

Compact Cylinder with Solenoid Valve/Guide Rod Type

CVQM Series

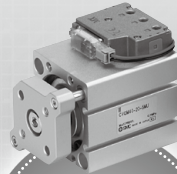
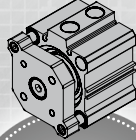
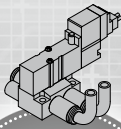
ø32, ø40, ø50, ø63

Labor, energy and space are saved by integrated structure.



Solenoid valve

Compact cylinder/Guide rod type



Labor saving

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

Energy saving

- Approx. 50% reduction in air consumption between cylinder and valve

Space saving

- Small mounting space with valve integrated structure

Non-rotating accuracy

±0.1° or less



Lateral load resisting 2 to 3 times

* Compared to the CDQ2 series

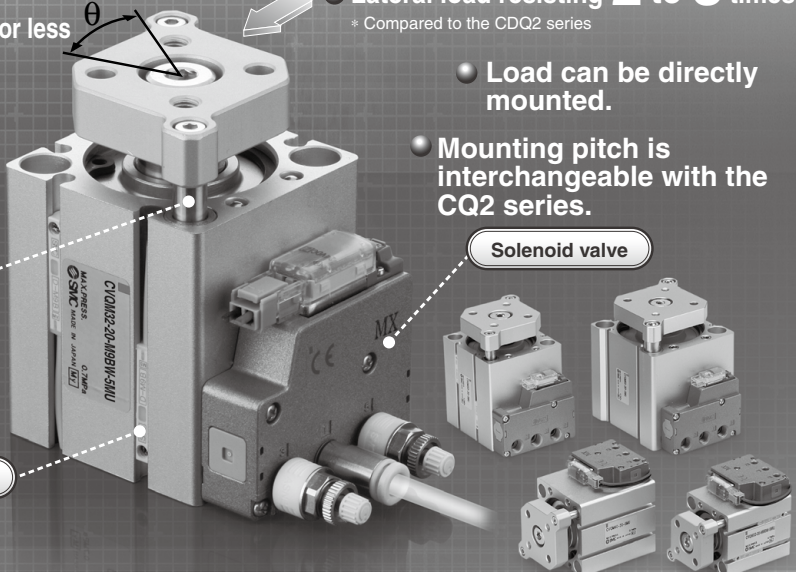
Load can be directly mounted.

Mounting pitch is interchangeable with the CQ2 series.

Guide rod

Solenoid valve

Auto switch



Variations

Bore size (mm)	Standard stroke (mm)											
	5	10	15	20	25	30	35	40	45	50	75	100
32	●	●	●	●	●	●	●	●	●	●	●	●
40	●	●	●	●	●	●	●	●	●	●	●	●
50	●	●	●	●	●	●	●	●	●	●	●	●
63	●	●	●	●	●	●	●	●	●	●	●	●

CVQ

CVQM

CVJ

CVM

CV3

CVS1

MVGQ

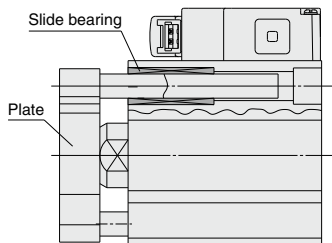
D-

-X

CVQM Series

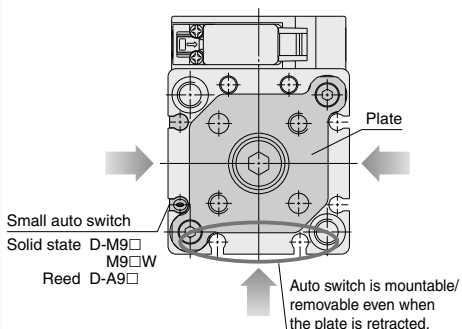
Guide rod configuration with improved lateral load resistance and non-rotating accuracy

- Allowable lateral load of the plate is 2 to 3 times better than the CDQ2 series.
- Plate non-rotating accuracy $\pm 0.1^\circ$

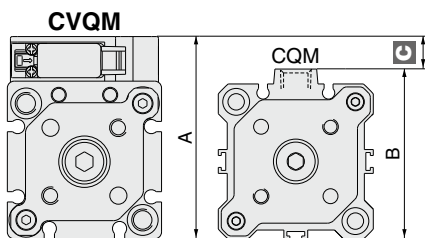


Small 2-color indicator solid state auto switch can be mounted.

- A round slot for mounting small auto switches is provided on 3 surfaces.



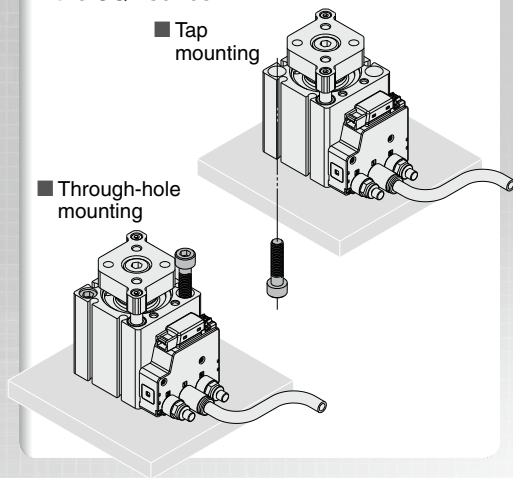
Height comparison
(Dimensional difference: C)



Bore size	A	B	C (mm)
32	59	49.5	9.5
40	67	57	10
50	83	71	12
63	97	84	13

Mounting example

- Two ways of mounting are possible.
- Mounting pitch is interchangeable with the CQ2 series.



Compact Cylinder with Solenoid Valve/ Guide Rod Type

CVQM Series

ø32, ø40, ø50, ø63



How to Order

CVQM **32** - **30** - **M9BW** - **5** **M** - - - - -

Bore size

32	32 mm
40	40 mm
50	50 mm
63	63 mm

Cylinder stroke (mm)

Refer to page 742 for "Standard Stroke" and "Intermediate Stroke".

Auto switch

Nil	Without auto switch (Built-in magnet)
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* For applicable auto switch models, refer to the below table.

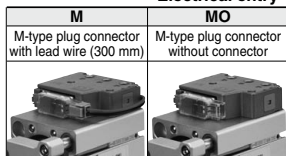
Number of auto switches

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

Rated voltage

5	24 VDC
6	12 VDC

Electrical entry



* For lead wire lengths other than 300 mm, refer to the plug connector lead wire. (Page 745)

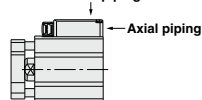
Port thread type

Nil	M5 x 0.8	ø32 ø40
	Rc	
F	G	ø50 ø63
N	NPT	

Piping

Nil	Standard
P	Axial

Standard piping



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)
U	With light/surge voltage suppressor (Non-polar)

Applicable Auto Switches/Refer to pages 941 to 1067 for detailed auto switch specifications.

Type	Special function	Electrical entry	Indicator light	Wiring (Output)	Load voltage		Auto switch model		Lead wire length (m) ^{*)}				Pre-wired connector	Applicable load			
					DC	AC	Perpendicular	In-line	0.5 (Nil)	1 (M)	3 (L)	5 (Z)					
Solid state auto switch	—	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	M9NV	M9N	●	●	●	○	○	IC circuit		
				3-wire (PNP)				M9PV	M9P	●	●	●	○	○			
				2-wire				M9BV	M9B	●	●	●	○	○		—	
				3-wire (NPN)				M9NWV	M9NW	●	●	●	○	○		IC circuit	
	3-wire (PNP)			M9PWV	M9PW	●	●	●	○	○							
	Water resistant (2-color indicator)			2-wire	3-wire (NPN)	5 V, 12 V	—	M9BWW	M9BW	●	●	●	○	○	○	—	
					3-wire (NPN)			M9NAV ^{*1}	M9NA ^{*1}	○	○	●	○	○	IC circuit		
					3-wire (PNP)			M9PAV ^{*1}	M9PA ^{*1}	○	○	●	○	○			
2-wire		M9BAV ^{*1}	M9BA ^{*1}		○			○	●	○	○	—					
Reed auto switch	—	Grommet	Yes	3-wire (NPN equivalent)	24 V	5 V	—	A96V	A96	●	—	●	—	—	IC circuit		
				2-wire				12 V	100 V	A93V ^{*2}	A93	●	●	●	●	—	Relay, PLC
								5 V, 12 V	100 V or less	A90V	A90	●	—	●	—	—	

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

Consult with SMC regarding water resistant types with the above model numbers.

*2 1 m type lead wire is only applicable to D-A93.

* Lead wire length symbols: 0.5 m Nil (Example) M9NV M9NW
 1 m M M9NV M9NWW
 3 m L M9NL M9NWL
 5 m Z M9NZ M9NZW

* Solid state auto switches marked with "○" are produced upon receipt of order.
 * For details about auto switches with pre-wired connector, refer to pages 1014 and 1015.
 * Auto switches are shipped together, (but not assembled).



CVQ

CVQM

CVJ

CVM

CV3

CVS1

MVGQ

D-□

X-□

CVQM Series

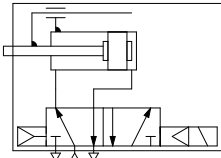


Caution

1. Do not separate the cylinder from the valve.
2. Do not disassemble or modify the guide rod.
3. This product should not be used as a stopper.

Symbol

Rubber bumper



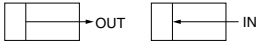
Standard Stroke

Bore size	Standard stroke (mm)
32 ^{*1}	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
50 ^{*2}	10, 15, 20, 25, 30, 35
	40, 45, 50, 75, 100
63	10, 15, 20, 25, 30, 35
	40, 45, 50, 75, 100

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

*2 The outline dimensions for 10 mm stroke will be the same as those for 15 mm stroke.

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
50	IN	495	825	1150
	OUT	589	982	1370
63	IN	840	1400	1960
	OUT	936	1560	2184

Cylinder Specifications

Bore size (mm)	32	40	50	63
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	Through-hole/Both ends tapped			
Piston speed	50 to 500 mm/s		50 to 300 mm/s	
Cushion	Rubber bumper			

* Stroke length tolerance dose not include the amount of bumper change.

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 range ^{Note)}	±10% of the rated voltage	
Power consumption	DC	0.35 (With light: 0.4) W
Surge voltage suppressor	Diode (Non-polar: 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 range.

S, Z type 24 VDC: -7% to +10%
12 VDC: -4% to +10%

Intermediate Stroke

Part no.	Refer to "How to Order" for standard model numbers. (Previous page)	
Description	Spacers are installed in a cylinder with standard stroke.	
	Bore size	Description
	32	Available in 1 mm stroke increments
Stroke range (mm)	Bore size	Stroke range
	32	1 to 99
	40, 50, 63	5 to 95
Example	Part no.: CVQM32-95-□ A spacer 5 mm in width is installed in standard cylinder CVQM32-100-□. B dimension: 133 mm	

Weight

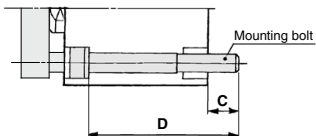
Bore size (mm)	Stroke											
	5	10	15	20	25	30	35	40	45	50	75	100
32	349	344	368	393	417	441	465	489	514	538	660	782
40	435	464	492	520	548	577	605	633	661	690	828	966
50	—	834	865	908	952	995	1039	1081	1125	1168	1386	1603
63	—	1088	1139	1190	1241	1292	1343	1394	1445	1496	1751	2006

Mounting Bolt for CVQM

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

Refer to the following for ordering procedures. Order the actual number of bolts that will be used.

Example) CQ-M5x45L 4 pcs.



Cylinder model	C	D	Mounting bolt part no.
CVQM32- 5	9	45	CQ-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
CVQM40- 5		7.5	45
- 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

Cylinder model	C	D	Mounting bolt part no.	
CVQM50- 10	12.5	60	CQ-M6 x 60L	
- 15		60	x 60L	
- 20		65	x 65L	
- 25		70	x 70L	
- 30		75	x 75L	
- 35		80	x 80L	
- 40		85	x 85L	
- 45		90	x 90L	
- 50		95	x 95L	
- 75		120	x 120L	
-100		145	x 145L	
CVQM63- 10		14.5	60	CQ-M8 x 60L
- 15			65	x 65L
- 20	70		x 70L	
- 25	75		x 75L	
- 30	80		x 80L	
- 35	85		x 85L	
- 40	90		x 90L	
- 45	95		x 95L	
- 50	100		x 100L	
- 75	125		x 125L	
-100	150		x 150L	

CVQ

CVQM

CVJ

CVM

CV3

CVS1

MVGQ

Plate Non-rotating Accuracy

Non-rotating accuracy without load is designed to be same or less than the figures shown in the table below at the retracted cylinder end (plate).

Bore size (mm)	Non-rotating accuracy
32 to 63	±0.1°

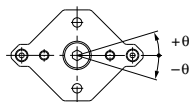
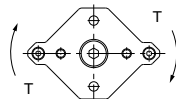


Plate Allowable Rotational Torque

Make sure to operate strictly within the allowable rotation torque range to the plate.

Operation outside of this range may result in shorter service life or damage to the device.



Unit: N·m

Bore size (mm)	Cylinder stroke (mm)											
	5	10	15	20	25	30	35	40	45	50	75	100
32	0.66	0.59	0.53	0.49	0.45	0.42	0.39	0.36	0.34	0.32	0.25	0.20
40	1.06	0.96	0.88	0.81	0.75	0.70	0.65	0.61	0.58	0.55	0.43	0.36
50	—	1.70	1.56	1.45	1.35	1.26	1.19	1.12	1.06	1.01	0.80	0.67
63	—	3.90	3.62	3.37	3.15	2.96	2.80	2.65	2.51	2.39	1.92	1.61

D-

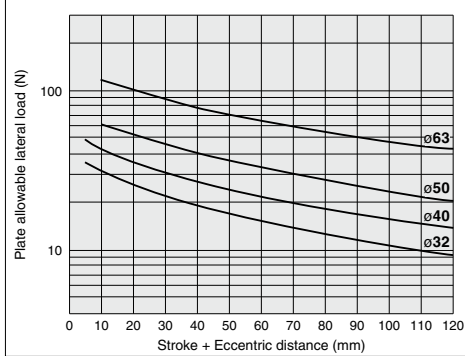
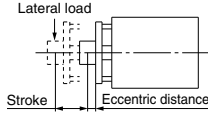
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CVQM Series

Plate Allowable Lateral Load

Make sure to operate strictly within the allowable lateral load range to the plate.

Operation outside of this range may result in shorter service life or damage to the device.

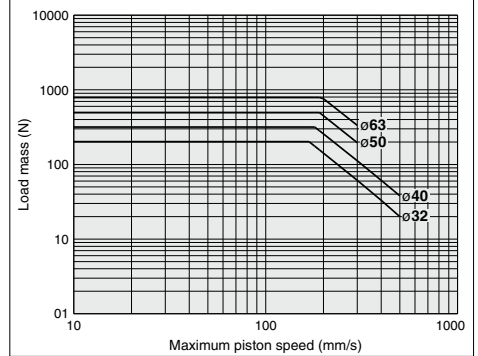


Allowable Kinetic Energy

Make sure to operate strictly within the allowable range of the load mass and maximum speed.

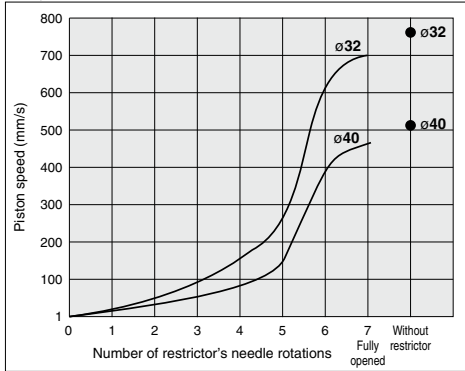
Operation outside of this range may cause excessive impact, which may result in the damage to the device.

Operating pressure: 0.5 MPa



Relationship between Number of Needle Rotations and Piston Speed

$\phi 32, \phi 40$



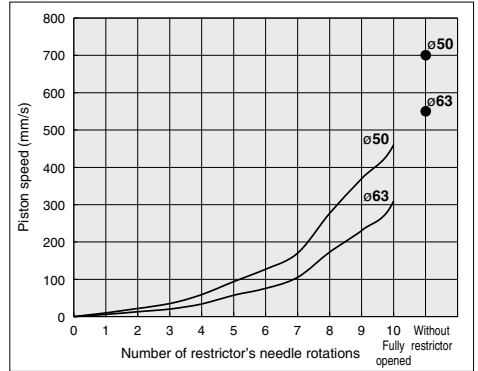
Restrictor: ASN2-M5

Pressure: 0.5 MPa

Mounting orientation: Horizontal, No-load, Piston extended

* The above piston speed is for reference purpose only.

$\phi 50, \phi 63$



Restrictor: ASN2-01

Pressure: 0.5 MPa

Mounting orientation: Horizontal, No-load, Piston extended

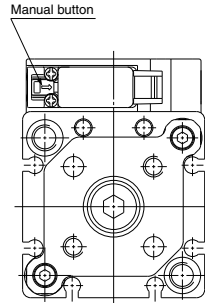
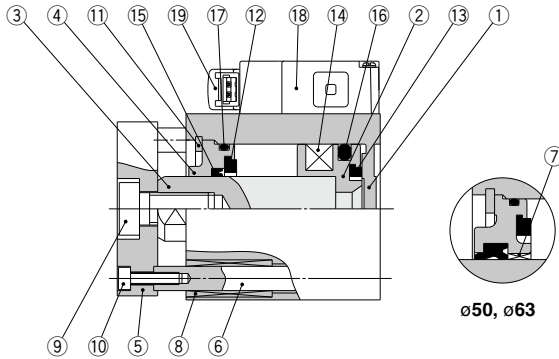
* The above piston speed is for reference purpose only.

<Exhaust restrictor with silencer >



Applicable bore size (mm)	Model	Port size	Effective area (mm ²)	Weight (g)
32, 40	ASN2-M5	M5 x 0.8	1.8	5
50, 63	ASN2-01	1/8	3.6	17

Construction



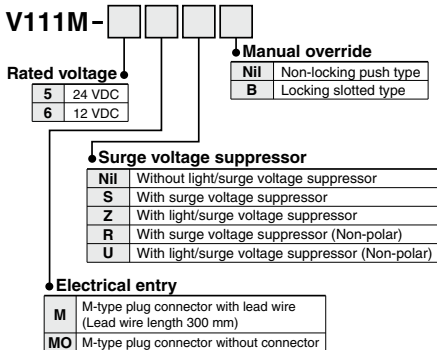
Component Parts

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 casted	ø50, ø63, Chromated, painted
		Aluminum alloy	ø32, ø40, Anodized
5	Plate	Aluminum alloy	Anodized
6	Guide rod	Stainless steel	
7	Bushing	Bearing alloy	ø50, ø63
8	Bushing	Oil impregnated sintered alloy	
9	Hexagon socket head bolt	Carbon steel	Nickel plated
10	Hexagon socket head bolt	Carbon steel	Nickel plated
11	Retaining ring	Carbon tool steel	Phosphate coated
12	Bumper A	Urethane	
13	Bumper B	Urethane	
14	Magnet	—	
15	Rod seal	NBR	
16	Piston seal	NBR	
17	Gasket	NBR	
18	Solenoid valve	—	
19	Pilot valve	—	

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



How to Order Connector Assembly

With lead wire: SY100-30-4A-□

Lead wire length●

Nil	300 mm	20	2000 mm
6	600 mm	25	2500 mm
10	1000 mm	30	3000 mm
15	1500 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
CVQM32-30-M9B-5MOZ
SY100-30-4A-20

CVQ

CVQM

CVJ□

CVM□

CV3

CVS1

MVGQ

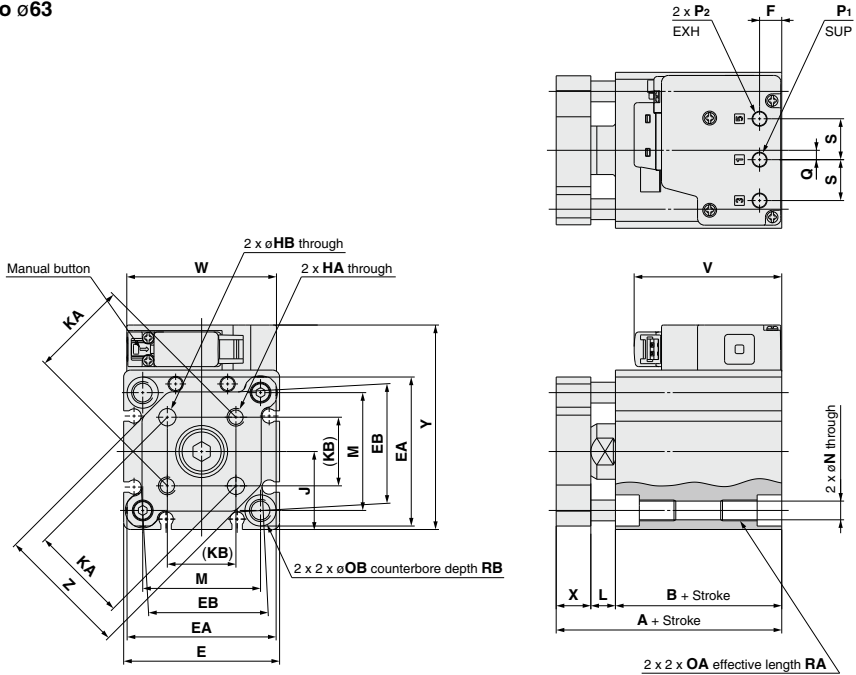
D-□

-X□

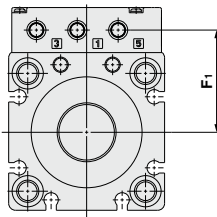
CVQM Series

Dimensions

ø32 to ø63



Axial piping



Bore size (mm)	F ₁
32	30
40	34.5
50	43.5
63	51

Bore size (mm)	Stroke range (mm)	A	B	E	EA	EB	F	HA	HB	J	KA	KB	L	M	N	OA
32	5 to 100	50 ^{Note 1)}	33 ^{Note 1)}	45	43	34.4	6.5	M5 x 0.8	5 ^{+0.2} ₀	22.5	28 ±0.2	19.8	7	34	5.4	M6 x 1
40	5 to 100	56.5	39.5	52	50	41.4	6.5	M5 x 0.8	5 ^{+0.2} ₀	26	33 ±0.2	23.3	7	40	5.4	M6 x 1
50	10 to 100	60.5 ^{Note 2)}	40.5 ^{Note 2)}	64	62	53.4	7.5	M6 x 1	6 ^{+0.2} ₀	32	42 ±0.2	29.7	8	50	6.6	M8 x 1.25
63	10 to 100	66	46	77	74	59.6	7.5	M6 x 1	6 ^{+0.2} ₀	38.5	50 ±0.2	35.4	8	60	9	M10 x 1.5

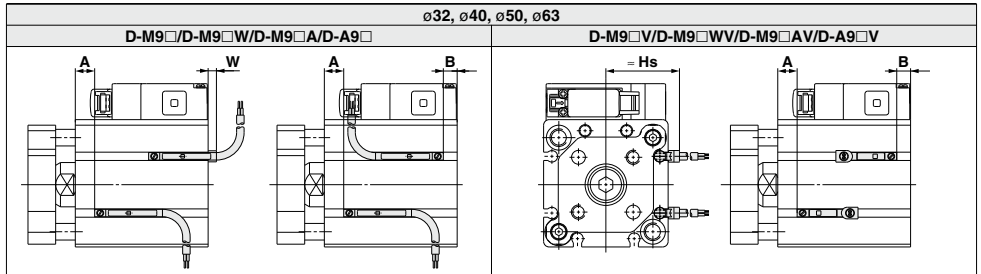
Note 1) The dimensions (A + stroke) and (B + stroke) for 5 mm stroke will be the same as those for 10 mm stroke.

Note 2) The dimensions (A + stroke) and (B + stroke) for 10 mm stroke will be the same as those for 15 mm stroke.

Bore size (mm)	Stroke range (mm)	OB	P ₁	P ₂	Q	RA	RB	S	V	W	X	Y	Z
32	5 to 100	9	M5 x 0.8	M5 x 0.8	2.5	10	7	12	43	43.5	10	59	38
40	5 to 100	9	M5 x 0.8	M5 x 0.8	2.5	10	7	12	43	43.5	10	67	46
50	10 to 100	11	Rc, G, NPT1/8	Rc, G, NPT1/8	3.5	14	8	17	54	63	12	83	58
63	10 to 100	14	Rc, G, NPT1/8	Rc, G, NPT1/8	3.5	18	10.5	17	54	63	12	97	69

Auto Switch Mounting

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

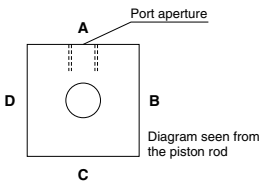


Bore size (mm)	D-M9□ D-M9□W			D-M9□V, D-M9□WV D-M9□AV			D-M9□A			D-A9□			D-A9□V		
	A	B	W	A	B	Hs	A	B	W	A	B	W	A	B	Hs
32	12 [17]	9	1	12 [17]	9	29	12 [17]	9	3	8 [13]	5	-3 (-0.5)	8 [13]	5	27
40	16	11.5	-1.5	16	11.5	32.5	16	11.5	0.5	12	7.5	-5.5 (-3)	12	7.5	30.5
50	14 <19>	14.5	-4.5	14 <19>	14.5	42	14 <19>	14.5	-2.5	10 <15>	10.5	-8.5 (-6)	10 <15>	10.5	36.5
63	16.5	17.5	-7.5	16.5	17.5	42	16.5	17.5	-5.5	12.5	13.5	-11.5 (-9)	12.5	13.5	40

- []: Values for 5 mm stroke with ø32
- < >: Values for 10 mm stroke with ø50
- (): Values for the D-A9□
- * 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 grooves for the direct mounting type auto switch.



Auto switch model	D-M9□(V), M9□W(V), M9□A(V), A9□(V)			
	A (Mounting groove number)	B (Mounting groove number)	C (Mounting groove number)	D (Mounting groove number)
Bore size (mm)				
32	—	(2)	(2)	(2)
40	—	(2)	(2)	(2)
50	—	(2)	(2)	(2)
63	—	(2)	(2)	(2)

Operating Range

Auto switch model	Bore size (mm)			
	32	40	50	63
D-M9□, D-M9□V D-M9□W, D-M9□WV D-M9□A, D-M9□AV	6	6	7	7.5
D-A9□, D-A9□V	9.5	9.5	9.5	11.5

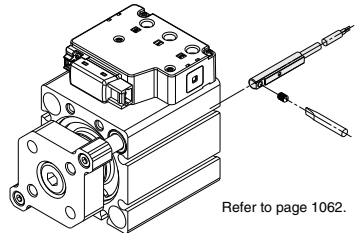
- * Since this is a guideline including hysteresis, not meant to be guaranteed. (assuming approximately ±30% dispersion)
- There may be the case it will vary substantially depending on the ambient environment.

Minimum Stroke for Auto Switch Mounting

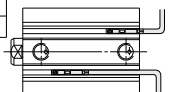
Bore size (mm)	Number of auto switches mounted	(mm)					
		D-M9□	D-M9□V	D-M9□W D-M9□A	D-M9□WV D-M9□AV	D-A9□	D-A9□V
32 ^{*1} , 40	1	10 (5)	5	15 (10)	10	10 (5)	5
50 ^{*2} , 63	2	10 (5)	5	15	15	10	10

- *1 The outline dimensions for 5 mm stroke will be the same as those for 10 mm stroke.
- *2 The outline dimensions for 10 mm stroke will be the same as those for 15 mm stroke.
- *3 (): Mountable minimum stroke when the auto switch protrudes from the cylinder body end face and does not interfere with the space for the lead wire. (The figure on the right) Order separately for auto switches.

Auto Switch Mounting



Refer to page 1062.



CVQ

CVQM

CVJ□

CVM□

CV3

CVS1

MVGQ

D-□

-X□



CVQM Series

Specific Product Precautions

Be sure to read this before handling the products.

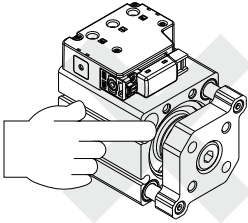
Refer to back page 50 for Safety Instructions and pages 3 to 12 for Actuator and Auto Switch Precautions.

Mounting

⚠ Warning

1. Do not put hands or fingers between the plate and cylinder tubing.

Never put hands or fingers in the gap between the plate and cylinder tubing when the piston rods are retracted. Due to the heavy power output of the cylinder, failure to comply with this directive may result in trapping and subsequent injury to the human body.



⚠ Caution

1. Do not scratch or dent the sliding parts of the piston rod and guide rods.

Damage to seals may cause air leakage or faulty operation.

2. Mounting of workpiece

When screwing a bolt onto the threaded portion of the plate surface, be certain that the guide rods are fully extended to the end. Also, be careful that the tightening torque is not applied to the guide rods.

3. Make sure that the cylinder mounting surface has a flatness of 0.02 mm or less.

When mounting the cylinder body or work pieces on the plate, improper flatness of the mounting surface may cause malfunctions.

When the flatness of a workpiece is not sufficient, attaching a shim such as a flat washer, etc., at the place of a mounting bolt between the workpiece and the plate may reduce the affect on the operation.

Others

⚠ Caution

1. Do not separate the cylinder from the valve.
2. This product should not be used as a stopper.
3. Do not disassemble and modify the product.
4. For example, in a pressing application, the cylinder thrust is directly applied to the plate, therefore, make sure that the pressing force is applied to the plate directly on the extended axial line of a rod. (Below figures)

