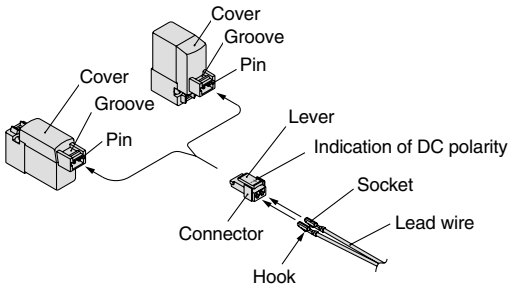
When locking the manual override with the push-turn locking type (D and E types), be sure to push it down before turning. Turning without first pushing it down can cause damage to the manual override and malfunction such as air leakage, etc.

Plug Connector

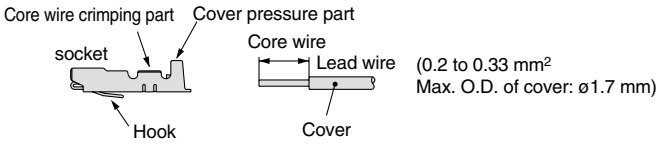
⚠ Caution

1. Connector installation and removal

- To install the connector, squeeze the lever and the connector body with your fingers, slide the connector straight over the pin, and lock it in place by pushing the tab of the lever into the groove in the cover.
- To remove the connector, press the lever with your thumb to disengage the tab from the groove, and pull the connector straight out.

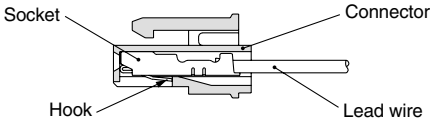


2. Crimping the lead wire into the socket
Peel approximately 3.2 to 3.7 mm of insulation from the tip of the lead wire, make sure that the ends of the core wire are even, insert the wire into the socket, and crimp it with a crimping tool.
At this time, make sure that the insulation of the lead wire does not enter the area in which the core wire is crimped. (Please contact SMC for details on the special crimping tool.)



3. Attaching and detaching lead wires with sockets

- **Attaching**
  Insert the sockets into the square holes of the connector (with ⊕ and ⊖ indication), continue to push the sockets all the way in until the lock by hooking into the seats in the connector. (When they are pushed in, their hooks open and they are locked automatically.) Then confirm that they are locked by pulling lightly on the lead wires.
- **Detaching**
  To detach a socket from a connector, pull out the lead wire while pressing the socket's hook with a stick having a thin tip (approx. 1 mm).
  If the socket is re-used as it is, spread the hook to the outside.



Precautions 2

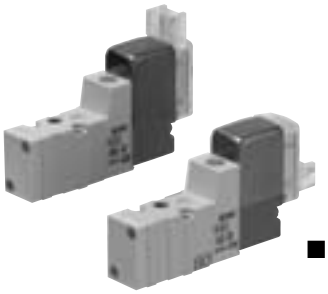
Be sure to read before handling.

Surge Voltage Suppressor

⚠Caution

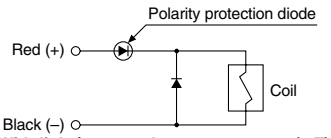
< For DC >

Grommet, L/M plug connector

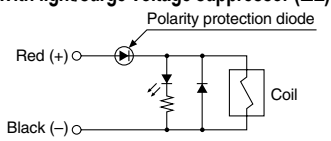


■ **Standard type (With polarity)**

With surge voltage suppressor (□S)

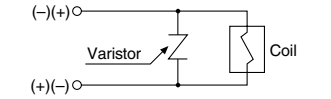


With light/surge voltage suppressor (□Z)

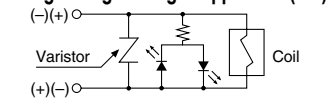


■ **Non-polar type**

With surge voltage suppressor (□R)



With light/surge voltage suppressor (□U)

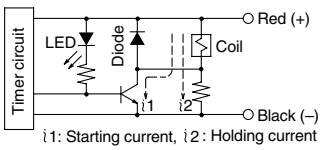


- Connect the wires by matching their polarities to the + and – marks.(Non-polar type can be connected to either of them.)
- Since the electrical voltage other than 24 VDC, 12 VDC have no feature of polarity protection diode, use caution not to make a mistake of the polarity.
- Valves with diode to prevent reverse current have a voltage drop of approximately 1 V. Be aware of the allowable voltage fluctuation. (Refer to solenoid specifications of each valve for details.)
- If the lead wires are connected beforehand, the red wire is +, and the black wire is –.

■ **With energy saving circuit**

By reducing electric power required in the holding state, power consumption is reduced to about 1/4 of the standard type. (Effective energizing time is over 62 ms when 24 VDC is applied.)

Electrical circuit (with energy saving circuit)

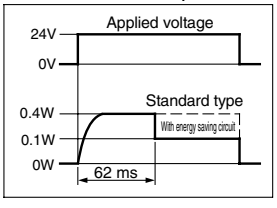


i1: Starting current, i2: Holding current

Working Principle

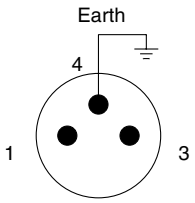
The circuit shown above reduces current consumption at holding, which reduces the overall power consumption. Refer to the electrical power waveform shown on the right.

<Energy-saving electrical power waveform, for **SYJ** $\frac{3}{5}$ **□□0T**>



- Since the product with an energy-saving circuit does not have a diode to prevent reverse current, avoid mistaking polarity.
- Be aware of the allowable voltage fluctuation, since there is about 0.5 voltage drop due to a transistor. (Refer to solenoid specifications of each valve for details.)

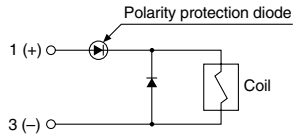
M8 connector



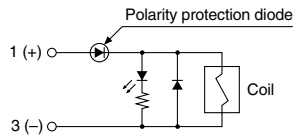
Solenoid valve side pin wiring diagram

■ **Standard type (With polarity)**

With surge voltage suppressor (□S)

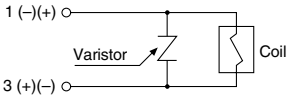


With light/surge voltage suppressor (□Z)

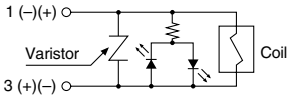


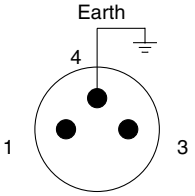
■ **Non-polar type**

With surge voltage suppressor (□R)



With light/surge voltage suppressor (□U)





Solenoid valve side pin wiring diagram

- Since the standard type has polarity, connect + to 1 and – to 3.
- Since the electrical voltage other than 24 VDC, 12 VDC have no feature of polarity protection diode, use caution not to make a mistake of the polarity.
- Valves with diode to prevent reverse current have a voltage drop of approximately 1 V. Be aware of the allowable voltage fluctuation. (Refer to solenoid specifications of each valve for details.)

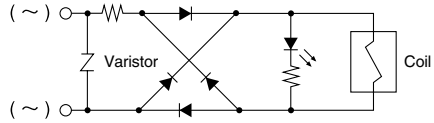
Surge Voltage Suppressor

< For AC >

(Since the rectifier prevents the production of surge voltage, there is no S type.)

Grommet, L/M plug connector

With indicator light (□Z)



Precautions 3

Be sure to read before handling.

M8 Connector

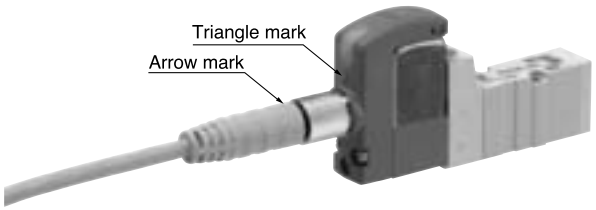
⚠ Caution

1. M8 connectors compliant with IP65 (enclosure) are protected against dust and water, however, they cannot be used in water.
   Use SMC's lead wire assembly (V100-49-1-□) or a connector for FA sensor (M8 thread 3 pin type) conforming to NECA (Nippon Electric Control Equipment Industries Association) standard 4202 (IEC60947-5-2) for the connectors used. When the connectors are used with SYJ3000 manifolds, use the connectors with O.D. 10.5 mm or smaller. If the connectors have O.D. 10.5 mm or greater, they cannot be connected since they interfere with manifolds.
2. When installing connectors, be sure to tighten them by hand since using tools may damage them. (0.4 to 0.6 N•m)
3. Do not apply a force of 30N or more since it may not meet IP65.

⚠ Caution

When using connectors other than M8 or not tightening them sufficiently, IP65 cannot be met.

• How to mount connectors with a lead wire



Note) When installing a connector cable, directions must be confirmed. When installing SMC's connector cable (V100-49-1□), align the arrow mark of the connector and the triangle mark of the valve.
Twisting without alignment may damage pins and cause malfunction.

■ Connector Cable

• Refer to how to order the connector cable for M8 shown below.

How to order

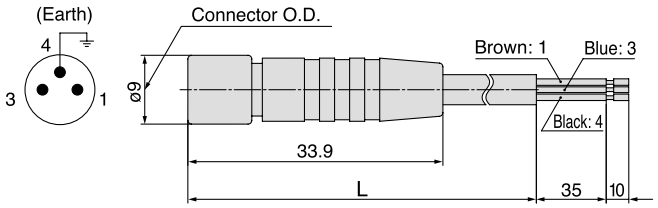
1. When ordering the solenoid valve and the connector cable at the same time
   (Connector cable is shipped together.)

SY 3 5 7 9 □□□ – □□□□ – □□

Electrical entry
W1: Cable length 300 mm
W2: Cable length 500 mm
W3: Cable length 1000 mm
W4: Cable length 2000 mm
W7: Cable length 5000 mm

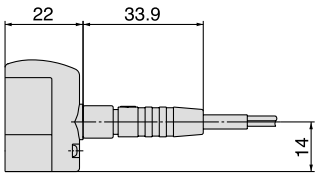
(Example 1) Cable length 300 mm
SY312-5W1ZE-C4
Cable entry symbol

2. When ordering a connector cable only



Cable length (**L**)	Model
300 mm	V100-49-1-1
500 mm	V100-49-1-2
1000 mm	V100-49-1-3
2000 mm	V100-49-1-4
5000 mm	V100-49-1-7

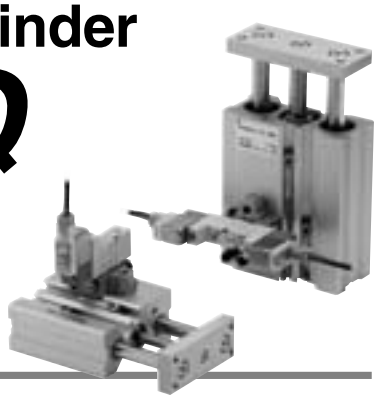
[Dimensions when installed]



Valve Mounted Guide Cylinder

Series MVGQ

ø12, ø16, ø20



How to Order

How to Order

When ordering valve mounted guide cylinder, Series MVGQ, specify the models of both the cylinder and the valve.

Ex.) MVGQM12-30-M9BWM-B ····· 1
SYJ3130-5LZ-MA ····· 1

Cylinder stroke (mm)
Refer to page 1649 for standard strokes.

Bore size

12	12 mm
16	16 mm
20	20 mm

Number of auto switches

Nil	2 pcs.
S	1 pc.
n	n pcs.

Auto switch

Nil	Without auto switch (Built-in magnet)

∗ For the applicable auto switch model, refer to page 1649.

Rod extended/retracted when energized Note)

Nil	Rod extended when energized
B	Rod retracted when energized

Note) Based on the case of 2 position single solenoid valve.

Bearing

M	Slide bearing
L	Ball bushing bearing

Cylinder MVGQ [M] [12] – [30] – [M9BW] [ ] – [ ] – [ ]

Valve SYJ3 [1] 3 [0] [ ] – [5] [L] [Z] [ ] – [MA] – [ ]

Type of actuation

1	2 position single solenoid
2	2 position double solenoid

∗ Please consult with SMC for 3 position type.

Speed controller specifications

MA	Meter-out
MB ∗	Meter-in

∗ Option

Made to Order
∗ Refer to page 1649 for datails.

Coil specification

Nil	Standard
T	With energy saving circuit (24/12 VDC only)

∗ The energy saving circuit is not available for W□.

DC specifications

5	24 VDC
6	12 VDC
V	6 VDC
S	5 VDC
R	3 VDC

AC specifications (50/60 Hz)

1	100 VAC
2	200 VAC
3	110 VAC [115 VAC]
4	220 VAC [230 VAC]

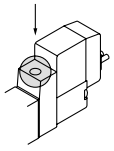
∗ W□: DC only

200 VAC, 220 VAC specifications

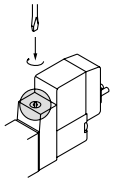
An AC specification solenoid valve using a grommet, L, or M plug connector has a built-in rectifier circuit in its pilot valve section to activate the DC coil.
The 200 VAC or 220 VAC specification pilot valve contains a rectifier circuit that generates heat when it is energized. Therefore, do not touch its exterior surface because it could be very hot, depending on the energizing conditions.

Manual override

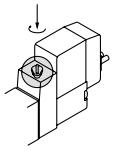
Nil: Non-locking push type



D: Push-turn locking slotted type

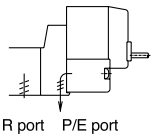


E: Push-turn locking lever type



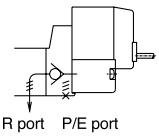
Body option

0: Pilot valve individual exhaust type



R port P/E port

3: Main/Pilot valve common exhaust type



R port P/E port

Electrical entry

24 V, 12 V, 6 V, 5 V, 3 VDC 100 V, 110 V, 200 V, 220VAC				24 V, 12 VDC 6 V, 5 V, 3 VDC
Grommet	L plug connector	M plug connector		M8 connector
G: Lead wire length: 300 mm	**L**: With lead wire (Wire length: 300 mm)	**M**: With lead wire (Wire length: 300 mm)	**MN**: Without lead wire	**WO**: Without connector cable
H: Lead wire length: 600 mm	**LN**: Without lead wire	**LO**: Without connector	**MO**: Without connector	**W□**: With connector cable

∗ 2 sockets are attached to "LN" and "MN" types.
∗ Refer to page 1646 for the connector cable for M8.
Note 1) □: Cable length symbol. Insert the symbol referring to page 1646.

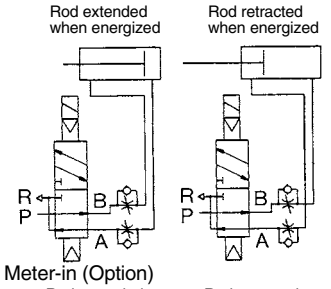
Light/Surge voltage suppressor

Nil	Without light/surge voltage suppressor
S	With surge voltage suppressor
Z	With light/surge voltage suppressor
R	With surge voltage suppressor (No polarity)
U	With light/surge voltage suppressor (No polarity)

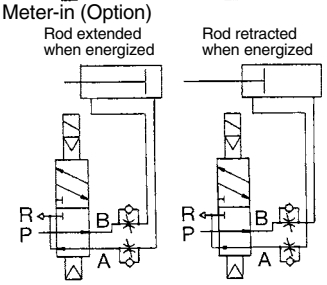
∗ In the case of AC, since the rectifier prevents the production of surge voltage, there is no type "S".
∗ R, U: DC only
∗ With energy saving circuit: For type "Z" only

JIS Symbol

Meter-out



Meter-in (Option)



The allowable lateral load, the allowable rotational torque for a plate, and the operation range of a stopper are the same as these of Series MGQ. For details, refer to pages 337 to 351.

Standard Stroke

Model	Standard stroke (mm)
MVGQ$^{M}_{L}$12/16	10, 20, 30, 40, 50, 75, 100
MVGQ$^{M}_{L}$20	20, 30, 40, 50, 75, 100 125, 150, 175, 200

Intermediate stroke (mm)
As for the intermediate strokes (by the 1 mm interval) other than the standard strokes above are manufactured by means of installing a spacer. Example) In the case of MVGQM20-35 st, a 5 mm width spacer is installed in the MVGQM20-40 st body; thus, the full length dimension are the same as the 40 st.

Made to Order Specifications

(For details, refer to pages 1847.)

Symbol	Specifications
-XA□	Change of guide rod end shape
-XC79	Tapped hole, drilled hole, pinned hole machined additionally

Specifications

Bore size (mm)		**12, 16, 20**
Action		Double acting
Fluid		Air
Bearing type		Slide bearing (MVGQM), Ball bushing bearing (MVGQL)
Operating pressure range (MPa)	**2 position single**	0.15 to 0.7
	2 position double	ø12, ø16: 0.12 to 0.7, ø20: 0.1 to 0.7
Ambient and fluid temperature (°C)		–10 to 50°C (No freezing)
Piston speed (mm/s)		50 to 500 (Refer to the page 1643.)
Cushion		Rubber bumper on both ends
Lubrication		Non-lube
Stroke length tolerance (mm)		$^{+1.5}_{0}$

Solenoid Valve Specifications

Model			**Series SYJ3000**
Manual override			Non-locking push type, Push-turn locking slotted type, Push-turn locking lever type
Pilot exhaust			Pilot valve individual exh. style, Main/Pilot valve common exh. style
Shock/Impact resistance (m/s²) (1)			150/30
Enclosure			Dustproof (* M8 connector: IP65)
Electrical entry			Grommet (G)/(H), L plug connector (L), M plug connector (M), M8 connector (W)
Coil rated voltage (V)	**DC**		24, 12, 6, 5, 3
	AC50/60 Hz		100*, 110*, 200*, 220*
Allowable voltage			±10% of the rated voltage*
Power consumption (2)	**DC**	**Standard type**	0.35 (With indicator light: 0.4)
		With energy saving circuit	0.1 (With indicator light only)
Apparent power (2) **(VA)**	**AC**	**100 V**	0.78 (With indicator light: 0.81)
		110 V [115 V]	0.86 (With indicator light: 0.89) [0.94 (With indicator light: 0.97)]
		200 V	1.18 (With indicator light: 1.22)
		220 V [230 V]	1.30 (With indicator light: 1.34) [1.42 (With indicator light: 1.46)]
Surge voltage suppressor			Diode (Non-polar type: Varistor)
Indicator light			LED

* Conforming to IEC60529
* 100 VAC and 115 VAC, 200 VAC and 230 VAC are common.
* Allowable voltage fluctuation for 115 VAC or 230 VAC is –15 to +5% of the rated voltage.
* For types S, Z and T with an energy saving circuit, the voltage will drop due to the internal circuit. Allowable voltage fluctuation must be in the range below.
  Types S, Z 24 VDC: –7 to +10 %, 12 VDC: –4 to +10 %
  Type T 24 VDC: –8 to +10 %, 12 VDC: –6 to +10 %

Note 1) Impact resistance: No malfunction resulted from the impact test using a drop impact tester. The test was performed on the axis and right angle directions of the main valve and armature, one time each in both energized and de-energized states.
Vibration resistance: No malfunction occurred in a one-sweep test between 45 and 2000 Hz. Test was performed at both energized and de-energized states to the axis and right angle directions of the main valve and armature. (Value in the initial stage.)

Note 2) At the rated voltage.

Applicable Auto Switch/Refer to pages 1719 to 1827 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC		Load voltage AC	Auto switch model Perpendicular	Auto switch model In-line	Lead wire length (m) 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	Pre-wired connector	Applicable load	
Solid state 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 indication)			3-wire (NPN)		5 V, 12 V		**M9NWV**	**M9NW**	●	●	●	○	○	IC circuit	
				3-wire (PNP)				**M9PWV**	**M9PW**	●	●	●	○	○		
				2-wire		12 V		**M9BWV**	**M9BW**	●	●	●	○	○	—	
Reed switch	——	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	**A96V**	**A96**	●	—	●	—	—	IC circuit	—
			No	2-wire	24 V	12 V	100 V	**A93V**	**A93**	●	—	●	—	—	—	Relay, PLC
							100 V or less	**A90V**	**A90**	●	—	●	—	—	IC circuit	

* 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
* Solid state auto switches marked with "○" are produced upon receipt of order.
* Since there are other applicable auto switches than listed, refer to page 1665 for details.
* For details about auto switches with pre-wired connector, refer to pages 1784 and 1785.
* Auto switches are shipped together (not assembled).

Low Power Consumption 0.5 W

Solenoid Specifications

Power consumption (W)	0.5 (With indicator light: 0.55)
Coil rated voltage (V)	24, 12, 6, 5, 3 VDC

Mass

(kg)

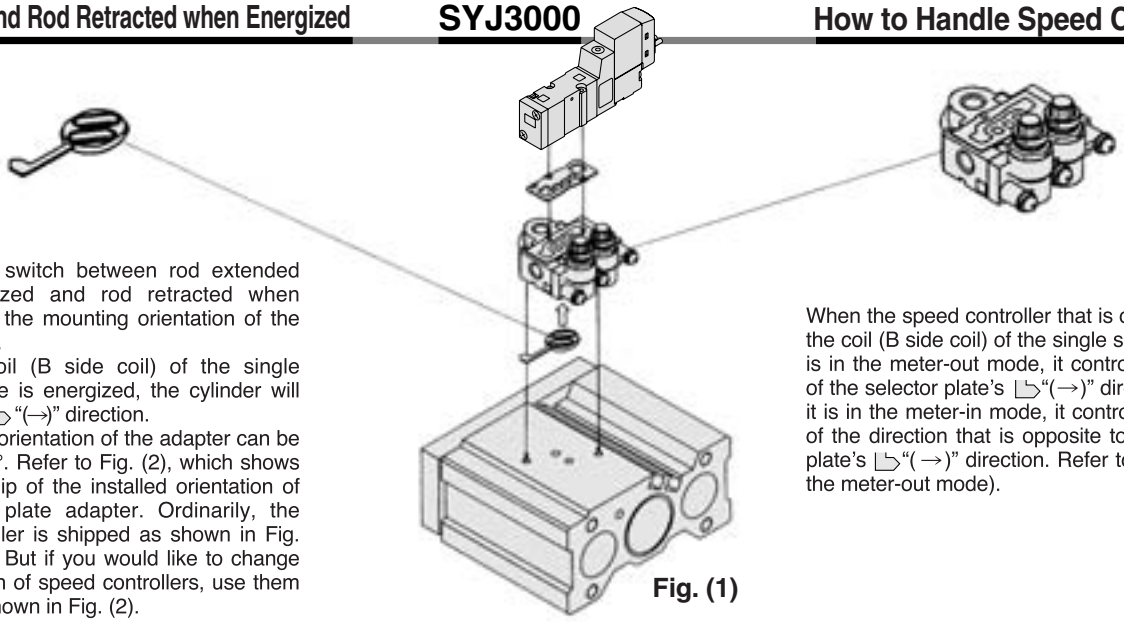
Bearing type	Bore size (mm)	Type	Standard stroke (mm)										
			10	20	30	40	50	75	100	125	150	175	200
Slide bearing	**12**	**MVGQM12**	0.23	0.28	0.32	0.35	0.39	0.49	0.59	–	–	–	–
	16	**MVGQM16**	0.35	0.40	0.46	0.51	0.56	0.69	0.81	–	–	–	–
	20	**MVGQM20**	–	0.55	0.62	0.70	0.77	0.95	1.10	1.25	1.40	1.55	1.70
Ball bushing bearing	**12**	**MVGQL12**	0.24	0.27	0.30	0.36	0.39	0.47	0.54	–	–	–	–
	16	**MVGQL16**	0.36	0.40	0.45	0.53	0.58	0.71	0.83	–	–	–	–
	20	**MVGQL20**	–	0.55	0.61	0.71	0.76	0.91	1.05	1.19	1.33	1.47	1.61

Note) The factors indicated above are of the single solenoid with grommet (G). Add 0.01 kg for the double solenoids.

Changing between Rod Extended when Energized and Rod Retracted when Energized

SYJ3000

How to Handle Speed Controller



It is able to switch between rod extended when energized and rod retracted when energized by the mounting orientation of the selector plate.
When the coil (B side coil) of the single solenoid valve is energized, the cylinder will move in the ⌙"(→)" direction.
The installed orientation of the adapter can be changed 180°. Refer to Fig. (2), which shows the relationship of the installed orientation of the selector plate adapter. Ordinarily, the speed controller is shipped as shown in Fig. (2) (a) or (b). But if you would like to change the orientation of speed controllers, use them in (c) or (d) shown in Fig. (2).

When the speed controller that is on the side of the coil (B side coil) of the single solenoid valve is in the meter-out mode, it controls the speed of the selector plate's ⌙"(→)" direction. When it is in the meter-in mode, it controls the speed of the direction that is opposite to the selector plate's ⌙"(→)" direction. Refer to Fig. (3) (for the meter-out mode).

Fig. (1)

Fig. (2)

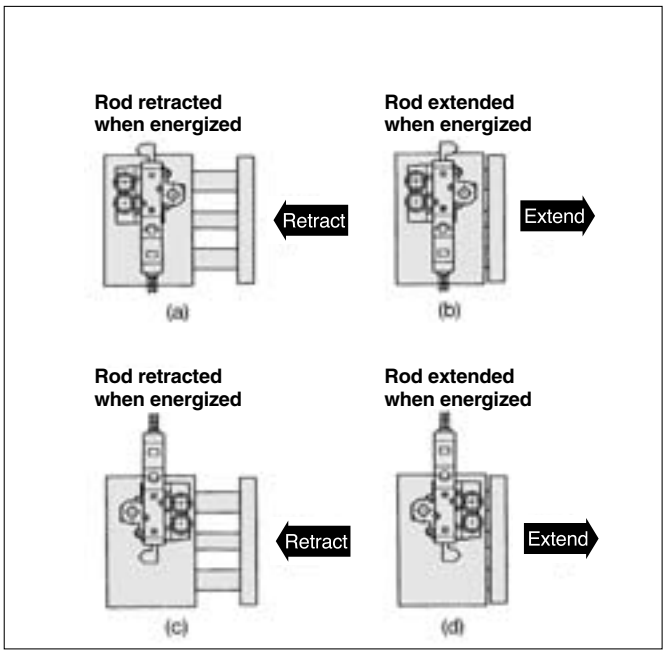
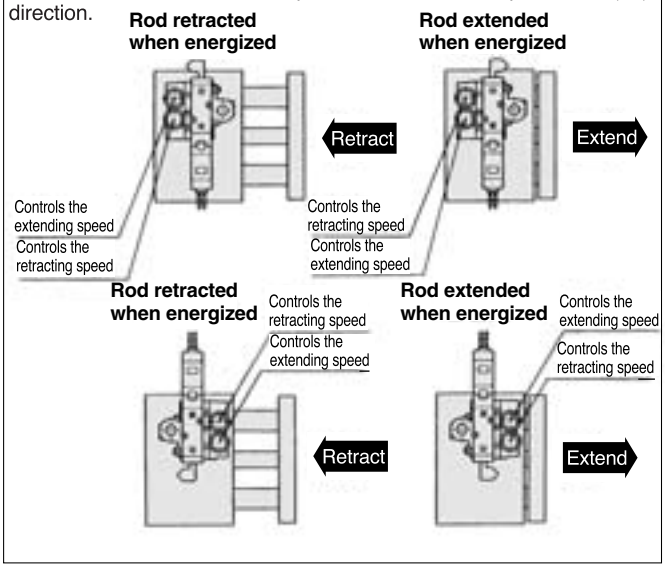


Fig. (3)

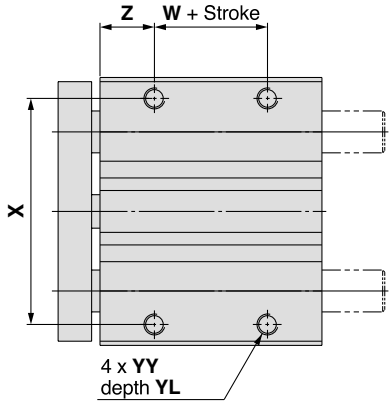
<Meter-out>

The speed controller that is located on the coil side of the signal solenoid valve controls the speed in the selector plate's ⌙"(→)" direction.

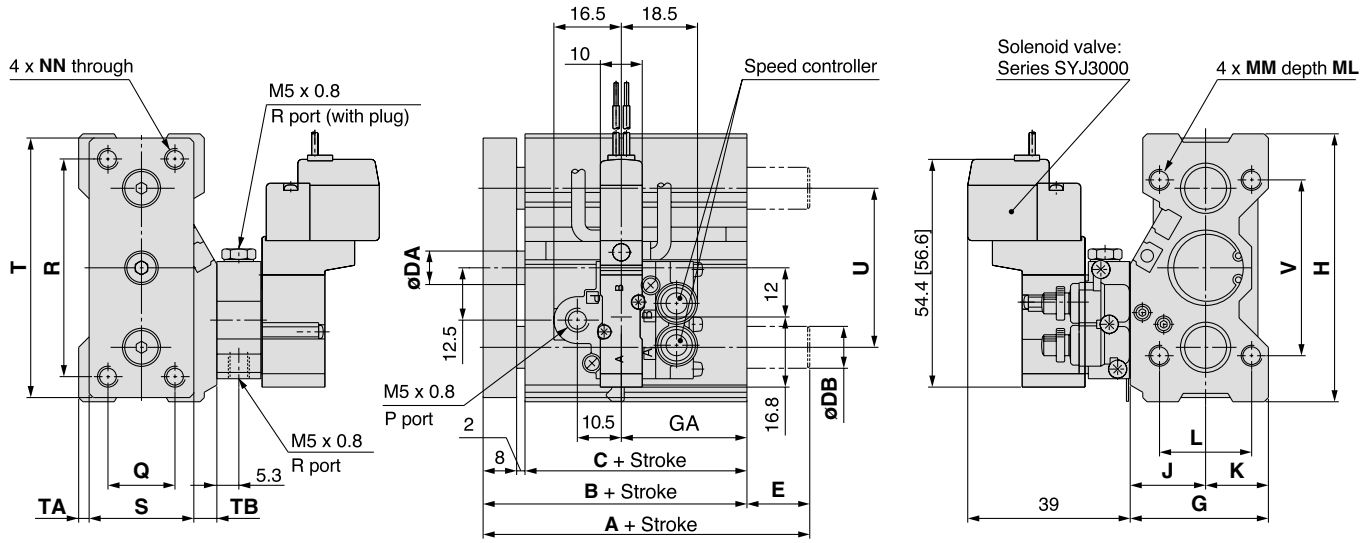


ø12, ø16, ø20

MVGQM, MVGQL



Bottom view



∗ The figures show when attached to SYJ3130-□G .

∗ [ ]: Denotes AC.

MVGQM, MVGQL Common Dimensions

(mm)

Bore size (mm)	Standard stroke (mm)	Applicable solenoid valve	B	C	DA	G	GA		H	J	K	L	MM	ML	NN	Q	R	S	T	TA	TB	U	V	W	X	YY	YL	Z
							Up to 10 st	Over 10 st																				
12	10, 20, 30, 40, 50, 75, 100	Series SYJ3000	39	29	6	29	20	30	58	16	13	18	M4 x 0.7	10	M4 x 0.7	14	48	22	56	2	5	36	40	5	50	M4 x 0.7	7	12
16			43	33	8	33	23	30	64	18	15	22	M5 x 0.8	13	M5 x 0.8	16	52	25	62	2.5	5.5	38	42	7	54	M5 x 0.8	8	13
20	20, 30, 40, 50, 75, 100, 125, 150, 175, 200		47	37	10	36	30		74	19	17	26	M5 x 0.8	13	M5 x 0.8	18	60	30	72	2	4	46	52	10	64	M5 x 0.8	8	13

Note 1) It is possible to manufacture the intermediate strokes other than the standard strokes by means of installing a spacer.
Note 2) For the electrical entry except the grommet type, refer to page 1648.

MVGQM (Slide bearing) A, DB, E Dimensions

Bore size (mm) \ Symbol / Stroke	A		DB	E	
	Up to 50 st	Over 50 st		Up to 50 st	Over 50 st
12	39		8	0	
16	43		10	0	
20	47	61.5	12	0	14.5

MVGQL (Ball bushing bearing) A, DB, E Dimensions

Bore size (mm) \ Symbol / Stroke	A		DB	E	
	Up to 30 st	Over 30 st		Up to 30 st	Over 30 st
12	43	55	6	4	16
16	49	65	8	6	22
20	57	74	10	10	27

Valve Mounted Guide Cylinder

Series MVGQ

ø25, ø32, ø40, ø50, ø63

How to Order

How to Order

When ordering valve mounted guide cylinder, Series MVGQ, specify the models of both the cylinder and the valve.

Ex.) MVGQM25-30-M9BWM-B ····· 1
VZ3140-5LZ-MA ····· 1

Cylinder stroke (mm)
Refer to page 1653 for standard strokes.

Auto switch

Nil	Without auto switch (Built-in magnet)

∗ For the applicable auto switch model, refer to page 1653.

Number of auto switches

Nil	2 pcs.
S	1 pc.
n	n pcs.

Bore size

25	25 mm	Series VZ3000	40	40 mm	Series VZ5000
32	32 mm		50	50 mm	
			63	63 mm	

Note)
Rod extended/retracted when energized

Nil	Rod extended when energized
B	Rod retracted when energized

Note) Based on the case of 2 position single solenoid valve.

Bearing

M	Slide bearing
L	Ball bushing bearing

Cylinder MVGQ **M** **25** – **30** – **M9BW** □ – □ – □

Valve VZ **3** **1** 4 **0** – **5** **L** □ □ – **MA** □ – □

Valve series

3	Series VZ3000
5	Series VZ5000

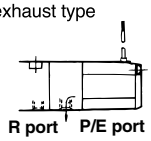
Type of actuation

1	2 position single solenoid
2	2 position double solenoid

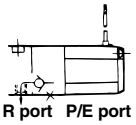
∗ Please consult with SMC for 3 position type.

Body option

0: Pilot valve individual exhaust type



3: Main/Pilot valve common exhaust type



Rated voltage

1	100 VAC 50/60 Hz
2	200 VAC 50/60 Hz
3∗	110 VAC 50/60 Hz
4∗	220 VAC 50/60 Hz
5	24 VDC
6∗	12 VDC
9∗	Other

∗ Option

Electrical entry

Grommet	L plug connector	M plug connector		DIN terminal
G: Lead wire length: 300 mm	L: With lead wire (Wire length: 300 mm)	M: With lead wire (Wire length: 300 mm)	MN: Without lead wire	D: With connector
H: Lead wire length: 600 mm	LN: Without lead wire	LO: Without connector	MO: Without connector	DO: Without connector

∗ 2 sockets are attached to "LN" and "MN" types.

Light/Surge voltage suppressor

Nil	Without light/surge voltage suppressor
S	With surge voltage suppressor
Z Note)	With light/surge voltage suppressor

Note) "GZ", "HZ" and "DOZ" are not available.

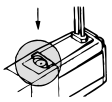
Speed controller specifications

MA	Meter-out
MB∗	Meter-in

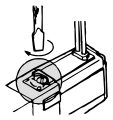
∗ Option

Manual override

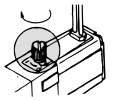
Nil: Non-locking push type



B: Locking type B (Slotted)



C: Locking type C (Manual)



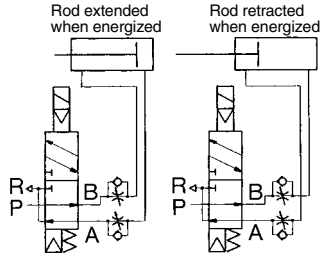
Port thread type

Nil	Rc
N	NPT
F	G

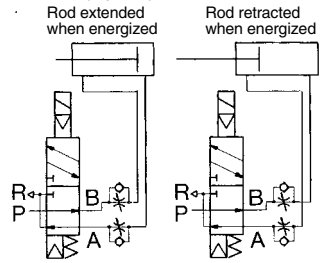
Made to Order
∗ Refer to page 1653 for datails.

JIS Symbol

Meter-out



Meter-in (Option)



Specifications

Bore size (mm)		25, 32, 40, 50, 63
Action		Double acting
Fluid		Air
Bearing type		Slide bearing (MVGQM), Ball bushing bearing (MVGQL)
Operating pressure range (MPa)	**2 position single**	0.15 to 0.7
	2 position double	0.1 to 0.7
Ambient and fluid temperature (°C)		–10 to 50°C (No freezing)
Piston speed (mm/s)		50 to 500 (Refer to the page 1643)
Cushion		Rubber bumper on both ends
Lubrication		Non-lube
Stroke length tolerance (mm)		$^{+1.5}_{0}$

Solenoid Valve Specifications

Model			Series VZ3000/VZ5000
Manual override			Non-locking push type, Locking slotted type, Locking lever type
Pilot exhaust			Pilot valve individual exh. type, Main/Pilot valve common exh. type
Mounting orientation			Universal
Shock/Impact resistance (m/s²) (1)			300/50
Enclosure			Dust proof
Electrical entry			Grommet (G)/(H), L plug connector (L), M plug connector (M), DIN terminal (D)
Coil rated voltage (V)	**AC50/60Hz**		100, 200, 24*, 48*, 110*, 220*
	DC		24, 6*, 12*, 48*
Allowable voltage (%)			–15 to 10% of the rated voltage
Power consumption (W) [Current: mA] (2)		**DC**	1.8 (With indicator light: 2.1) [24 VDC: 75 (With light: 87.5)]
Apparent power (VA) [Current: mA] (2)	**AC**	**Start-up**	4.5 to 50 Hz, 4.2/60 Hz [100 VAC: 45/50 Hz, 42/60 Hz; 200 VAC: 22.5/50 Hz, 21/60 Hz]
		Holding	3.5/50 Hz, 3/60 Hz [100 VAC: 35/50 Hz, 30/60 Hz; 200 VAC: 17.5/50 Hz, 15/60 Hz]
Surge voltage suppressor			DC: Diode, AC: ZNR
Indicator light			DC: LED (Red), AC: Neon bulb

* Option

Note 1) Impact resistance: No malfunction resulted from the impact test using a drop impact tester. The test was performed on the axis and right angle direction of the main valve and armature, one time each in both energized and de-energized states.

Vibration resistance: No malfunction occurred in a one-sweep test between 45 and 2000 Hz. Test was performed at both energized and de-energized states to the axis and right angle direction of the main valve and armature. (Value in the initial stage.)

Note 2) At the rated voltage.

Made to Order Specifications

(For details, refer to pages 1843 and 1847.)

Symbol	Specifications
-XA□	Change of guide rod end shape
-XC79	Tapped hole, drilled hole, pinned hole machined additionally

Standard Stroke

Model	Standard stroke (mm)	Intermediate stroke (mm)
MVGQ$^{M}_{L}$25	20, 30, 40, 50, 75, 100, 125, 150, 175, 200	* As for the intermediate strokes (by the 1 stroke interval) for ø25, ø32 other than the standard strokes at left are manufactured by means of installing a spacer. Ex.) In the case of MVGQM25-21 st, an interface of 9 mm wide (5 mm + 4 mm) is installed inside of the MVGQ20-30 st, and thus the full length dimension of the body is the same as 30 st.
MVGQ$^{M}_{L}$32, 40, 50, 63	25, 50, 75, 100, 125, 150, 175, 200	* As for the intermediate strokes (by the 5 stroke interval) for ø40 to ø63 other than the standard strokes at left are manufactured by means of installing a spacer. Ex.) In the case of MVGQM50-40 st, an interface of 10 mm wide is installed inside of the MVGQ50-50 st, and thus the full length dimension of the body is the same as 50 st.

Applicable Auto Switch/Refer to pages 1719 to 1827 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC		Load voltage AC	Auto switch model Perpendicular	Auto switch model In-line	Lead wire length (m) 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	Pre-wired connector	Applicable load	
Solid state 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 indication)			3-wire (NPN)		5 V, 12 V		**M9NWV**	**M9NW**	●	●	●	○	○	IC circuit	
				3-wire (PNP)				**M9PWV**	**M9PW**	●	●	●	○	○		
				2-wire		12 V		**M9BWV**	**M9BW**	●	●	●	○	○	—	
Reed switch	——	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	**A96V**	**A96**	●	—	●	—	—	IC circuit	—
			No	2-wire	24 V	12 V	100 V	**A93V**	**A93**	●	—	●	—	—	—	Relay, PLC
							100 V or less	**A90V**	**A90**	●	—	●	—	—	IC circuit	

* 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

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

* Since there are other applicable auto switches than listed, refer to page 1665 for details.
* For details about auto switches with pre-wired connector, refer to pages 1784 and 1785.
* Auto switches are shipped together (not assembled).

Mass

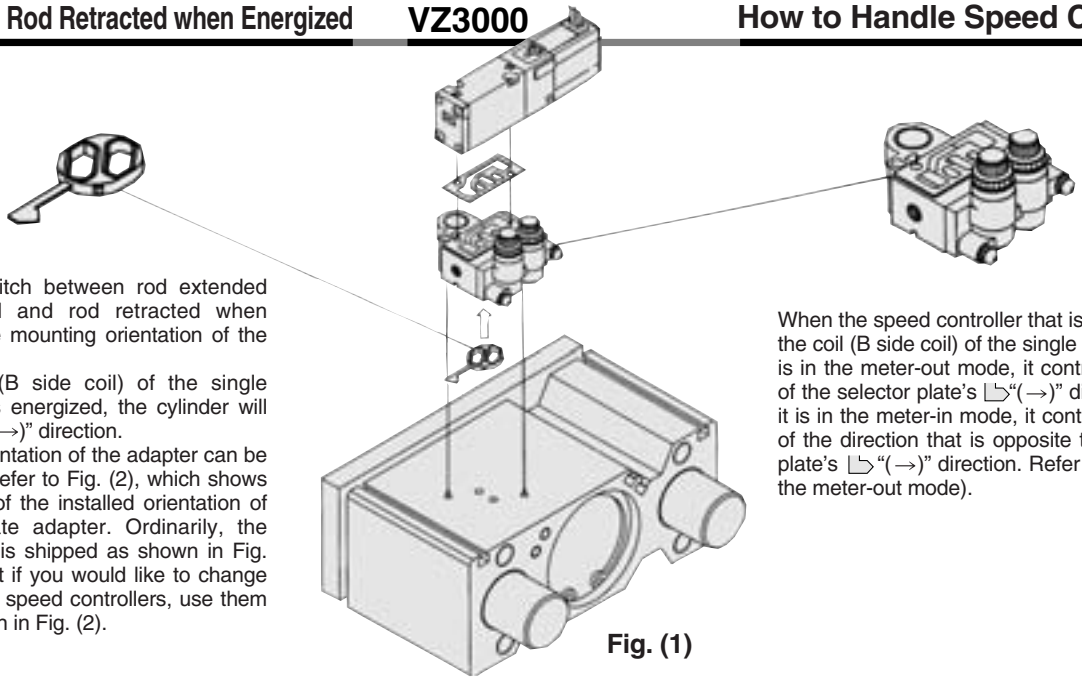
(kg)

Bearing type	Bore size (mm)	Model	Standard stroke (mm)										
			20	25	30	40	50	75	100	125	150	175	200
Slide bearing	25	MVGQM25	0.96	–	1.06	1.17	1.26	1.57	1.81	2.05	2.29	2.53	2.77
	32	MVGQM32	–	1.64	–	–	2.04	2.42	2.82	3.22	3.62	4.02	4.42
Ball bushing bearing	25	MVGQL25	0.97	–	1.06	1.21	1.30	1.50	1.71	1.92	2.13	2.34	2.55
	32	MVGQL32	–	1.45	–	–	1.80	2.22	2.58	2.94	3.30	3.66	4.02

Note) The factors indicated above are of the single solenoid with grommet (G). Add 0.05 kg for the double solenoids.

The allowable lateral load, the allowable rotational torque for a plate, and the operation range of a stopper are the same as those of Series MGQ. For details, refer to pages 337 to 351.

Changing between Rod Extended when Energized and Rod Retracted when Energized — VZ3000 — How to Handle Speed Controller



It is able to switch between rod extended when energized and rod retracted when energized by the mounting orientation of the selector plate.
When the coil (B side coil) of the single solenoid valve is energized, the cylinder will move in the ⊾"(→)" direction.
The installed orientation of the adapter can be changed 180°. Refer to Fig. (2), which shows the relationship of the installed orientation of the selector plate adapter. Ordinarily, the speed controller is shipped as shown in Fig. (2) (a) or (b). But if you would like to change the orientation of speed controllers, use them in (c) or (d) shown in Fig. (2).

When the speed controller that is on the side of the coil (B side coil) of the single solenoid valve is in the meter-out mode, it controls the speed of the selector plate's ⊾"(→)" direction. When it is in the meter-in mode, it controls the speed of the direction that is opposite to the selector plate's ⊾"(→)" direction. Refer to Fig. (3) (for the meter-out mode).

Fig. (1)

Fig. (2)

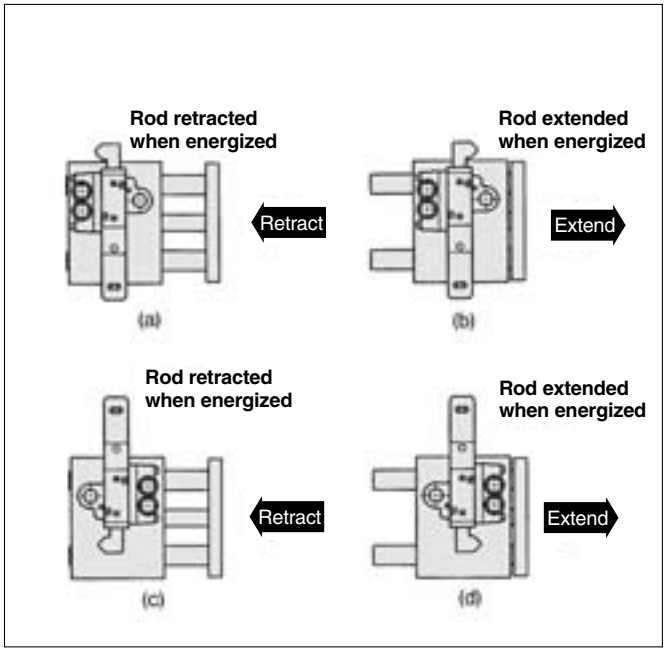
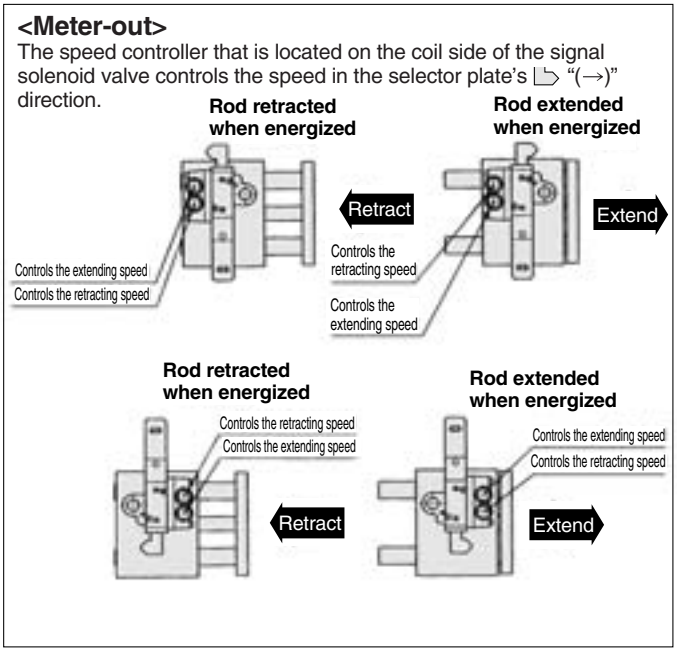


Fig. (3)



Mass

(kg)

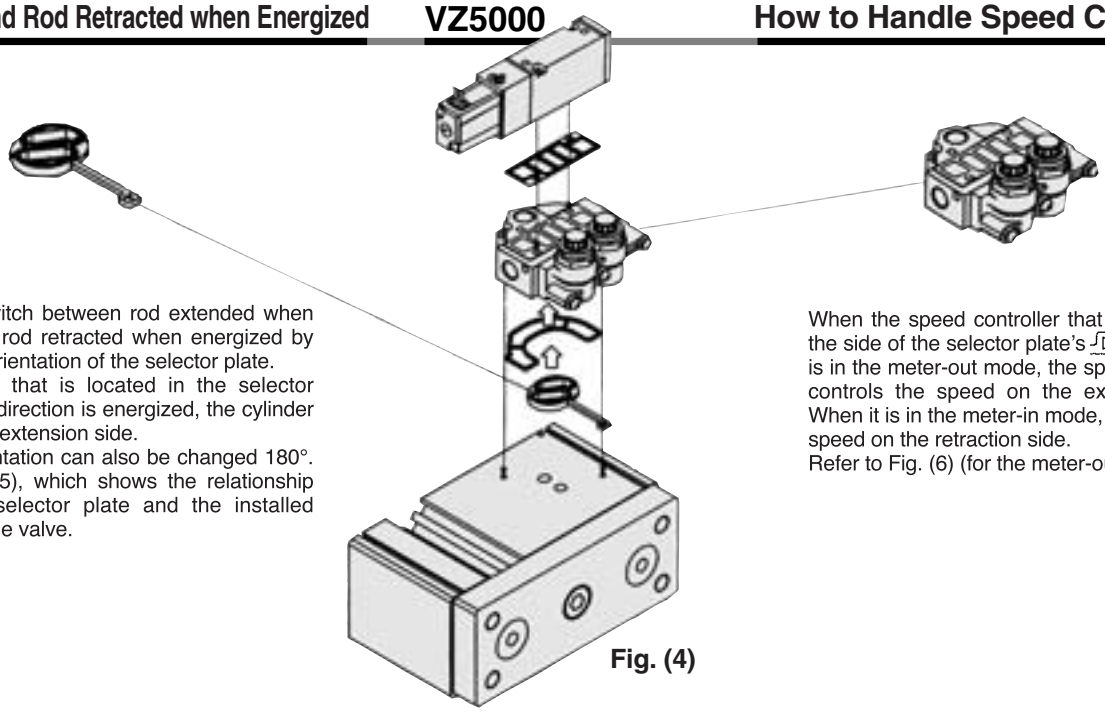
Bearing type	Bore size (mm)	Model	Standard stroke (mm)							
			25	50	75	100	125	150	175	200
Slide bearing	**40**	**MVGQM40**	1.91	2.50	2.72	3.13	3.54	3.95	4.36	4.77
	50	**MVGQM50**	2.80	3.35	3.91	4.47	5.03	5.59	6.15	6.71
	63	**MVGQM63**	3.27	3.89	4.49	5.11	5.73	6.35	6.97	7.59
Ball bushing bearing	**40**	**MVGQL40**	1.72	2.08	2.53	2.89	3.25	3.61	3.97	4.33
	50	**MVGQL50**	2.37	2.85	3.45	3.94	4.43	4.92	5.41	5.90
	63	**MVGQL63**	2.91	3.45	4.11	4.65	5.19	5.73	6.27	6.81

Note) The factors indicated above are of the single solenoid with grommet (G). Add 0.04 kg for the double solenoids.

Changing between Rod Extended when Energized and Rod Retracted when Energized

VZ5000

How to Handle Speed Controller



It is able to switch between rod extended when energized and rod retracted when energized by the mounting orientation of the selector plate.
When the coil that is located in the selector plate's ▷ (↑) direction is energized, the cylinder moves into the extension side.
The valve orientation can also be changed 180°. Refer to Fig. (5), which shows the relationship between the selector plate and the installed orientation of the valve.

When the speed controller that is located on the side of the selector plate's ▷ (↑) direction is in the meter-out mode, the speed controller controls the speed on the extension side. When it is in the meter-in mode, it controls the speed on the retraction side.
Refer to Fig. (6) (for the meter-out mode).

Fig. (4)

Fig. (5)

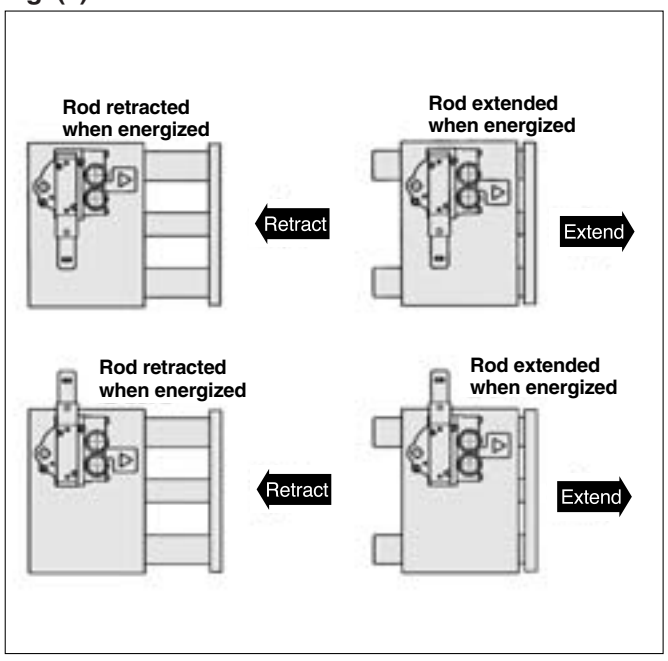
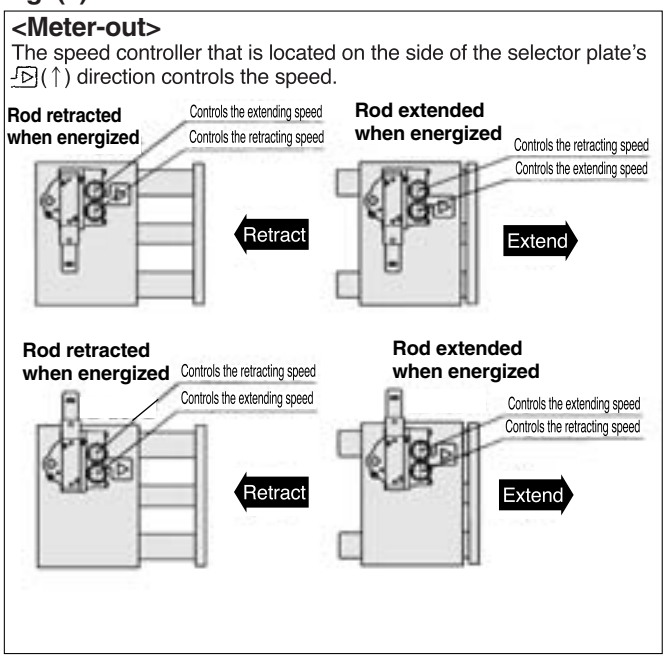
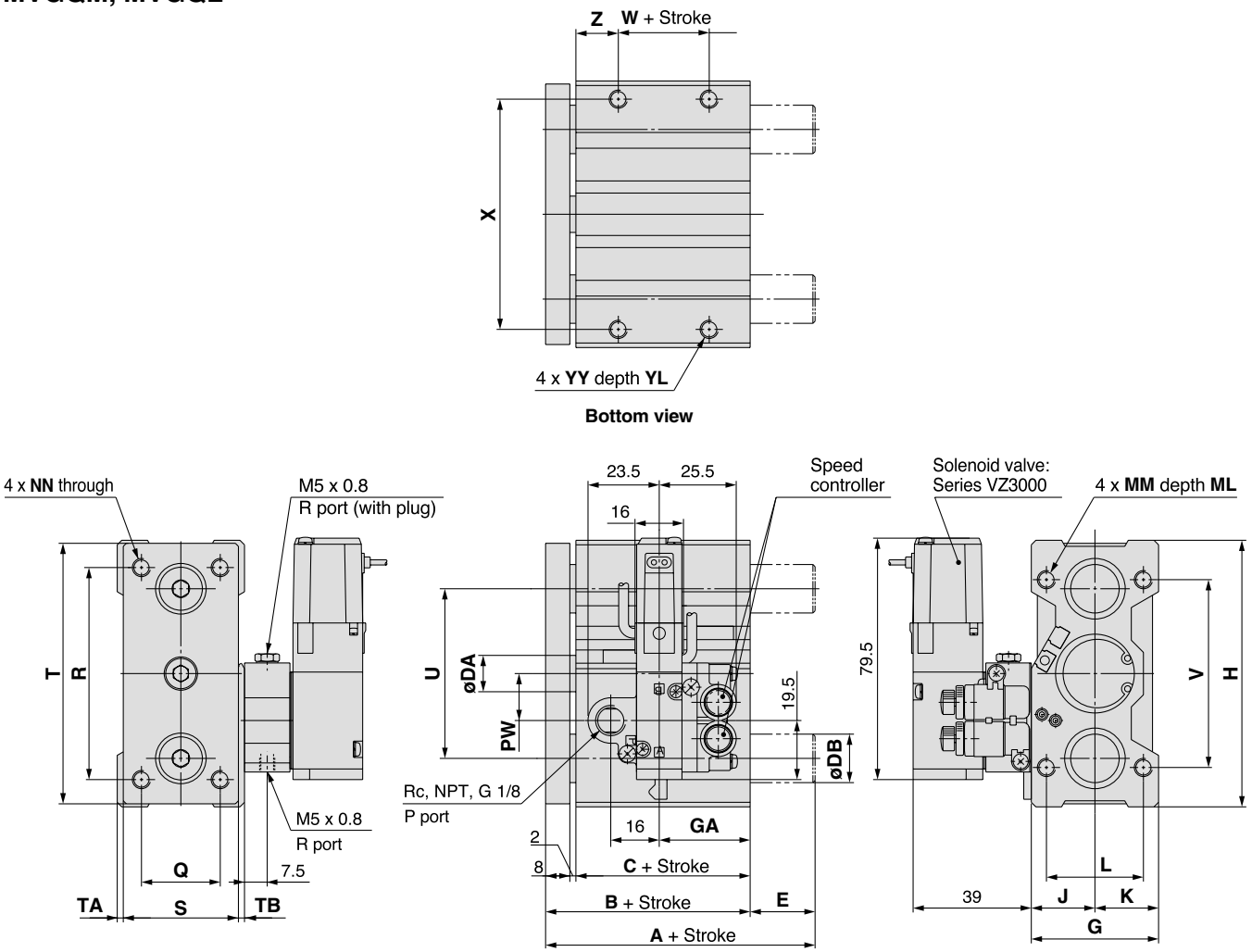


Fig. (6)



ø25, ø32

MVGQM, MVGQL



∗ The figures show when attached to VZ3140-□G .

∗ [ ]: Denotes AC.

MVGQM, MVGQL Common Dimensions

(mm)

Bore size (mm)	Standard stroke (mm)	Applicable solenoid valve	B	C	DA	G	GA		H	J	K	L	MM	ML	NN	PW	Q	R	S	T	TA	TB	U	V	W	X	YY	YL	Z
							20 st	Over 20 st																					
25	20, 30, 40, 50, 75, 100, 125, 150, 175, 200	Series VZ3000	47.5	37.5	12	42	30	35	88	21	21	32	M6 x 1.0	15	M6 x 1.0	15.5	26	70	38	86	2	2	56	62	10	76	M6 x 1.0	9	14
32	25, 50, 75, 100, 125, 150, 175, 200		47.5	37.5	16	51	35		114	25	26	38	M8 x 1.25	20	M8 x 1.25	22	30	96	48	112	2	1	80	80	5	100	M8 x 1.25	11	16

Note 1) It is possible to manufacture the intermediate strokes other than the standard strokes by means of installing a spacer.
Note 2) For the electrical entry except the grommet type, refer to page 1652.

MVGQM (Slide bearing) A, DB, E Dimensions

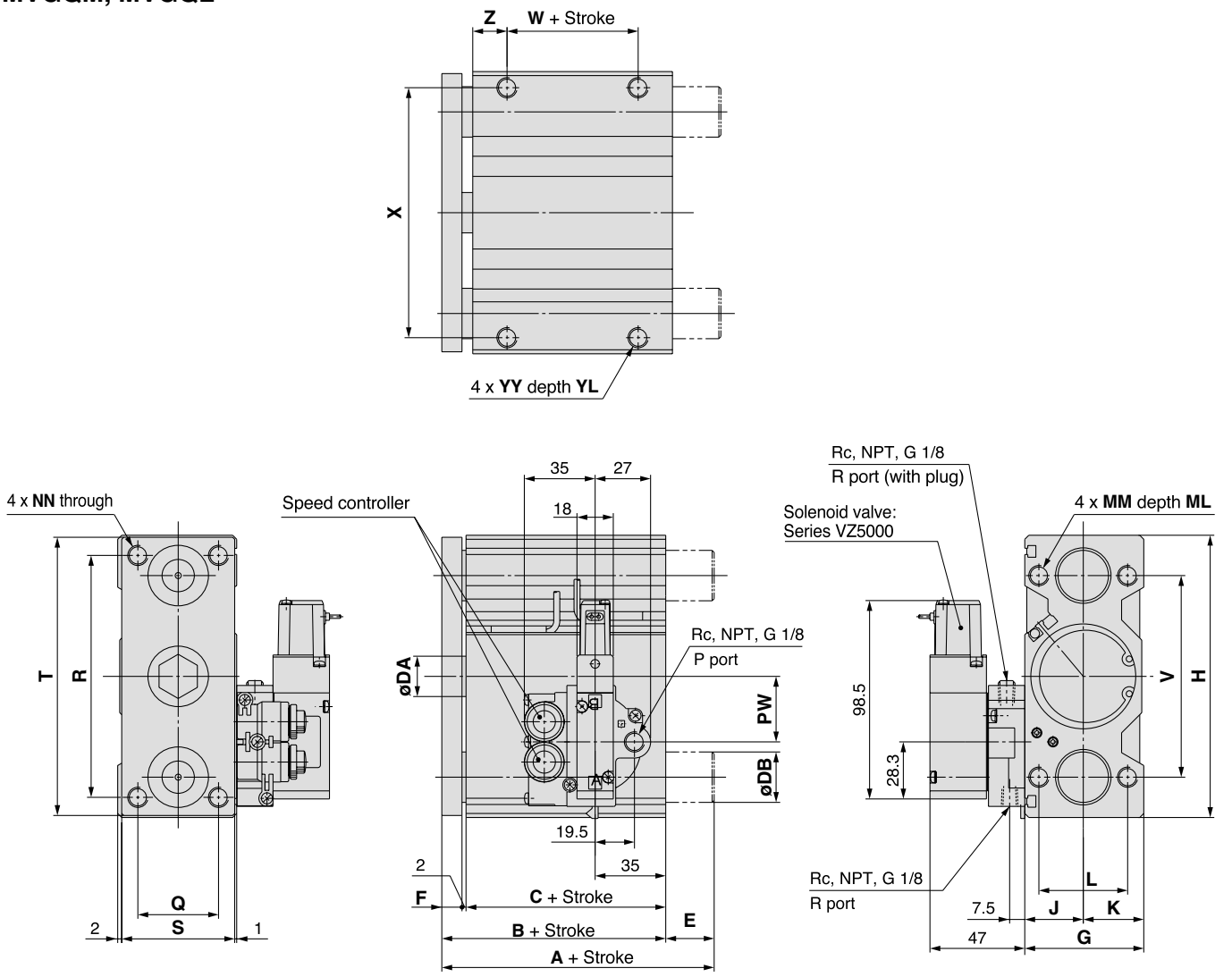
Bore size (mm) \ Symbol / Stroke	A		DB	E	
	Up to 50 st	Over 50 st		Up to 50 st	Over 50 st
25	47.5	62	16	0	14.5
32	71.5		20	24	

MVGQL (Ball bushing bearing) A, DB, E Dimensions

Bore size (mm) \ Symbol / Stroke	A		DB	E	
	Up to 30 st	Over 30 st		Up to 30 st	Over 30 st
25	63.5	79.5	13	16	32
32	Up to 50 st	Over 50 st	16	Up to 50 st	Over 50 st
	53	90		5.5	42.5

ø40, ø50, ø63

MVGQM, MVGQL



∗ The figures show when attached to VZ5140-□G .

MVGQM, MVGQL Common Dimensions

(mm)

Bore size (mm)	Standard stroke (mm)	Applicable solenoid valve	B	C	DA	F	G	H	J	K	L	MM	ML	NN	PW	Q	R	S	T	V	W	X	YY	YL	Z
40	25, 50, 75, 100, 125, 150, 175, 200	Series VZ5000	54	44	16	8	51	124	25	26	38	M8 x 1.25	20	M8 x 1.25	27	30	106	48	122	90	10	110	M8 x 1.25	11	17
50			56	44	20	10	59	140	29	30	44	M10 x 1.5	25	M10 x 1.5	32.5	40	120	56	138	100	10	124	M10 x 1.5	12.5	17
63			61	49	20	10	72	150	35.5	36.5	44	M10 x 1.5	25	M10 x 1.5	29.8	50	130	69	148	110	10	132	M10 x 1.5	15	19

Note 1) It is possible to manufacture the intermediate strokes other than the standard strokes by means of installing a spacer.
Note 2) For the electrical entry except the grommet type, refer to page 1652.

MVGQM (Slide bearing) A, DB, E Dimensions

Bore size (mm) \ Symbol	A	DB	E
40	71.5	20	17.5
50	81	25	25
63	81	25	20

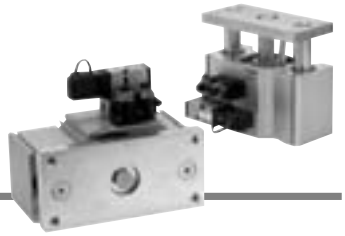
MVGQL (Ball bushing bearing) A, DB, E Dimensions

Bore size (mm) \ Symbol / Stroke	A		DB	E	
	Up to 50 st	Over 50 st		Up to 50 st	Over 50 st
40	54	90	16	0	36
50	60	102	20	4	46
63	61	102	20	0	41

Valve Mounted Guide Cylinder

Series MVGQ

ø80, ø100



How to Order

How to Order

When ordering valve mounted guide cylinder, Series MVGQ, specify the models of both the cylinder and the valve.

Ex.) MVGQM80-50-M9BWM-B ····· 1
VF3140-5LZ-MA ····· 1

Auto switch

Nil	Without auto switch (Built-in magnet)

* For the applicable auto switch model, refer to page 1659.

Cylinder stroke (mm)
Refer to page 1659 for standard strokes.

Number of auto switches

Nil	2 pcs.
S	1 pc.
n	n pcs.

Bore size

80	80 mm
100	100 mm

Rod extended/retracted Note)
when energized

Nil	Rod extended when energized
B	Rod retracted when energized

Note) Based on the case of 2 position single solenoid valve.

Bearing

M	Slide bearing
L	Ball bushing bearing

Cylinder MVGQ **M** **80** – **50** – **M9BW** □ – □ – □

Valve VF3 **1** 4 **0** – **5** **L** **Z** □ – **MA** □ – □

Made to Order
* Refer to page 1659 for datails.

Type of actuation

1	2 position single solenoid
2	2 position double solenoid

* Please consult with SMC for 3 position type.

Speed controller specifications

MA	Meter-out
MB *	Meter-in

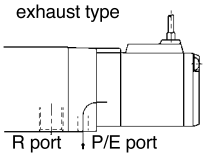
* Option

Port thread type

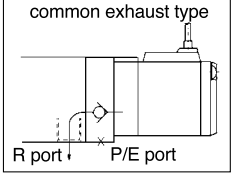
Nil	Rc
N	NPT
F	G

Body option

0: Pilot valve individual exhaust type



3: Main/Pilot valve * common exhaust type



* Option

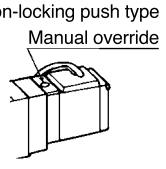
Rated voltage

1	100 VAC, 50/60 Hz
2	200 VAC, 50/60 Hz
3*	110 to 120 VAC, 50/60 Hz
4*	220 VAC, 50/60 Hz
5	24 VDC
6*	12 VDC
7*	240 VAC, 50/60 Hz
9*	Other

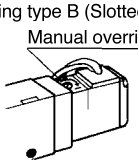
Maximum rated voltage for L/M type plug connectors is 220 VAC.
* Option

Manual override

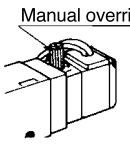
Nil: Non-locking push type



B: Locking type B (Slotted)



C: Locking type C (Manual)



Light/Surge voltage suppressor

Nil	Without light/surge voltage suppressor
S (1)	With surge voltage suppressor
Z (2)	With light/surge voltage suppressor

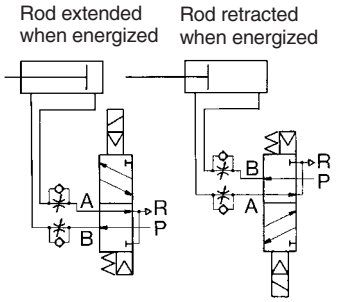
Note 1) Applicable to the grommet type only.
Note 2) "GZ", "HZ" are not available.

Electrical entry

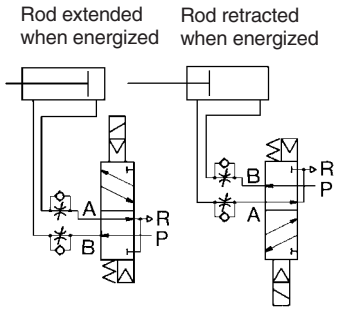
G	Grommet (Lead wire length: 300 mm)	**L**	L plug connector	With lead wire
H	Grommet (Lead wire length: 600 mm)	**LO**		Without connector
E	Grommet terminal	**M**	M plug connector	With lead wire
T	Conduit terminal	**MO**		Without connector
		D	DIN termminal	With connector
		DO		Without connector

JIS Symbol

Meter-out



Meter-in (Option)



Specifications

Bore size (mm)		80, 100
Action		Double acting
Fluid		Air
Bearing type		Slide bearing (MVGQM), Ball bushing bearing (MVGQL)
Operating pressure range (MPa)	**2 position single**	0.15 to 0.9
	2 position double	0.1 to 0.9
Ambient and fluid temperature (°C)		–10 to 50°C (No freezing)
Piston speed (mm/s)		50 to 350 (Refer to the page 1643)
Cushion		Rubber bumper on both ends
Lubrication		Non-lube
Stroke length tolerance (mm)		$^{+1.5}_{0}$

Solenoid Valve Specifications

Model			Series VF3000
Manual override			Non-locking push type, Locking B type*, Locking C type*
Pilot exhaust			Pilot valve individual exh. type, Main/Pilot valve common exh. type
Mounting orientation			Universal
Shock/Impact resistance (m/s²) (1)			300/50
Enclosure			Dustproof
Electrical entry			Grommet, Grommet terminal, Conduit terminal, DIN terminal, L plug connector, M plug connector
Coil rated voltage (V)	**AC50/60 Hz**		100, 200, 12*, 24*, 48*, 110*, 220*, 240*
	DC		24, 6*, 12*, 48*, 100*, 110*
Allowable voltage			–15% to 10% of the rated voltage
Apparent power (2)	**AC**	**Inrush**	5.6 VA (50 Hz), 5.0 VA (60 Hz)
		Holding	3.4 VA (50 Hz), 2.3 VA (60 Hz)
Power consumption (W) (2)	**DC**		1.8, 2 (With indicator light)
Light/Surge voltage suppressor	**AC**		ZNR (Varistor), Neon bulb (LED for less than 100 V)
	DC		ZNR (Varistor), LED (Neon bulb for 100 V or more)

Note 1) Impact resistance: No malfunction resulted from the impact test using a drop impact tester. The test was performed on the axis and right angle direction of the main valve and armature, one time each in both energized and de-energized states.

Vibration resistance: No malfunction occurred in a one-sweep test between 45 and 2000 Hz. Test was performed at both energized and de-energized states to the axis and right angle direction of the main valve and armature. (Value in the initial stage.)

Note 2) At the rated voltage.

* Option

Made to Order Specifications

(For details, refer to pages 1843 and 1847.)

Symbol	Specifications
-XA□	Change of guide rod end shape
-XC79	Tapped hole, drilled hole, pinned hole machined additionally

Standard Stroke

Model	Standard stroke (mm)	Intermediate stroke (mm)
MVGQ$^{M}_{L}$ 80/100	25, 50, 75, 100 125, 150, 175, 200	As for the intermediate strokes (by the 5 stroke interval) other than the standard strokes at left are manufactured by means of installing a spacer with the width of 5, 10, 15, 20 mm. Ex.) In the case of MVGQM80-40 st, an interface of 10 mm wide is installed inside of the MVGQM80-50 st, and thus the full length dimension of the body is the same as 50 st.

Applicable Auto Switch/Refer to pages 1719 to 1827 for further information on auto switches.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage DC		Load voltage AC	Auto switch model Perpendicular	Auto switch model In-line	Lead wire length (m) 0.5 (Nil)	1 (M)	3 (L)	5 (Z)	Pre-wired connector	Applicable load	
Solid state 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 indication)			3-wire (NPN)		5 V, 12 V		**M9NWV**	**M9NW**	●	●	●	○	○	IC circuit	
				3-wire (PNP)				**M9PWV**	**M9PW**	●	●	●	○	○		
				2-wire		12 V		**M9BWV**	**M9BW**	●	●	●	○	○	—	
Reed switch	——	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	**A96V**	**A96**	●	—	●	—	—	IC circuit	—
			No	2-wire	24 V	12 V	100 V	**A93V**	**A93**	●	—	●	—	—	—	Relay, PLC
							100 V or less	**A90V**	**A90**	●	—	●	—	—	IC circuit	

* 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

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

* Since there are other applicable auto switches than listed, refer to page 1665 for details.
* For details about auto switches with pre-wired connector, refer to pages 1784 and 1785.
* Auto switches are shipped together (not assembled).

Mass

(kg)

Bearing type	Bore size (mm)	Model	Standard stroke (mm)							
			25	50	75	100	125	150	175	200
Slide bearing	80	MVGQM80	6.15	7.08	7.98	8.90	9.82	10.73	11.66	12.58
	100	MVGQM100	9.45	10.76	12.06	13.39	14.72	16.05	17.38	18.71
Ball bushing bearing	80	MVGQL80	5.98	6.87	8.44	9.28	10.12	10.96	11.80	12.64
	100	MVGQL100	8.83	10.02	12.27	13.45	14.63	15.81	16.99	18.17

Note) The factors indicated above are of the single solenoid with grommet (G). Add 0.08 kg for the double solenoids.

The allowable lateral load, the allowable rotational torque for a plate, and the operation range of a stopper are the same as those of Series MGQ. For details, refer to pages 337 to 351.

Changing between Rod Extended when Energized and Rod Retracted when Energized

It is able to switch between rod extended when energized and rod retracted when energized by the mounting orientation of the valve. Refer to Fig. (2).

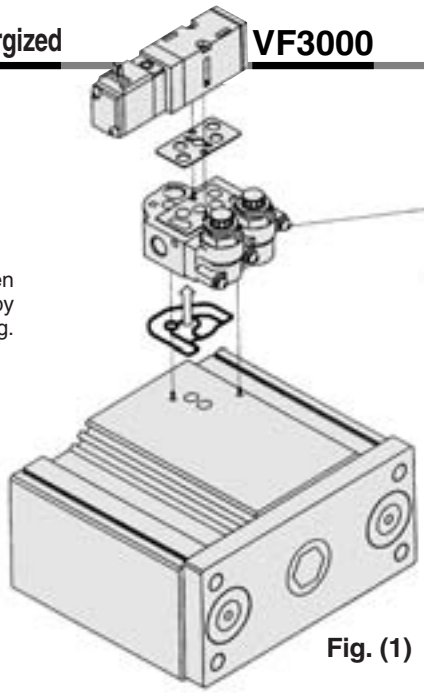


Fig. (1)

VF3000 How to Handle Speed Controller

Coil (coil in A side) of the single solenoid valve and the speed controller in the opposite side at the rod extended when energized control the extending speed at meter-out and the retracting speed at meter-in. Refer to Fig. (3).

Fig. (2)

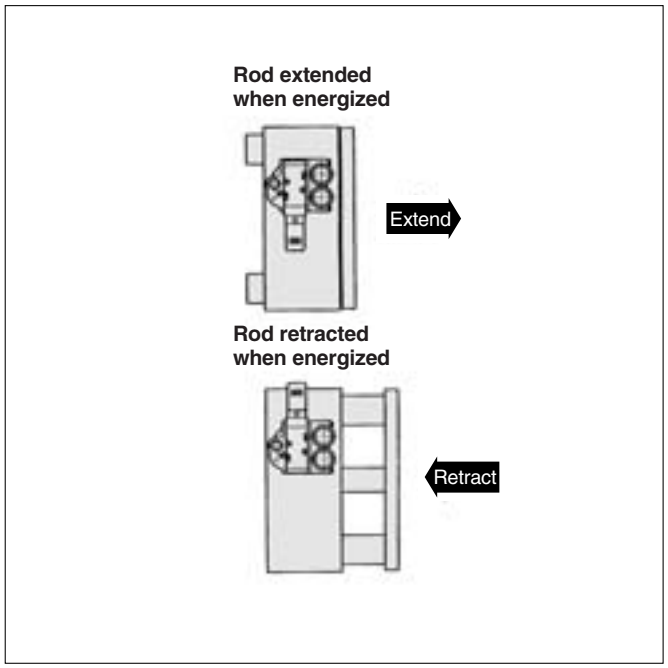
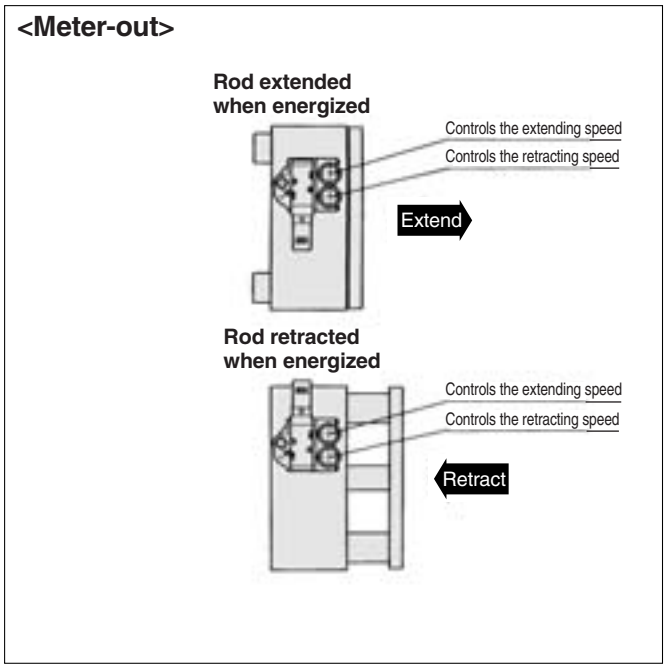
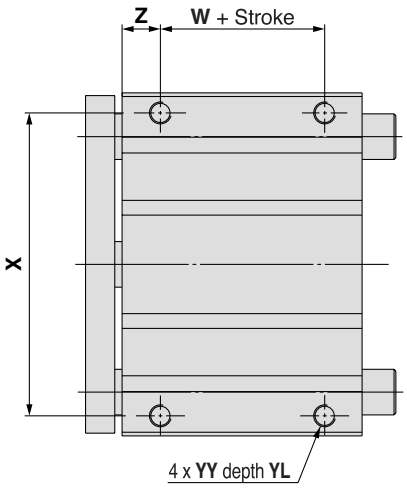


Fig. (3)

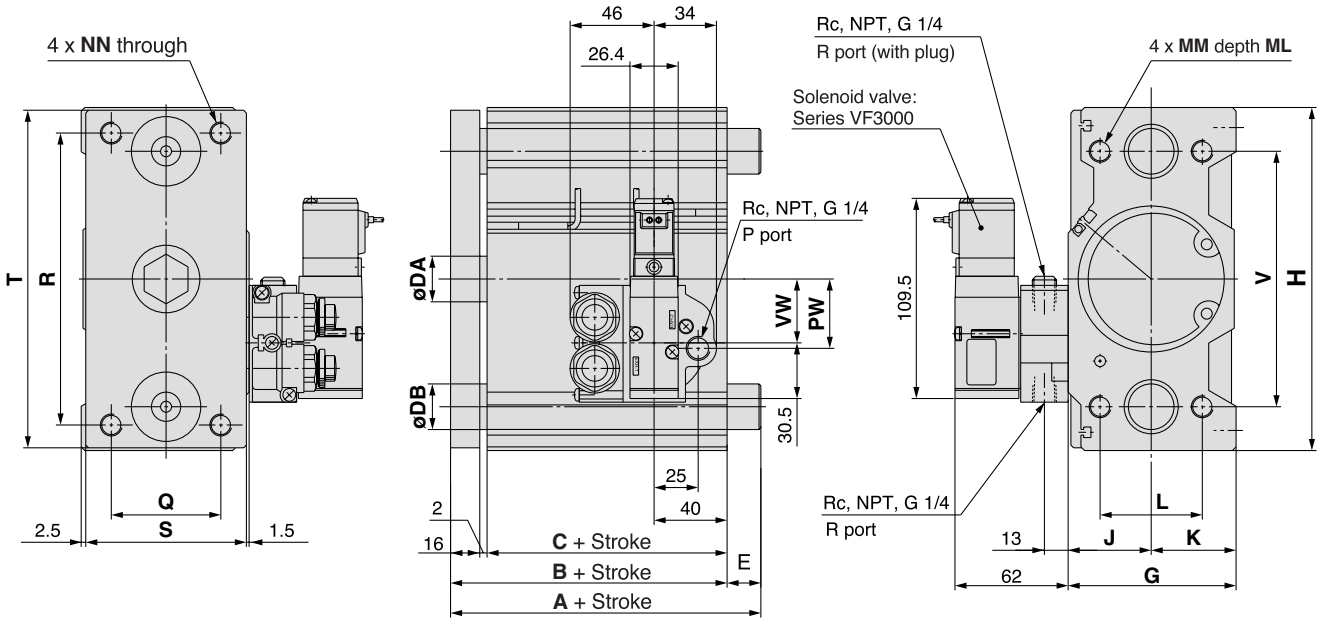


ø80, ø100

MVGQM, MVGQL



Bottom view



∗ The figures show when attached to VF3140-□G .

MVGQM, MVGQL Common Dimensions

(mm)

Bore size (mm)	Standard stroke (mm)	Applicable solenoid valve	B	C	DA	G	GA	H	J	K	L	MM	ML	NN	VW	PW	Q	R	S	T	V	W	X	YY	YL	Z
80	25, 50, 75, 100, 125, 150, 175, 200	Series VF3000	74.5	56.5	25	92	40	188	45.5	46.5	56	M12X1.75	30	M12 x 1.75	35	38	60	160	88	185	140	15	166	M12 x 1.75	18	21
100			84	66	30	112	40	224	55.5	56.5	62	M14X2	35	M14 x 2	41	44	80	190	108	221	170	15	200	M14 x 2	21	25

Note 1) It is possible to manufacture the intermediate strokes other than the standard strokes by means of installing a spacer.
Note 2) For the electrical entry except the grommet type, refer to page 1658.

MVGQM (Slide bearing) A, DB, E Dimensions

Bore size (mm) \ Symbol	A	DB	E
80	93	28	18.5
100	105	36	21

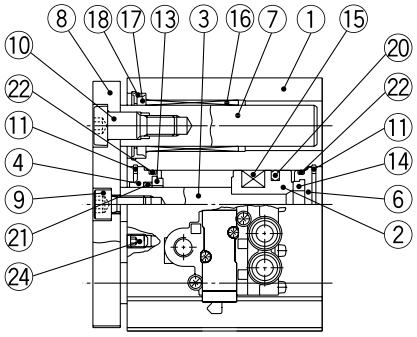
MVGQL (Ball bushing bearing) A, DB, E Dimensions

Bore size (mm) \ Symbol / Stroke	A		DB	E	
	Up to 50 st	Over 50 st		Up to 50 st	Over 50 st
80	84	143	25	9.5	68.5
100	89	153	30	5	69

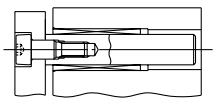
Construction

Series MVGQM

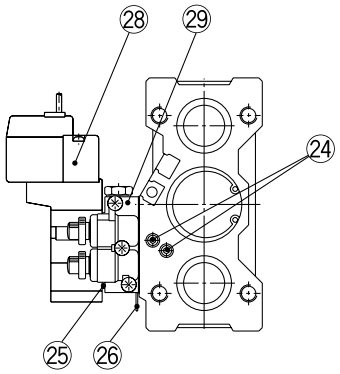
MVGQM12 to 25

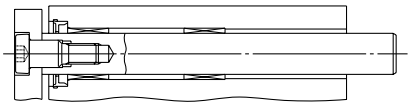


50 stroke or less



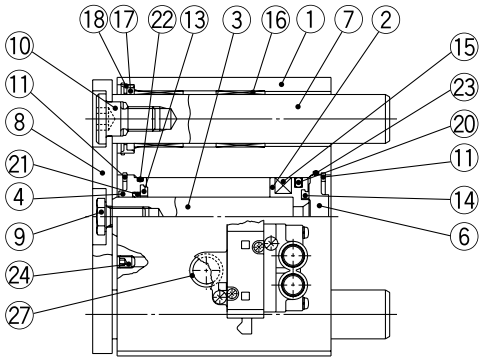
ø12, ø16

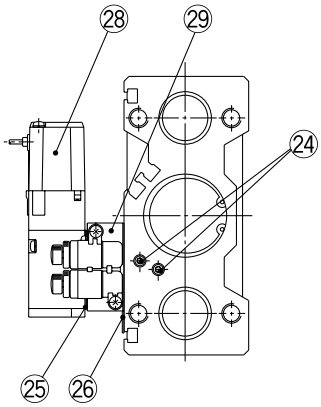


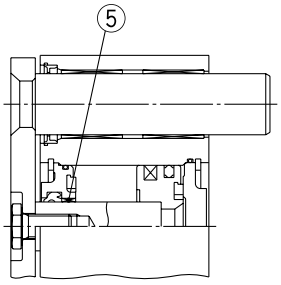


ø20, ø25 Over 50 stroke

MVGQM32 to 100







ø50 or more

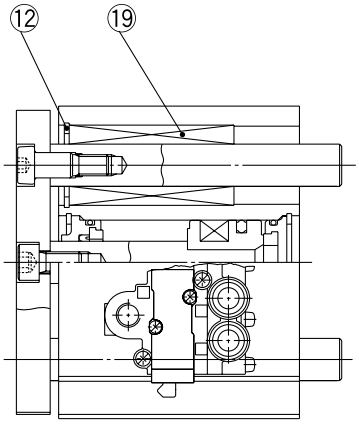
Component Parts

No.	Description	Material	Note	
1	**Body**	Aluminum alloy	Hard anodized	
2	**Piston**	Aluminum alloy	Chromated	
3	**Piston rod**	Stainless steel	ø12 to ø25	
		Carbon steel	ø32 to ø100	Hard chrome plated
4	**Collar**	Aluminum alloy	ø12 to ø40	White anodized
		Aluminum alloy casted	ø50 to ø100	Painted
5	**Bushing**	Special friction material	ø50 to ø100	
6	**Head cover**	Aluminum alloy	ø12 to ø63	Chromated
			ø80 to ø100	Painted
7	**Guide rod**	Carbon steel	Hard chrome plated	
8	**Plate**	Carbon steel	Nickel plated	
9	**Plate mounting bolt**	Carbon steel	Nickel plated	
10	**Guide bolt**	Carbon steel	Nickel plated	
11	**Retaining ring**	Carbon tool steel	Phosphate coated	
12	**Retaining ring**	Carbon tool steel	Phosphate coated	

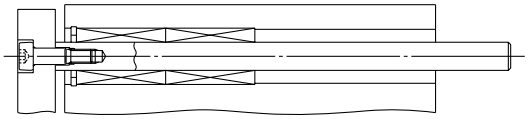
No.	Description	Material	Note
13	**Bumper A**	Urethane	
14	**Bumper B**	Urethane	
15	**Magnet**	–	
16	**Slide Bearing**	Special friction material	
17	**Felt**	Felt	
18	**Holder**	Resin	
19	**Ball bushing**		
20	**Piston seal**	NBR	
21	**Rod seal**	NBR	
22	**Gasket A**	NBR	
23	**Gasket B**	NBR	
24	Hexagon socket head cap screw	Carbon steel	Nickel plated
25	**Manifold gasket**		
26	**Selector plate**		ø12 to ø63 only
27	**Adapter gasket**		ø25 to ø100 only
28	**Solenoid valve**		
29	**Adapter assembly**		

Series MVGQL

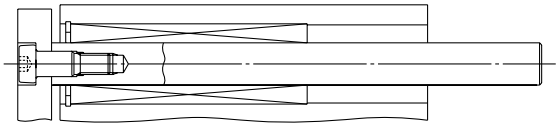
MVGQL12 to 25



30 stroke or less

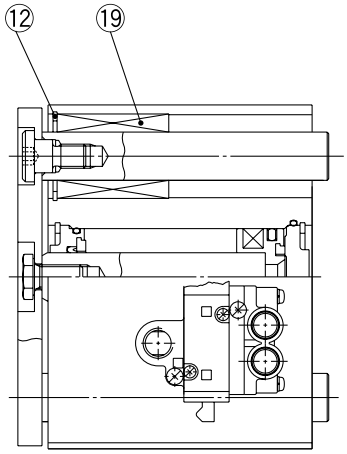


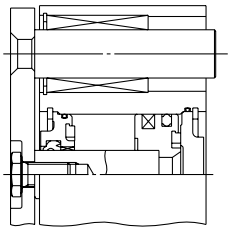
ø12, ø16: Over 30 stroke



ø20, ø25: Over 30 stroke

MVGQL32 to 100





50 stroke or more

Replacement Parts

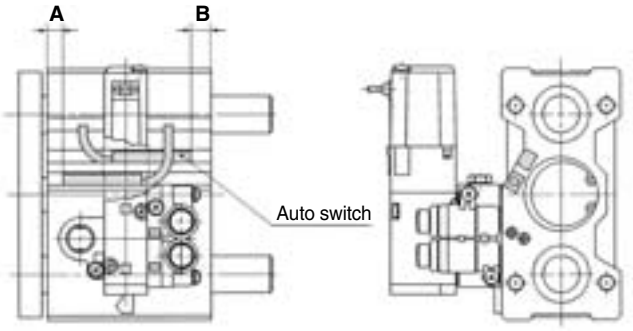
No.	Description	Kit no.									
		ø12	**ø16**	**ø20**	**ø25**	**ø32**	**ø40**	**ø50**	**ø63**	**ø80**	**ø100**
19 to **20**	**Seal kit**	MGQ12-PS	MGQ16-PS	MGQ20-PS	MGQ25-PS	MGQ32-PS	MGQ40-PS	MGQ50-PS	MGQ63-PS	MGQ80-PS	MGQ100-PS
25 to **29**	Solenoid valve with adapter assembly	SYJ3□3-□□□□-M$^{A}_{B}$			VZ3□4□-□□□□-M$^{A}_{B}$□		VZ5□4□-□□□□-M$^{A}_{B}$□			VF3□4□-□□□□-M$^{A}_{B}$□	

Note 1) Seal kit includes ⑲ to ㉒. Order the seal kit, based on each bore size.
Note 2) For the specifying way of ordering numbers for the solenoid valve with adapter assembly, refer to pages 1648, 1652 and 1658.
∗ Since the seal kit does not include a grease pack, order it separately.
Grease pack part no.: GR-S-010 (10 g)

Port thread type

Nil	Rc
N	NPT
F	G

Auto Switch Proper Mounting Position (Detection at Stroke End)



Auto Switch Proper Mounting Position

(mm)

Auto switch model / Bore size	D-M9□ D-M9□V D-M9□W D-M9□WV		D-A9□ D-A9□V		D-Z7□/Z80 D-Y59□/Y7P D-Y69□/Y7PV D-Y7□W D-Y7□WV	
	A	B	A	B	A	B
12	6	8	2	4	1	3
16	9	9	5	5	4	4
20	9.5	12.5	5.5	8.5	4.5	7.5
25	9.5	13	5.5	9	4.5	8
32	10.5	12	6.5	8	5.5	7
40	14.5	14.5	10.5	10.5	9.5	9.5
50	12.5	16.5	8.5	12.5	7.5	11.5
63	15	19	11	15	10	14
80	18	23.5	14	19.5	13	18.5
100	22.5	28.5	18.5	24.5	17.5	23.5

Note) Adjust the auto switch after confirming the operating conditions in the actual setting.

Minimum Stroke for Auto Switch Mounting

(mm)

Auto switch model	No. of auto switches mounted	ø12	ø16	ø20	ø25	ø32	ø40	ø50	ø63	ø80	ø100
D-A9□	1 pc.	10		5							
	2 pcs.	15		10							
D-A9□V D-M9□V	1 pc.	5									
	2 pcs.	10									
D-M9□	1 pc.	15	10			5					
	2 pcs.	15	10								
D-M9□W	1 pc.	15	10								
	2 pcs.	15	10								
D-M9□WV	1 pc.	10									
	2 pcs.	10									
D-Z7□ D-Z80	1 pc.	10				5					
	2 pcs.	15		10							
D-Y59□ D-Y7P	1 pc.	10				5					
	2 pcs.	15		10							
D-Y69□ D-Y7PV	1 pc.	5									
	2 pcs.	5									
D-Y7□W D-Y7□WV	1 pc.	10									
	2 pcs.	15									

Operating Range

(mm)

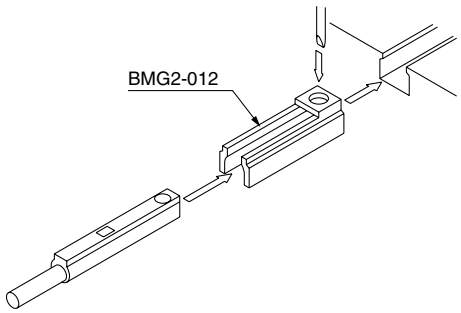
Auto switch model	Bore size									
	12	16	20	25	32	40	50	63	80	100
D-A9□/A9□V	7	9.5	9	9	9	9	9	10.5	10	10.5
D-M9□/M9□V D-M9□W/M9□WV	4	5.5	5	5	5.5	5	5.5	5.5	6.5	7
D-Z7□/Z8□	7.5	8.5	9.5	9.5	11	11	11	13	13	14
D-Y59□/Y69□ D-Y7P/Y7PV D-Y7□W/Y7□WV	5	6	6	6.5	8.5	8.5	9	10	10	11.5

* Since this is a guideline including hysteresis, not meant to be guaranteed. (Assuming approximately ±30% dispersion)
There may be the case it will vary substantially depending on an ambient environment.

Auto Switch Mounting Bracket: Part No.

Auto switch model	Bore size (mm)
	ø12 to ø100
D-A9□/A9□V **D-M9□/M9□V** **D-M9□W/M9□WV**	BMG2-012

• D-A9□(V), M9□(V), M9□W(V)



Other than the models listed in "How to Order", the following auto switches are applicable.
For detailed specifications, refer to pages 1719 to 1827.

Auto switch type	Model	Electrical entry (Fetching direction)	Features
Reed	D-Z73, Z76	Grommet (In-line)	—
	D-Z80		Without indicator light
Solid state	D-Y69A, Y69B, Y7PV	Grommet (Perpendicular)	—
	D-Y7NWV, Y7PWV, Y7BWV		Diagnostic indication (2-color)
	D-Y59A, Y59B, Y7P	Grommet (In-line)	—
	D-Y7NW, Y7PW, Y7BW		Diagnostic indication (2-color)

∗ For solid state auto switches, auto switches with a pre-wired connector are also available. Refer to pages 1784 and 1785 for details.
∗ Normally closed (NC = b contact), solid state auto switch (D-F9G/F9H/Y7G/Y7H type) are also available. For details, refer to pages 1746 and 1748.