

Compact Cylinder With Solenoid Valve

Series CVQ

ø32, ø40



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)
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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.

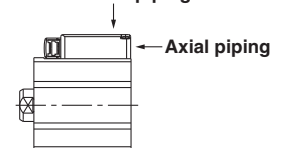
Rated voltage

5	24 VDC
6	12 VDC

Piping

Nil	Standard
P	Axial

Standard piping



Manual override

Nil	Non-locking push type
B	Locking slotted type

Surge voltage suppressor

Nil	Without 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 5).

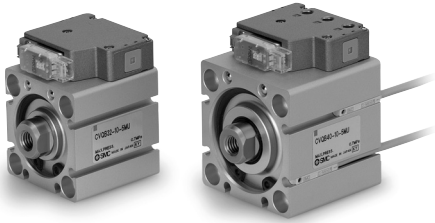
Applicable Auto Switches / Refer to pages 11 through to 15 for detailed auto switch specifications.

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	Electrical entry		0.5 (Nil)	1 (M)	3 (L)	5 (Z)		IC circuit	Relay, PLC	
					—	5 V	—	Perpendicular	In-line								
Reed switch	—	Grommet	Yes	3-wire (NPN equivalent)	—	5 V	—	A96V	A96	●	—	●	—	—	—	—	
				2-wire	24 V	12 V	100 V	A93V	A93	●	—	●	—	—	—	—	—
					5 V, 12 V	100 V or less	A90V	A90	●	—	●	—	—	—	—	—	—
Solid state switch	Diagnostic indication (2-color indication)	Grommet	Yes	3-wire (NPN)	24 V	5 V, 12 V	—	M9NV	M9N	●	—	●	○	○	—	—	
				3-wire (PNP)				M9PV	M9P	●	—	●	○	○	—	—	
				2-wire				M9BV	M9B	●	—	●	○	○	—	—	
				3-wire (NPN)				M9NWV	M9NW	●	●	●	○	○	—	—	
				3-wire (PNP)				M9PWV	M9PW	●	●	●	○	○	—	—	
				2-wire				M9BWV	M9BW	●	●	●	○	○	—	—	
				—				—	—	—	—	—	—	—	—	—	—

* Lead wire length symbols: 0.5 m Nil (Example) M9NW
 1 m M M9NWM
 3 m L M9NWL
 5 m Z M9NWX

* Solid state switches marked with "○" are produced upon receipt of order.
 * For details about auto switches with pre-wired connector, refer to "Best Pneumatics 2004" Vol. 6 catalog.
 * Auto switches are included, (but not assembled).

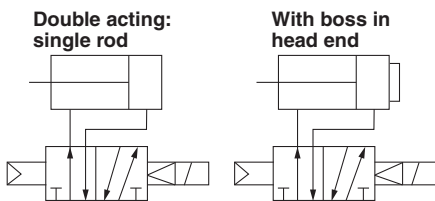
Series CVQ



⚠ Caution

Do not separate the cylinder from the valve.

JIS Symbol



Standard Stroke

Bore size (mm)	Standard stroke (mm)
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)	
Rod end thread tolerance	JIS Class 2	
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

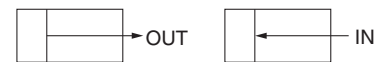
Solenoid Specifications

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

Weight

Weight

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 weight: CVQB32-20 88 g
 - Additional weight: Rod end male thread 43 g
- 131 g

Additional Weight

Unit (g)

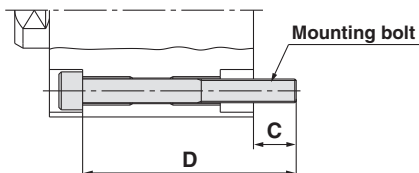
Bore size (mm)	32	40	
Axial piping	5	5	
Connector (300 mm)	3	3	
Rod end male thread	Male thread	26	27
	Nut	17	17
With boss in head end	5	7	
Foot (including mounting bolt)	148	160	
Rod flange (including mounting bolt)	185	219	
Head flange (including mounting bolt)	170	203	
Double clevis (including pin,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

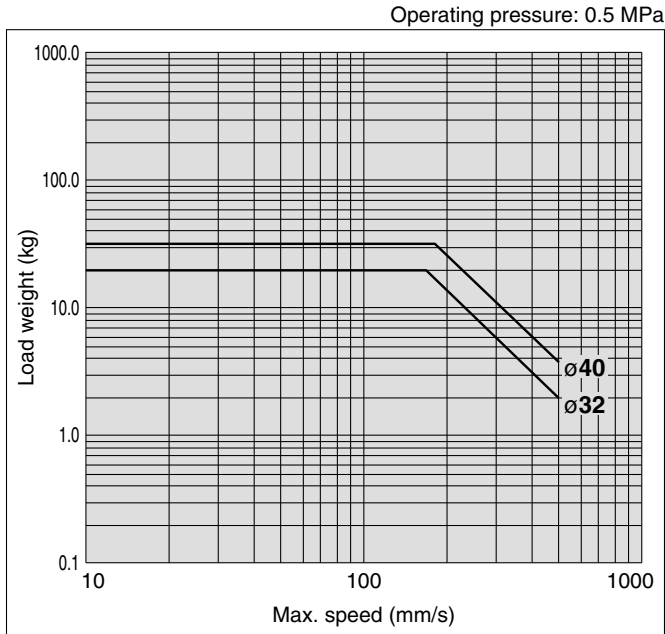
Example) Bolt M5 x 40L: 4 pcs.



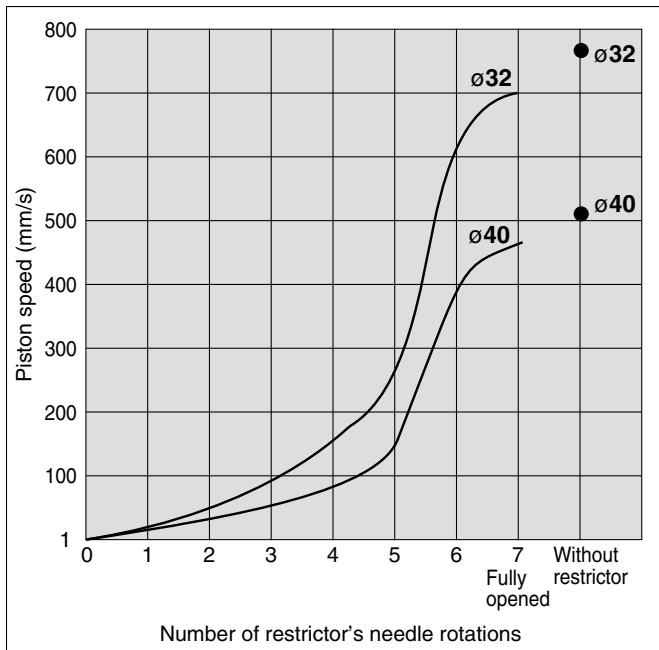
Cylinder model	C	D	Mounting bolt size
CVQB32- 5	9	45	M5 x 45L
- 10		45	x 45L
- 15		50	x 50L
- 20		55	x 55L
- 25		60	x 60L
- 30		65	x 65L
- 35		70	x 70L
- 40		75	x 75L
- 45		80	x 80L
- 50		85	x 85L
- 75		110	x 110L
-100		135	x 135L
CVQB40- 5	7.5	45	M5 x 45L
- 10		50	x 50L
- 15		55	x 55L
- 20		60	x 60L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

Series CVQ

Allowable Kinetic Energy



Relationship between Number of Needle Rotations and Piston Speed



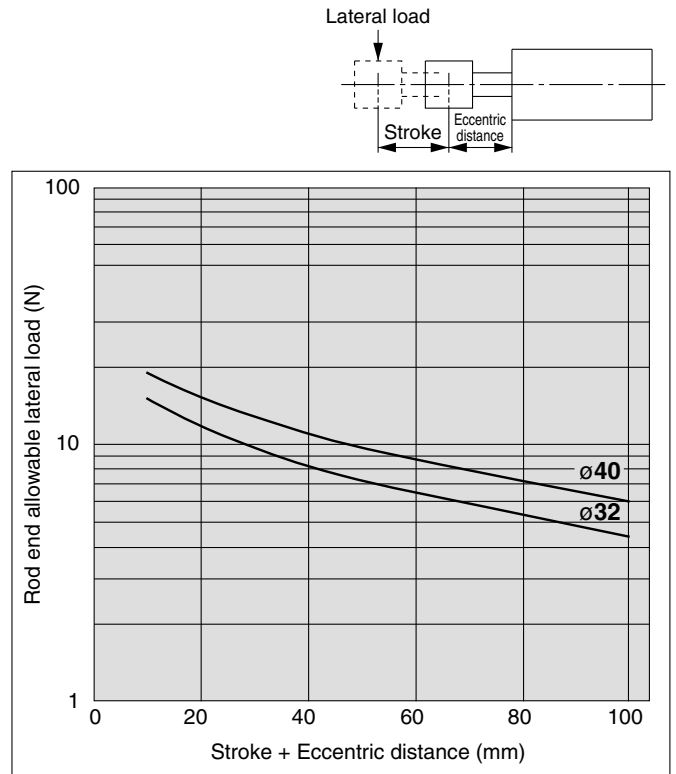
Restrictor: ASN2-M5
 Pressure: 0.5 MPa
 Mounting orientation: Horizontal, with no load, piston extended
 * The above piston speed is for reference purpose only.

<Exhaust restrictor with silencer >



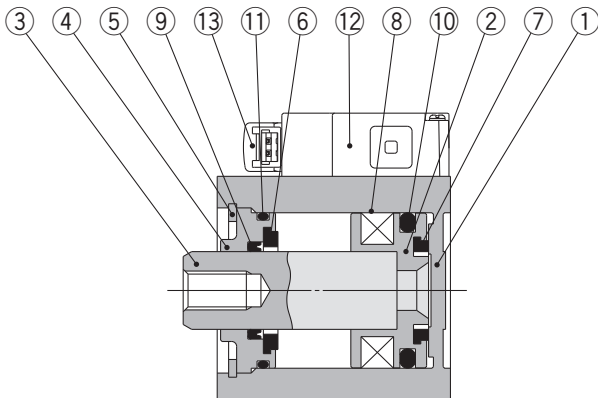
Model	Port size	Effective area (mm ²)	Weight (g)
ASN2-M5	M5 x 0.8	1.8	5

Rod End Allowable Lateral Load

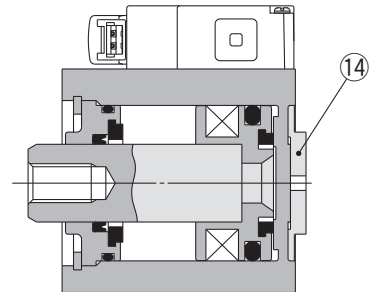


The allowable lateral load applied to the rod end is as shown above. Do not use exceeding the value shown by the graph.

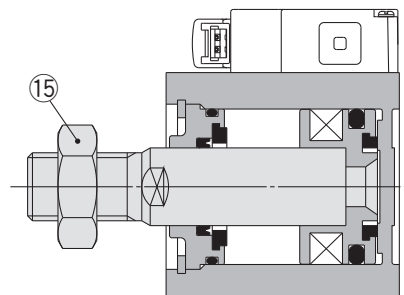
Construction



With boss in head end



Rod end male thread



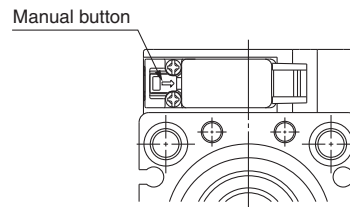
Component Parts

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

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.



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

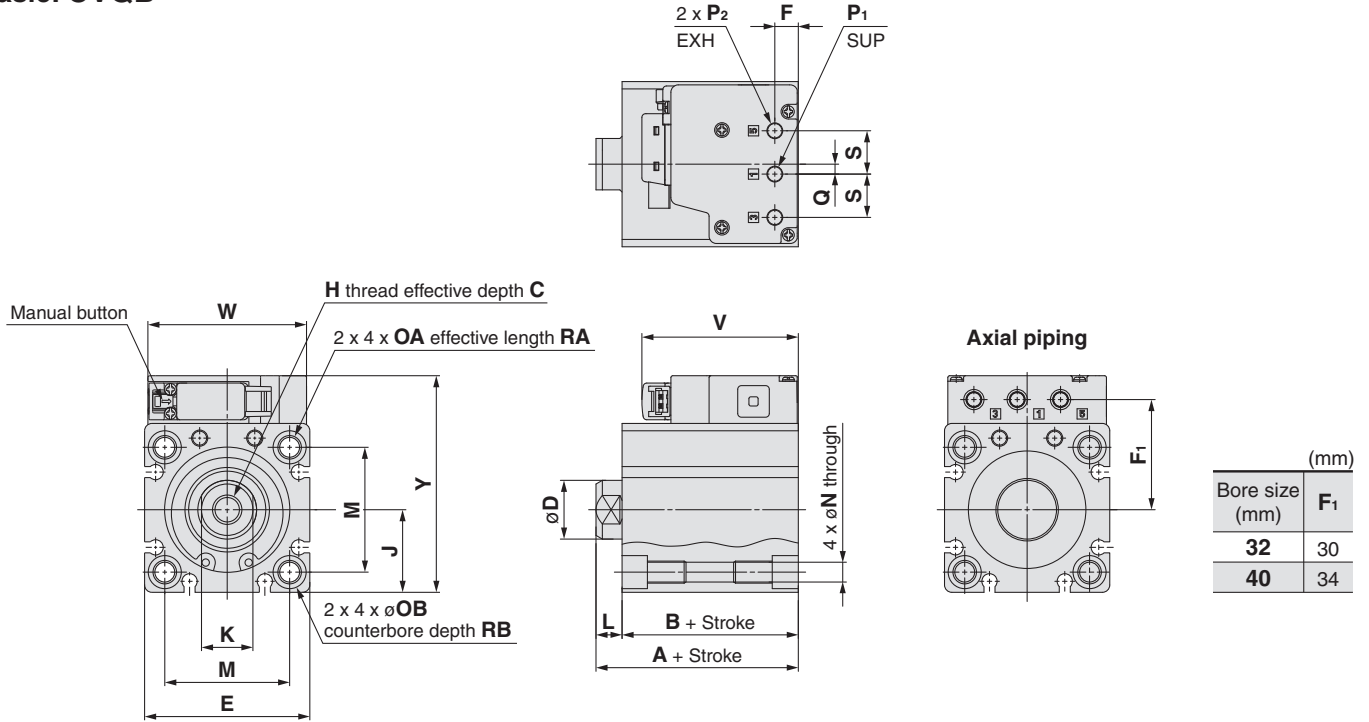
Indicate the part number of the connector assembly in addition to the part number of the solenoid valve without the connector for the plug connector. Example) Lead wire length 2000 mm

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

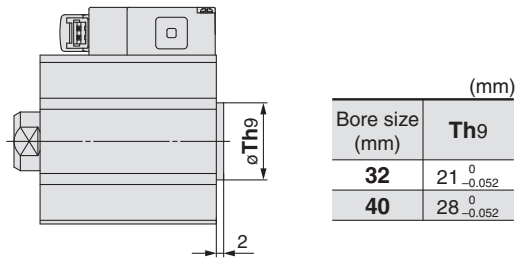
Series CVQ

Dimensions: $\phi 32, \phi 40$

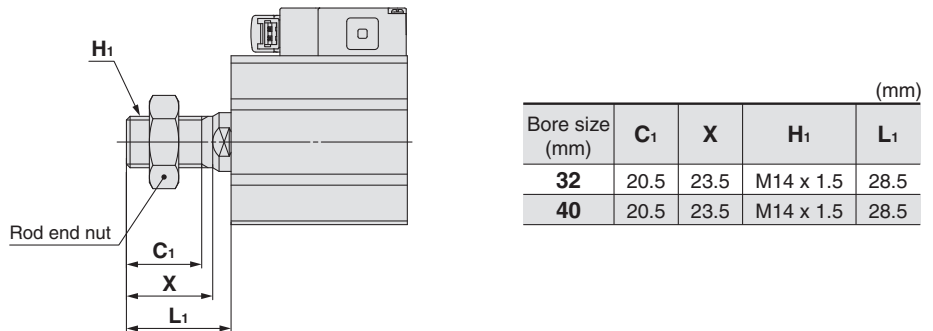
Basic: CVQB



With boss in head end



Rod end male thread



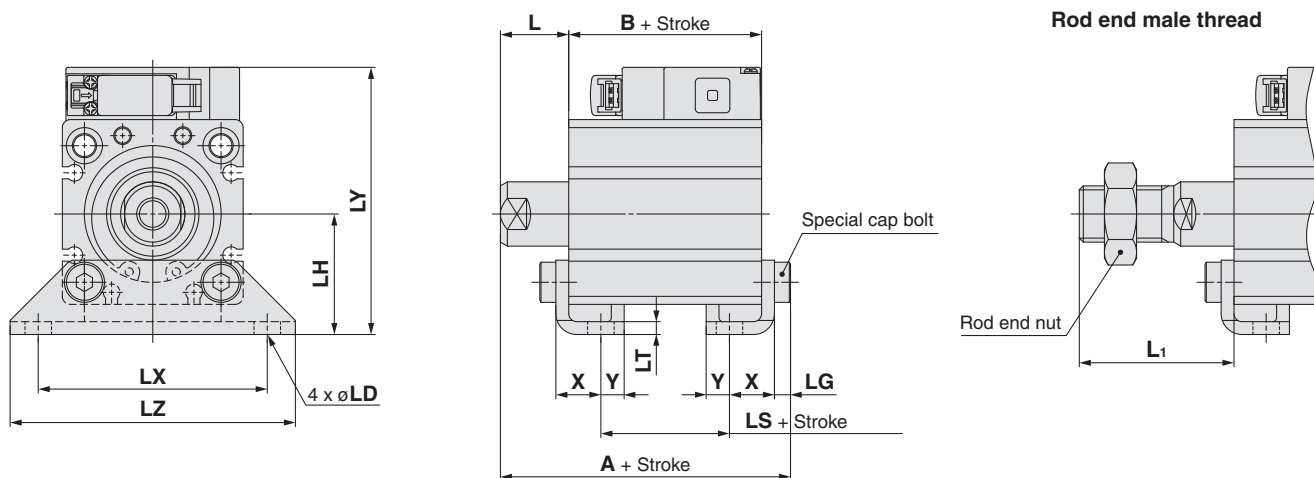
		(mm)																		
Bore size (mm)	Stroke range (mm)	A	B	C	D	E	F	H	J	K	L	M	N	OA	OB	P ₁	P ₂	Q	RA	RB
32	5 to 100	40 ^{Note)}	33 ^{Note)}	13	16	45	6.5	M8 x 1.25	22.5	14	7	34	5.4	M6 x 1	9	M5 x 0.8	M5 x 0.8	2.5	10	7
40	5 to 100	46.5	39.5	13	16	52	7	M8 x 1.25	26	14	7	40	5.4	M6 x 1	9	M5 x 0.8	M5 x 0.8	2.5	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: $\phi 32, \phi 40$

Foot: CVQL

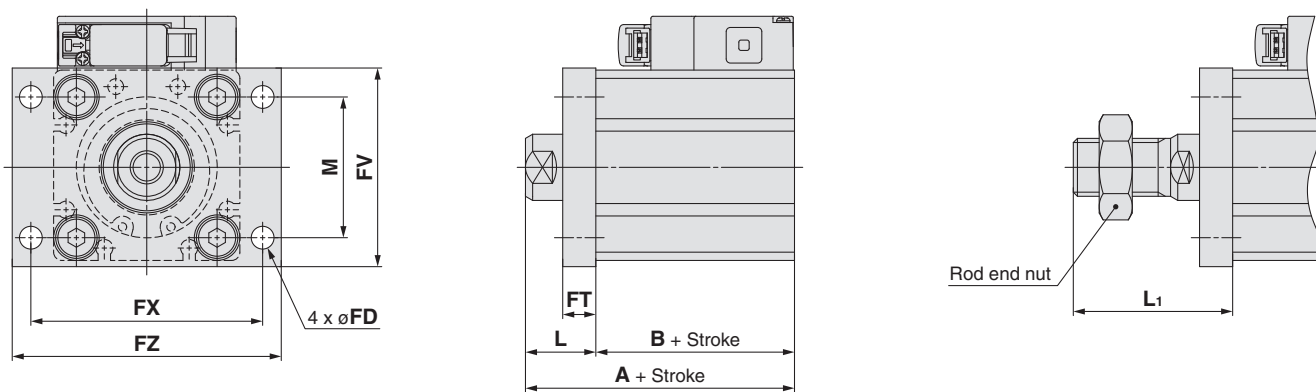


Bore size (mm)	Stroke range (mm)	A	B	LS	L	L ₁	LD	LG	LH	LT	LX	LY	LZ	X	Y
32	5 to 100	57.2 <small>Note</small>	33 <small>Note</small>	17 <small>Note</small>	17	38.5	6.6	4	30	3.2	57	66.5	71	11.2	5.8
40	5 to 100	63.7	39.5	23.5	17	38.5	6.6	4	33	3.2	64	74	78	11.2	7

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



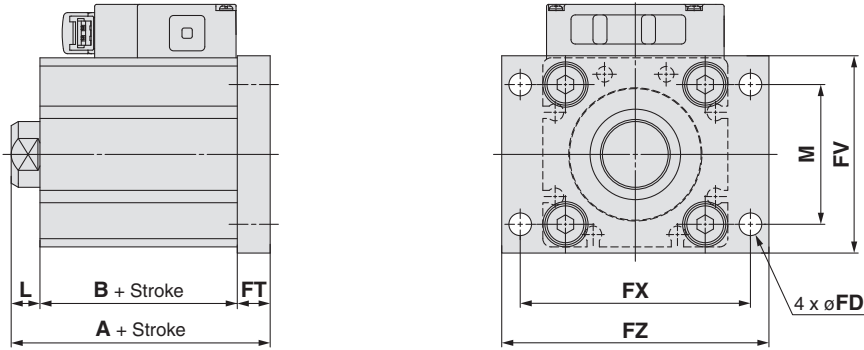
Bore size (mm)	Stroke range (mm)	A	B	FD	FT	FV	FX	FZ	L	L ₁	M
32	5 to 100	50 <small>Note</small>	33 <small>Note</small>	5.5	8	48	56	65	17	38.5	34
40	5 to 100	56.5	39.5	5.5	8	54	62	72	17	38.5	40

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

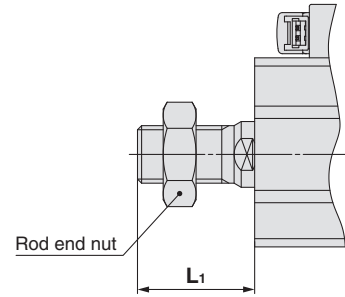
Series CVQ

Dimensions: $\phi 32, \phi 40$

Head flange: CVQG



Rod end male thread

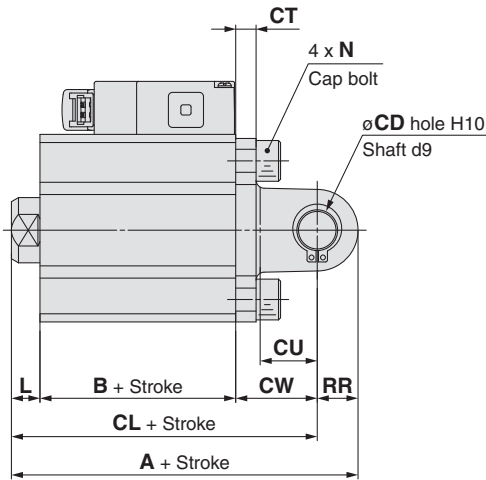


(mm)

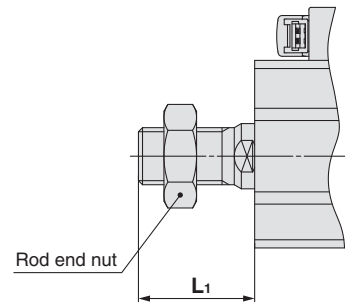
Bore size (mm)	Stroke range (mm)	A	B	FD	FT	FV	FX	FZ	L	L ₁	M
32	5 to 100	48 <small>Note</small>	33 <small>Note</small>	5.5	8	48	56	65	7	28.5	34
40	5 to 100	54.5	39.5	5.5	8	54	62	72	7	28.5	40

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



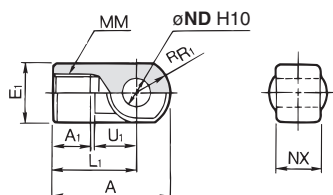
(mm)

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 <small>Note</small>	33 <small>Note</small>	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

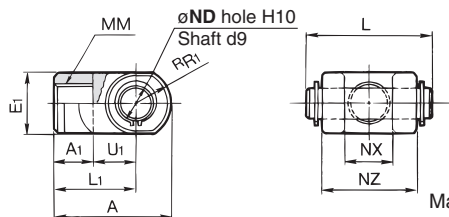
Single knuckle joint



Material: Cast iron
(mm)

Part no.	Applicable bore size (mm)	A	A ₁	E ₁	L ₁	MM	R _{R1}	U ₁	ND _{H10}	NX
I-G04	32, 40	42	14	∅22	30	M14 x 1.5	12	14	10 ^{+0.058/0}	18 ^{-0.3/-0.5}

Double knuckle joint

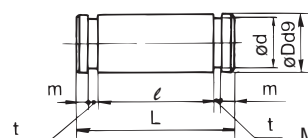


Material: Cast iron
(mm)

Part no.	Applicable bore size (mm)	A	A ₁	E ₁	L ₁	MM	R _{R1}	U ₁	ND _{H10}	NX	NZ	L	Applicable pin part no.
Y-G04	32, 40	42	16	∅22	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.

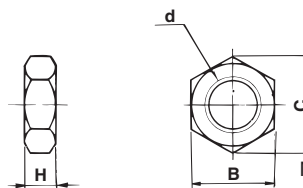
Knuckle pin (Common with double clevis pin)



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 / ∅32, ∅40

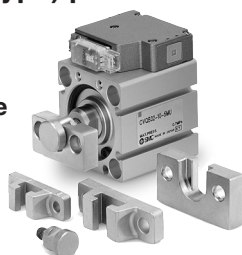
Joint and mounting bracket (A/B-type) part no.

YA - 03

• Mounting bracket

• Applicable air cylinder bore size

YA	A-type mounting bracket	03	For ∅32, ∅40
YB	B-type mounting bracket		
YU	Joint		



Allowable Eccentricity (mm)

Bore size	∅32	∅40
Eccentricity tolerance	±1	
Backlash	0.5	

<Ordering>

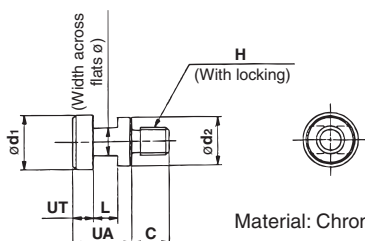
- Joints are not included with the A- or B-type mounting brackets. Order them separately.

(Example)

- Bore size for ∅40 Order number
- A-type mounting bracket YA-03
- Joint YU-03

Joint Part No.

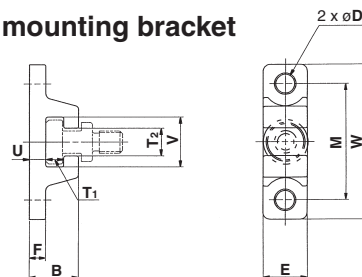
Bore size (mm)	Joint part no.	Applicable mounting bracket		Weight (g)
		A-type mounting bracket	B-type mounting bracket	
32, 40	YU-03	YA-03	YB-03	25



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

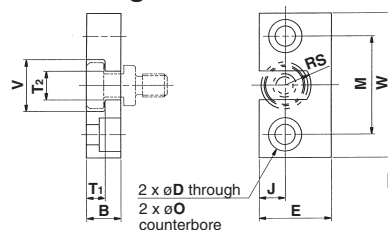


Material: Chromium molybdenum steel (Nickel plated)
(mm)

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



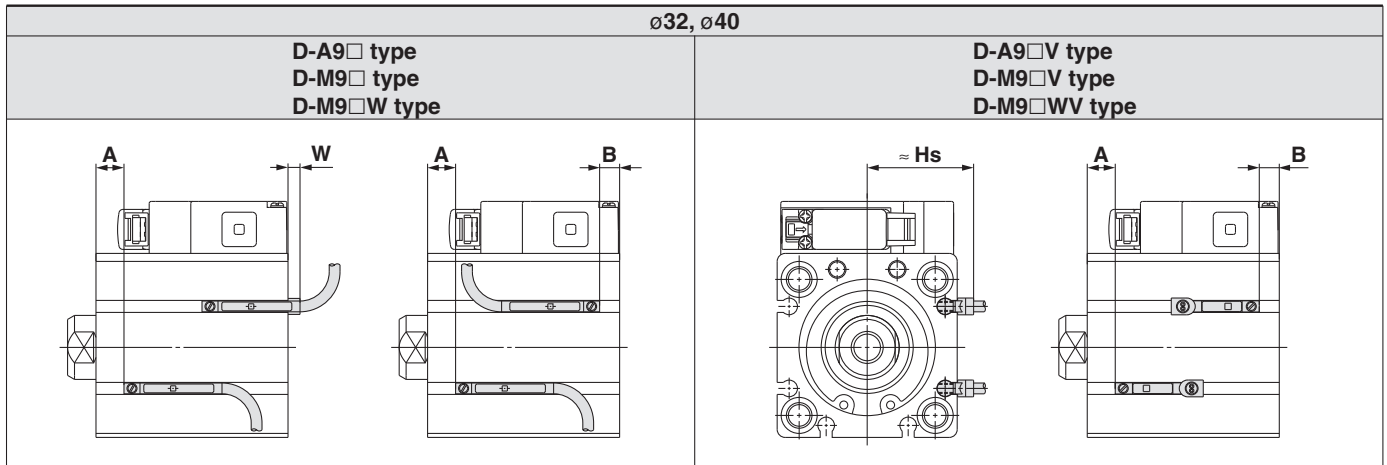
Material: Carbon steel (Nickel plated)
(mm)

Part no.	Bore size (mm)	B	D	E	J	M	∅O
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

Series CVQ

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



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	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 $\phi 32$.

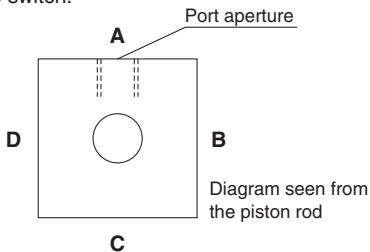
(): Denotes the values for D-A93.

* 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.



Switch model	D-A9□(V), M9□(V), M9□W(V)			
	A (Mounting groove number)	B (Mounting groove number)	C (Mounting groove number)	D (Mounting groove number)
32	—	○ (2)	○ (2)	○ (2)
40	—	○ (2)	○ (2)	○ (2)

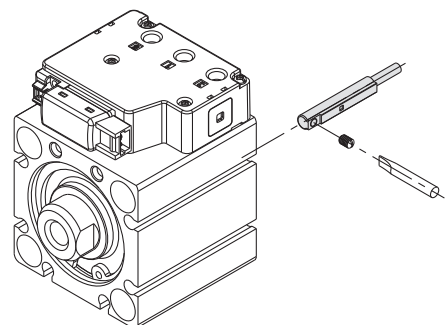
Operating Range

Auto switch model	Bore size (mm)	
	32	40
D-A9□, D-A9□V	9.5	9.5
D-M9□, D-M9□V	3	3
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 $\pm 30\%$ dispersion.)

There may be the case it will vary substantially depending on an ambient environment.

Auto Switch Mounting



Minimum Stroke for Auto Switch Mounting

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

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

Series CVQ

Auto Switch Specifications

Auto Switch Common Specifications

Type	Reed switch	Solid state switch
Leakage current	None	3-wire: 100 μ A or less 2-wire: 0.8 mA or less
Operating time	1.2 ms	1 ms or less
Impact resistance	300 m/s ²	1000 m/s ²
Insulation resistance	50 M Ω or more at 500 VDC Mega (between lead wire and case)	
Withstand voltage	1500 VAC for 1 minute (between lead wire and case)	1000 VAC for 1 minute (between lead wire and case)
Ambient temperature	-10 to 60°C	
Enclosure	IEC529 standard IP67, JIS C 0920 waterproof construction	
Standard	Conforming to CE Standards	

Lead Wire Length

Lead wire length indication

(Example) D-M9BW **L**

Lead wire length

Nil	0.5 m
M	1 m
L	3 m
Z	5 m

Note 1) Applicable auto switch with 5 m lead wire "Z"

Solid state switch: Manufactured upon receipt of order as standard.

Note 2) 1 m (M): D-M9□W(V) only.

Note 3) Lead wire tolerance

Lead wire length	Tolerance
0.5 m	±15 mm
1 m	±30 mm
3 m	±90 mm
5 m	±150 mm

Contact Protection Boxes: CD-P11, CD-P12

<Applicable switch model>

D-A9/A9□V type

The auto switches below do not have a built-in contact protection circuit. Therefore, please use a contact protection box with the switch for any of the following cases:

- ① Where the operation load is an inductive load.
- ② Where the wiring length to load is greater than 5 m.
- ③ Where the load voltage is 100 VAC.

The contact life may be shortened (due to permanent energizing conditions).

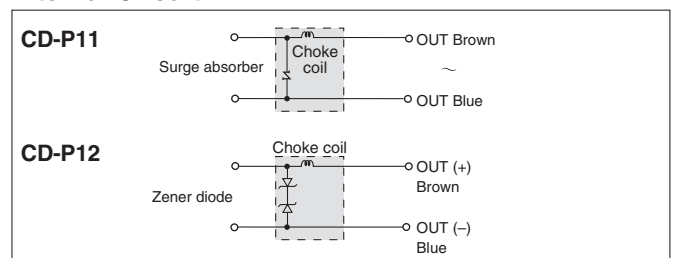
Specifications

Part no.	CD-P11		CD-P12
Load voltage	100 VAC	200 VAC	24 VDC
Max. load current	25 mA	12.5 mA	50 mA

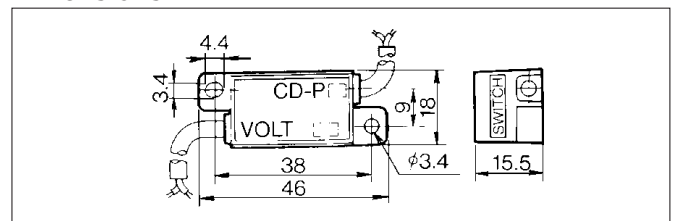
* Lead wire length — Switch connection side 0.5 m
Load connection side 0.5 m



Internal Circuit



Dimensions



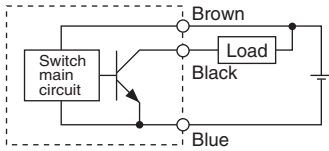
Connection

To connect a switch unit to a contact protection box, connect the lead wire from the side of the contact protection box marked SWITCH to the lead wire coming out of the switch unit. Keep the switch as close as possible to the contact protection box, with a lead wire length of no more than 1 meter.

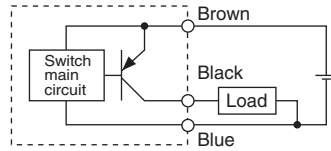
Auto Switch Connections and Examples

Basic Wiring

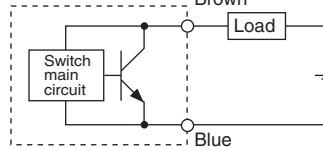
Solid state 3-wire, NPN



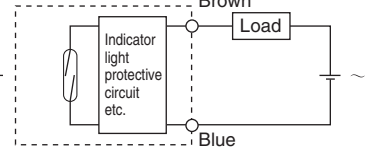
Solid state 3-wire, PNP



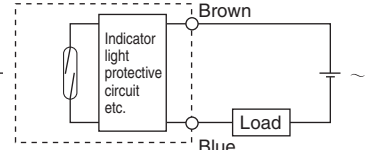
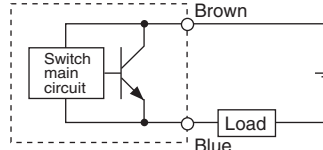
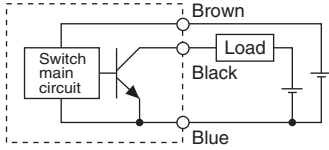
2-wire (Solid state)



2-wire (Reed)

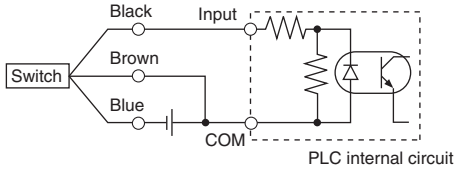


(Power supplies for switch and load are separate.)

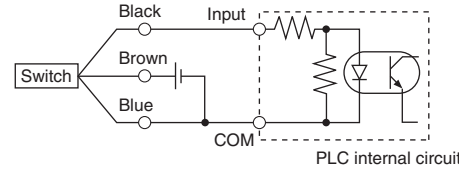


Example of Connection to PLC (Programmable Logic Controller)

• Sink input specification 3-wire, NPN

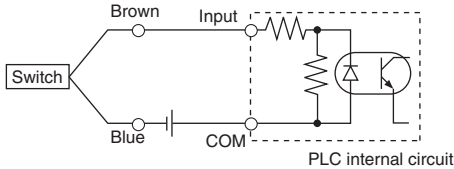


• Source input specification 3-wire, PNP

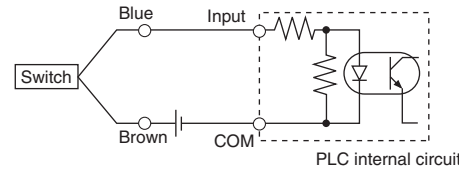


Connect according to the applicable PLC input specifications, since the connection method will vary depending on the PLC input specifications.

2-wire



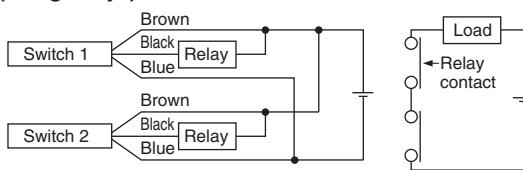
2-wire



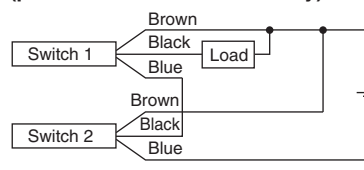
Example of AND (Serial) and OR (Parallel) Connection

• 3-wire

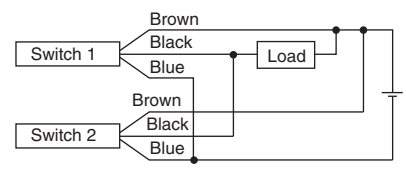
AND connection for NPN output (using relays)



AND connection for NPN output (performed with switches only)

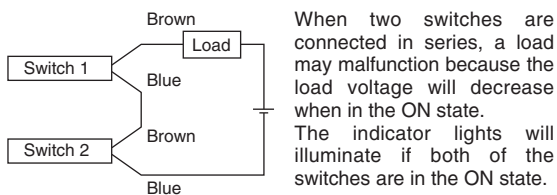


OR connection for NPN output



The indicator lights will illuminate when both switches are turned ON.

2-wire with 2-switch AND connection

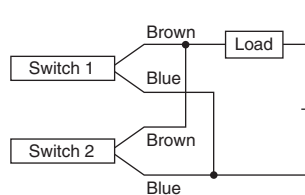


When two switches are connected in series, a load may malfunction because the load voltage will decrease when in the ON state. The indicator lights will illuminate if both of the switches are in the ON state.

$$\begin{aligned} \text{Load voltage at ON} &= \text{Power supply voltage} - \text{Residual voltage} \times 2 \text{ pcs.} \\ &= 24 \text{ V} - 4 \text{ V} \times 2 \text{ pcs.} \\ &= 16 \text{ V} \end{aligned}$$

Example: Power supply is 24 VDC.
Internal voltage drop in switch is 4 V.

2-wire with 2-switch OR connection



(Solid state)

When two switches are connected in parallel, a malfunction may occur because the load voltage will increase when in the OFF state.

(Reed)

Because there is no current leakage, the load voltage will not increase when turned OFF. However, depending on the number of switches in the ON state, the indicator lights may sometimes dim or not light because of the dispersion and reduction of the current flowing to the switches.

$$\begin{aligned} \text{Load voltage at OFF} &= \text{Leakage current} \times 2 \text{ pcs.} \\ &\quad \times \text{Load impedance} \\ &= 1 \text{ mA} \times 2 \text{ pcs.} \times 3 \text{ k}\Omega \\ &= 6 \text{ V} \end{aligned}$$

Example: Load impedance is 3 kΩ.
Leakage current from switch is 1 mA.

Reed Switch: Direct Mounting Style D-A90(V)/D-A93(V)/D-A96(V)

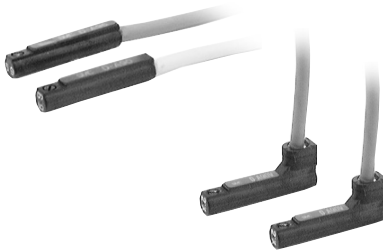


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Auto Switch Specifications

PLC: Programmable Logic Controller

Grommet



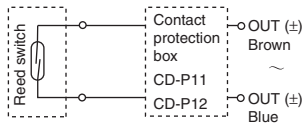
Caution

Operating Precautions

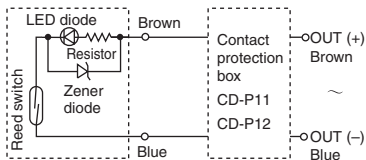
Fix the switch with the existing screw installed on the switch body. The switch may be damaged if a screw other than the one supplied is used.

Auto Switch Internal Circuit

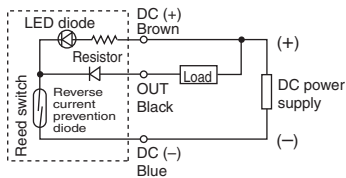
D-A90(V)



D-A93(V)



D-A96(V)



- Note) ① In a case where the operation load is an inductive load.
 ② In a case where the wiring load is greater than 5 m.
 ③ In a case where the load voltage is 100 VAC.

Use the auto switch with a contact protection box in any of the above mentioned cases. (For details about the contact protection box, refer to page 11.)

D-A90/D-A90V (Without indicator light)						
Auto switch part no.	D-A90	D-A90V	D-A90	D-A90V	D-A90	D-A90V
Electrical entry direction	In-line	Perpendicular	In-line	Perpendicular	In-line	Perpendicular
Applicable load	IC circuit, Relay, PLC					
Load voltage	24 VAC/DC or less		48 VAC/DC or less		100 VAC/DC or less	
Maximum load current	50 mA		40 mA		20 mA	
Contact protection circuit	None					
Internal resistance	1 Ω or less (including lead wire length of 3 m)					
D-A93/D-A93V/D-A96/D-A96V (With indicator light)						
Auto switch part no.	D-A93	D-A93V	D-A93	D-A93V	D-A96	D-A96V
Electrical entry direction	In-line	Perpendicular	In-line	Perpendicular	In-line	Perpendicular
Applicable load	Relay, PLC				IC circuit	
Load voltage	24 VDC		100 VAC		4 to 8 VDC	
Load current range and max. load current	5 to 40 mA		5 to 20 mA		20 mA	
Contact protection circuit	None					
Internal voltage drop	D-A93 — 2.4 V or less (to 20 mA)/3 V or less (to 40 mA) D-A93V — 2.7 V or less				0.8 V or less	
Indicator light	Red LED illuminates when turned ON.					
Standard	Conforming to CE Standards					

Lead wires

D-A90(V)/D-A93(V) — Oilproof heavy-duty vinyl cable: $\phi 2.7$, 0.18 mm² x 2 cores (Brown, Blue), 0.5 m
 D-A96(V) — Oilproof heavy-duty vinyl cable: $\phi 2.7$, 0.15 mm² x 3 cores (Brown, Black, Blue), 0.5 m
 Note 1) Refer to page 11 for reed switch common specifications.
 Note 2) Refer to page 11 for lead wire lengths.

Weight

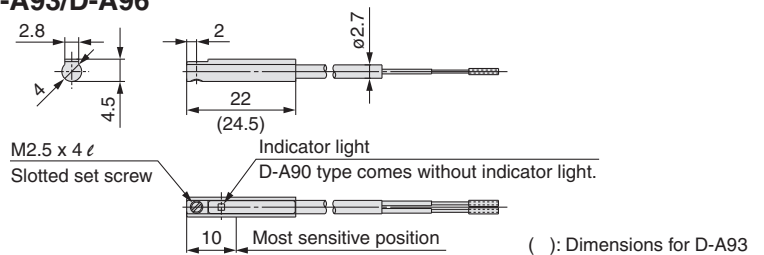
Unit: g

Auto switch part no.	D-A90(V)	D-A93(V)	D-A96(V)
Lead wire length (m)	0.5	6	8
	3	30	41

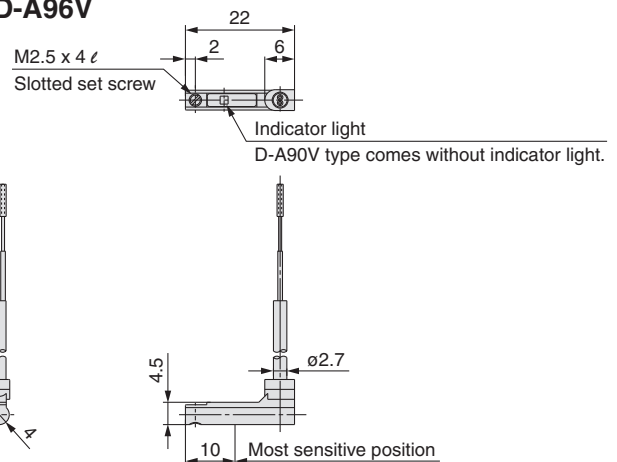
Dimensions

Unit: mm

D-A90/D-A93/D-A96



D-A90V/D-A93V/D-A96V



Solid State Switch: Direct Mounting Style D-M9N(V)/D-M9P(V)/D-M9B(V)



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Auto Switch Specifications

PLC: Programmable Logic Controller

D-M9□/D-M9□V (With indicator light)						
Auto switch part no.	D-M9N	D-M9NV	D-M9P	D-M9PV	D-M9B	D-M9BV
Electrical entry direction	In-line	Perpendicular	In-line	Perpendicular	In-line	Perpendicular
Wiring type	3-wire				2-wire	
Output type	NPN		PNP		—	
Applicable load	IC circuit, Relay, PLC				24 VDC relay, PLC	
Power supply voltage	5, 12, 24 VDC (4.5 to 28 V)					
Current consumption	10 mA or less					
Load voltage	28 VDC or less		—		24 VDC (10 to 28 VDC)	
Load current	40 mA or less				2.5 to 40 mA	
Internal voltage drop	0.8 V or less				4 V or less	
Leakage current	100 μA or less at 24 VDC				0.8 mA or less	
Indicator light	Red LED illuminates when turned ON.					
Standard	Conforming to CE Standards					

- Lead wires — Oilproof heavy-duty vinyl cable: $\phi 2.7 \times 3.2$ ellipse
 - D-M9B(V) 0.15 mm² x 2 cores
 - D-M9N(V), D-M9P(V) 0.15 mm² x 3 cores

Note 1) Refer to page 11 for solid state switch common specifications.

Note 2) Refer to page 11 for lead wire lengths.

Grommet

- 2-wire load current is reduced (2.5 to 40 mA).
- Lead-free
- UL certified (style 2844) lead cable is used.
- Flexibility is 1.5 times greater than the conventional model (SMC comparison).
- Using flexible cable as standard spec.



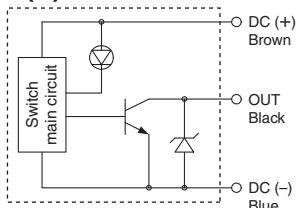
Caution

Operating Precautions

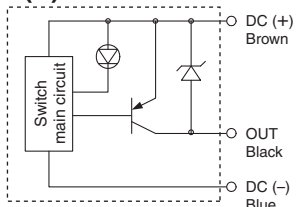
Fix the switch with the existing screw installed on the switch body. The switch may be damaged if a screw other than the one supplied is used.

Auto Switch Internal Circuit

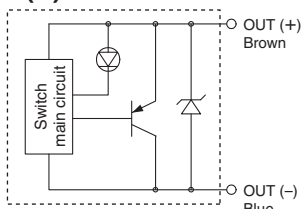
D-M9N(V)



D-M9P(V)



D-M9B(V)



Weight

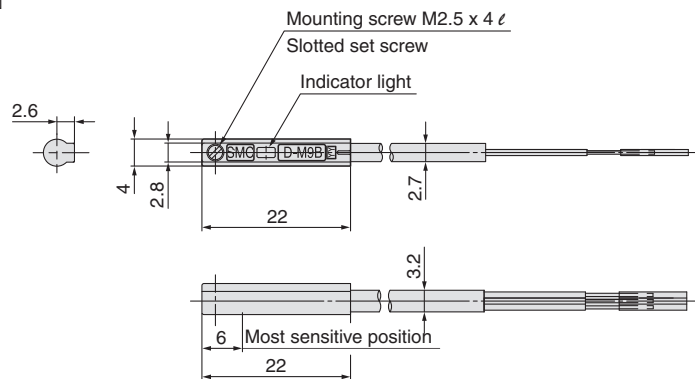
Unit: g

Auto switch part no.	D-M9N(V)	D-M9P(V)	D-M9B(V)
Lead wire length (m)	0.5	8	7
	3	41	38
	5	68	63

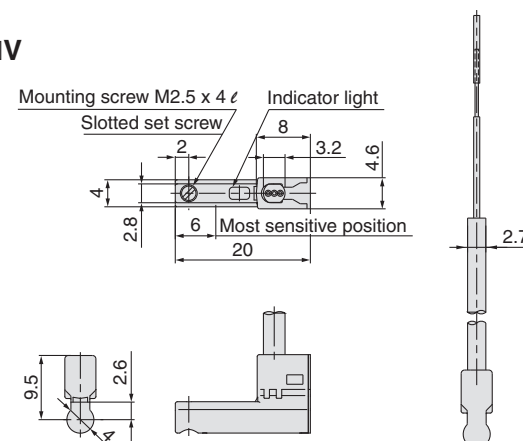
Dimensions

Unit: mm

D-M9□



D-M9□V



2-Color Indication Solid State Switch: Direct Mounting Style

D-M9NW(V)/D-M9PW(V)/D-M9BW(V)



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Auto Switch Specifications

PLC: Programmable Logic Controller

D-M9□W/D-M9□WV (With indicator light)						
Auto switch part no.	D-M9NW	D-M9NWV	D-M9PW	D-M9PWV	D-M9BW	D-M9BWV
Electrical entry direction	In-line	Perpendicular	In-line	Perpendicular	In-line	Perpendicular
Wiring type	3-wire			2-wire		
Output type	NPN		PNP		—	
Applicable load	IC circuit, Relay, PLC				24 VDC relay, PLC	
Power supply voltage	5, 12, 24 VDC (4.5 to 28 V)					—
Current consumption	10 mA or less					—
Load voltage	28 VDC or less		—		24 VDC (10 to 28 VDC)	
Load current	40 mA or less				2.5 to 40 mA	
Internal voltage drop	0.8 V or less at 10 mA (2 V or less at 40 mA)				4 V or less	
Leakage current	100 μA or less at 24 VDC				0.8 mA or less	
Indicator light	Operating position Red LED illuminates. Optimum operating position Green LED illuminates.					
Standard	Conforming to CE Standards					

- Lead wires — Oilproof heavy-duty vinyl cable: $\phi 2.7 \times 3.2$ ellipse
 D-M9BW(V) 0.15 mm² x 2 cores
 D-M9NW(V), D-M9PW(V) 0.15 mm² x 3 cores

Note 1) Refer to page 11 for solid state switch common specifications.

Note 2) Refer to page 11 for lead wire lengths.

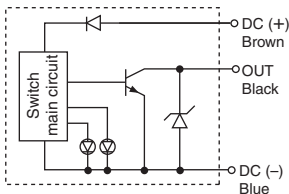
Grommet

- 2-wire load current is reduced (2.5 to 40 mA).
- RoHS compliant
- UL certified (style 2844) lead cable is used.
- Flexibility is 1.5 times greater than the conventional model (SMC comparison).
- Using flexible cable as standard spec.
- The optimum operating position can be determined by the color of the light. (Red → Green → Red)

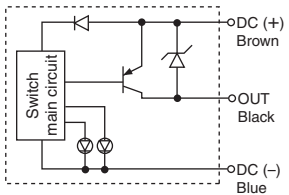


Auto Switch Internal Circuit

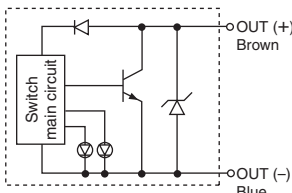
D-M9NW(V)



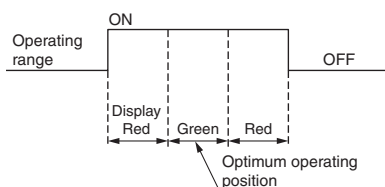
D-M9PW(V)



D-M9BW(V)



Indicator light / Display method



Weight

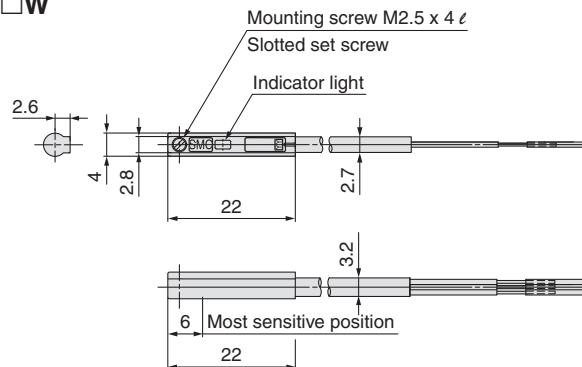
Unit: g

Auto switch part no.	D-M9NW(V)	D-M9PW(V)	D-M9BW(V)	
Lead wire length (m)	0.5	8	8	7
	1	14	14	13
	3	41	41	38
	5	68	68	63

Dimensions

Unit: mm

D-M9□W



D-M9□WV

