Direct Operated 2 Port Solenoid Valve For Air

Series VCA

Improved durability (Nearly twice the life of the previous series)
Resistance of moving parts has been reduced.
Service life and wear resistance are improved.

Large flow rate: TV factor 0.33 to 2.11

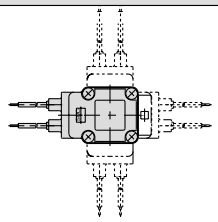
Compact: Single valve volume reduced by –13% (Class 2)
Weight reduced by –25% (Class 2)
Manifold length reduced by –22% (Class 2 : 5 stations) (SMC comparison)

Built-in surge voltage suppressor

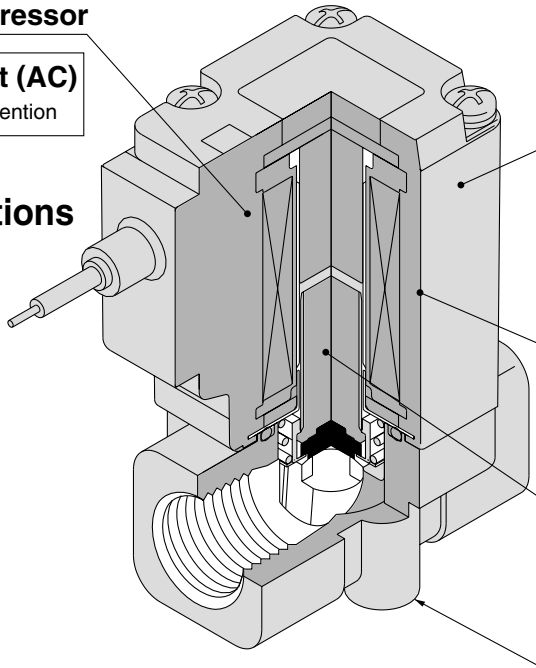
Built-in rectifying circuit (AC)
• Noise prevention • Burn-out prevention

Electrical entry directions

Electrical entry is available from four directions



* When shipped from our factory, the electrical entry is set in the IN port side.



Compact and lightweight
New compact coil reduces the overall size and weight of the valve.
Volume: –13%
Weight: –25%
} SMC comparison (Class 2)

Flame resistant molded coil material
Flame resistance equivalent to UL94 standard V-0

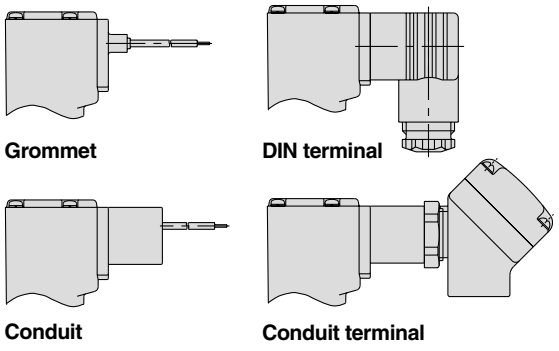
Special construction reduces operating resistance.

Threaded for bottom mounting
Spacial bracket can be mounted.

A variety of wiring options
Grommet, DIN terminal,
Conduit, Conduit terminal

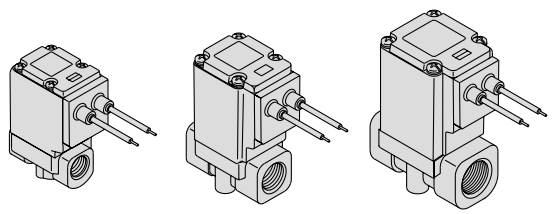
Wiring Specifications (Class B coil)

Wiring Variations



Enclosure: Dusttight
Low jetproof (Equivalent to IP65)

Lined Up by Compact Design



⚠ Precautions

Be sure to read before handling. Refer to page 17-6-3 Safety Instructions and Solenoid Valve Precautions.

Operation by Manual Override

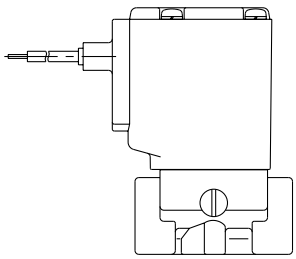
⚠ Warning

Operation

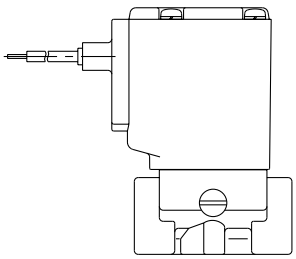
Opening the valve: Turn 90° clockwise by a flat head screwdriver to open the valve. Besides, the valve remains in the open state even when a screwdriver is detached.

Closing the valve: Turn 90° counterclockwise from the open state to the original state to close the valve.

Perform an eletrical operation at the position where the valve is closed.



Closed state (Vertical slot)

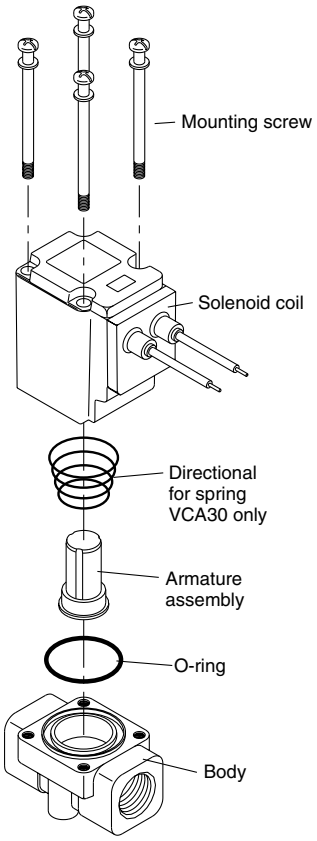


Open state (Horizontal slot)

Disassembly and Reassembly

⚠ Caution

- Cut off the electrical power and pressure supply, and release the residual pressure before dissembling.
- Disassembly procedure
  1. Remove the mounting screws on the top.
  2. Remove the solenoid coil, spring and armature assembly.
  3. If foreign matter is adhering to the parts, perform an appropriate procedure, such as blowing with air or cleaning with neutral detergent.
- Assembly procedure
  Re-assemble by following the disassembly procedure in the reverse order.
  When changing the electrical entry direction, mount it in the direction that solenoid coils will be mounted.



Note 1) For series VCA30, the end of the spring with the smaller O.D. is fitted over the armature ass'y. Be sure to make this distinction when assembling.

Note 2) Tighten the four mounting screws in a diagonally crossing order, and use the proper tightening torque below.

Proper Tightening Torque (N·m)

VCA20	0.4 to 0.5
VCA30	0.6 to 0.8
VCA40	0.6 to 0.8

⚠ Precautions

Be sure to read before handling. Refer to page 17-6-3 for Safety Instructions and Solenoid Valve Precautions.

Glossary

Pressure

1. Maximum operating pressure differential
This indicates the maximum pressure differential (inlet and outlet pressure differential) which can be allowed for operation with the valve closed or open.

2. Maximum operating pressure
This indicates the limit of pressure that can be applied inside the pipelines. (Line pressure)

3. Withstand pressure
The pressure which must be withstood without a drop in performance after returning to the operating pressure range (The value under the prescribed conditions).

Electricity

1. Surge voltage
A high voltage which is momentarily in the shut-off unit by shutting off the power.

Others

1. Material
HNBR: Nitrile hydride rubber

2. JIS symbol
In the JIS symbol () IN and OUT are in a blocked condition (≒), but actually in the case of reverse pressure (OUT > IN), there is a limit to the blocking capability.
() is used to indicate that blocking of reverse pressure is not possible.

For details about certified products conforming to international standards, visit us at www.smcworld.com.

Direct Operated 2 Port Solenoid Valve For Air

Series VCA

How to Order Valves (Single Unit)

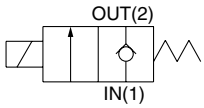
VC A 2 1 ☐ – 1 G ☐ – 3 – 02 ☐ – ☐

For air

Series

2	Class 2
3	Class 3
4	Class 4

Valve type

1	N.C.	

Fluid

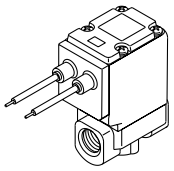
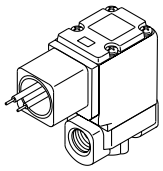
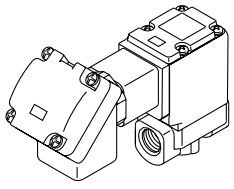
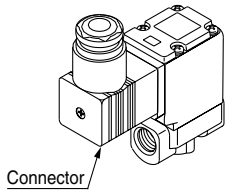
Nil	General air
A	Dry air

Voltage

1	100 VAC
2	200 VAC
3	110 VAC
4	220 VAC
5	24 VDC
6	12 VDC
36	230 VAC

∗ Please consult with SMC regarding other voltages.

Electrical entry

G – Grommet	C – Conduit
	
T – Conduit terminal **TL – Conduit terminal with indicator light**	**D – DIN terminal** **DL – DIN terminal with indecator light** **DO – DIN terminal (without connector)**
	

∗ All types are equipped with surge voltage suppressor.

Manual override

Nil	None
B	Slotted locking type (Tool required)

Option

Nil	None
F	Foot type bracket

∗ When a bracket is separately required, refer to Table 2 given below.

Thread type (for single unit only)

Nil	Rc
F	G
N	NPT
T	NPTF

Port size

Symbol	Port size	Class 2	Class 3	Class 4
02	1/4 (8A)	○	○	—
03	3/8(10A)	—	○	○
04	1/2(15A)	—	—	○
06	3/4(20A)	—	—	○

Orifice size

Symbol	Orifice size (mmø)	Class 2	Class 3	Class 4
3	3	○	—	—
4	4	—	○	—
5	5	○	—	○
7	7	—	○	○
10	10	—	—	○

∗ Refer to the below table for orifice and port size combinations.

Table (1) Orifice and Port Size Combinations

Class	Port size	Orifice size (mmø)				
		3	**4**	**5**	**7**	**10**
2	1/4 (8A)	●	—	●	—	—
3	1/4 (8A)	—	●	—	●	—
	3/8 (10A)	—	●	—	●	—
4	3/8 (10A)	—	—	●	●	●
	1/2 (15A)	—	—	●	●	●
	3/4 (20A)	—	—	—	—	●

Table (2) Bracket Assembly Part No.

Valve model	Bracket assembly part no.
VCA21	VCA20-12-1A
VCA31	VCA30-12-1A
VCA41	VCA40-12-1A

∗ Mounting screws (2 pcs.)

Standard Specifications

Valve specifications	Valve construction			Direct operated poppet
	Fluid			Air, Inert gas, Low vacuum (133 Pa·abs)
	Withstand pressure (MPa)			2.0
	Body material			Al
	Seal material			HNBR
	Ambient temperature (°C)			–20 to 60
	Fluid temperature (°C)			–10 to 60 (No freezing)
	Enclosure			Dusttight, low jetproof (equivalent to IP65)
	Environment			Location without corrosive or explosive gases
	Valve leakage cm³/min (ANR)			0.2 or less
	Mounting orientation			Unrestricted
	Vibration/Impact resistance (m/s²) (2)			30/150 or less
Coil specifications	Rated voltage			24 VDC, 12 VDC, 100 VAC, 110 VAC, 200 VAC, 220 VAC, 230 VAC (50/60 Hz)
	Allowable voltage fluctuation			±10% of rated voltage
	Coil insulation type			Class B
	Power consumption	DC		VCA 2: 6.5 W, VCA 3: 8 W, VCA 4: 11.5 W
	Apparent power	AC (1)	50 Hz	VCA 2: 7.5 VA, VCA 3: 10 VA, VCA 4: 13 VA
			60 Hz	

Note 1) Since AC coil uses a rectifying circuit, there is no difference in apparent power between inrush and holding.
Note 2) Vibration resistance ···· Conditions when tested with one sweep of 10 to 300 Hz in the axial direction and at a right angle to the armature, in both energized and deenergized states. No malfunction occured when tested. (Value at initial state)
Impact resistance ····· Conditions when tested with a drop tester in the axial direction and at a right angle to the armature, one time each in energized and deenergized states. No malfunction occured when tested. (Value at the initial state).

Characteristic Specifications

Model	Class	Port size	Orifice size (mmø)	Max. operating pressure differential(MPa)	Flow characteristics			Max.operating pressure (MPa)	(1) Weight (kg)
					C [dm³/(s<·bar)]	b	Cv		
VCA (for air) 2 port solenoid valve	2	1/4 (8A)	3	1.0	1.1	0.45	0.29	1.0	0.21
			5	0.15	2.9	0.21	0.68		
	3	1/4 (8A) 3/8 (10A)	4	1.0	1.9	0.24	0.45	1.0	0.30
			7	0.15	5.0	0.16	1.2		
	4	3/8 (10A) 1/2 (15A) 3/4 (20A)	5	1.0	3.0	0.35	0.78	1.0	0.50
			7	0.3	5.4	0.27	1.4		
			10	0.15	7.7	0.23	1.9		

Note 1) Weight values are for the grommet type.

Made to Order Specifications

Please contact SMC for detailed specifications, delivery, and price. Made to Order

Oil-free specifications

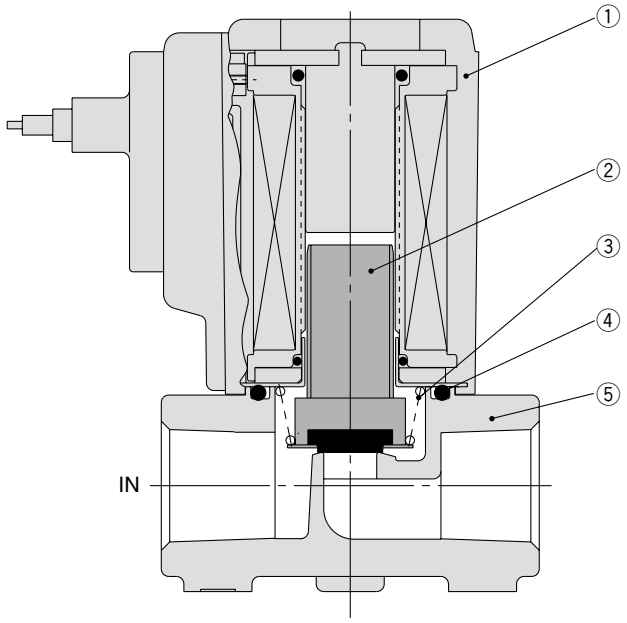
VCA$^{2}_{3}_{4}$1A–□□□–□–□□–□–□–X15

Normally open (N.O.) specifications

VCW$^{2}_{3}_{4}$2–□□□–□–□□–□–□–X43

Note) Fluid: Air. Refer to VCW for model numbers and characteristics.

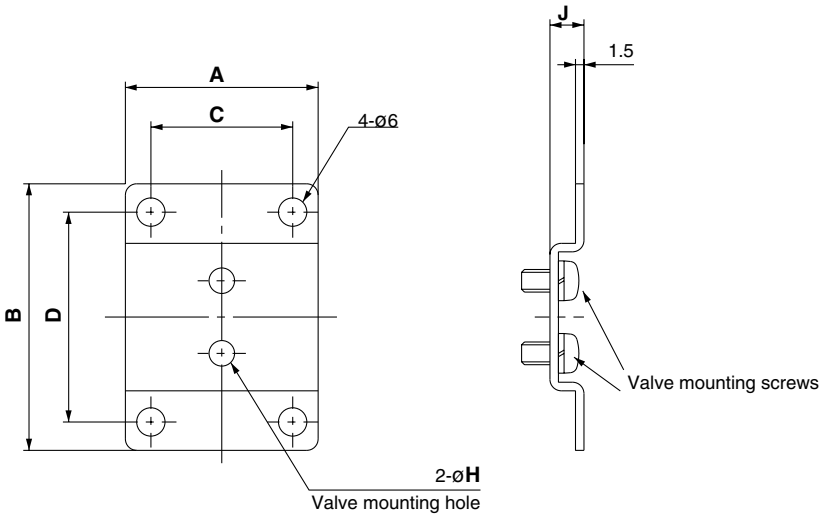
Construction



Component Parts

No.	Description	Material
①	Solenoid coil	—
②	Armature assembly	Stainless steel, HNBR, PPS
③	Return spring	Stainless steel
④	O-ring	HNBR
⑤	Body	Aluminum

Bracket Assembly Dimensions



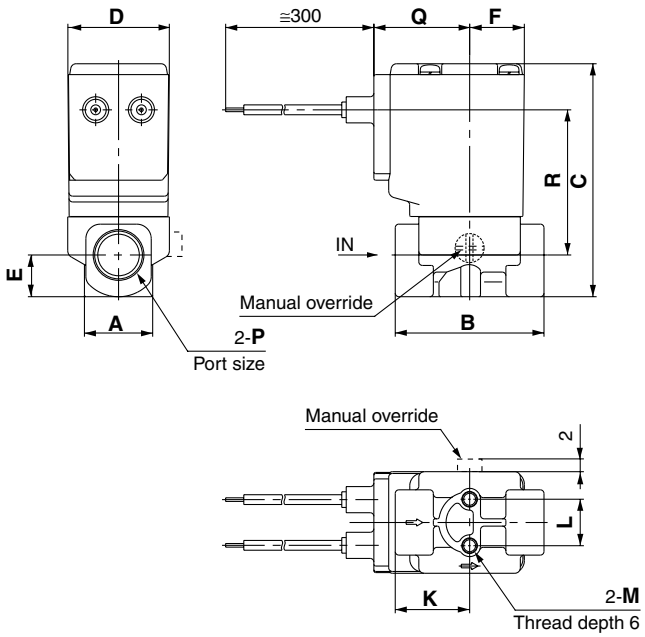
Bracket Mounting Dimensions/Bracket Material: Stainless Steel (mm)

Assembly part no.	A	B	C	D	H	J
VCA20-12-1A	41	52	30	40	4.5	6
VCA30-12-1A	48	56	36	44	5.5	7
VCA40-12-1A	50	62	38	50	5.5	7

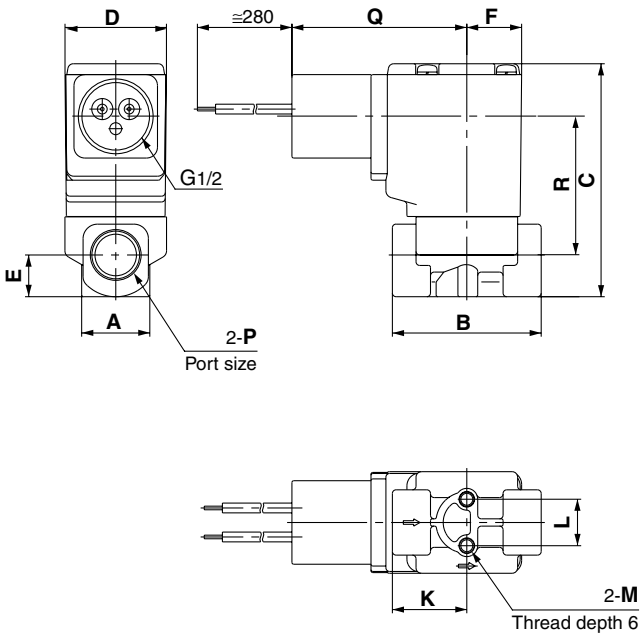
∗ 2 mounting screws (for mounting brackets) are included in bracket part no.

Dimensions

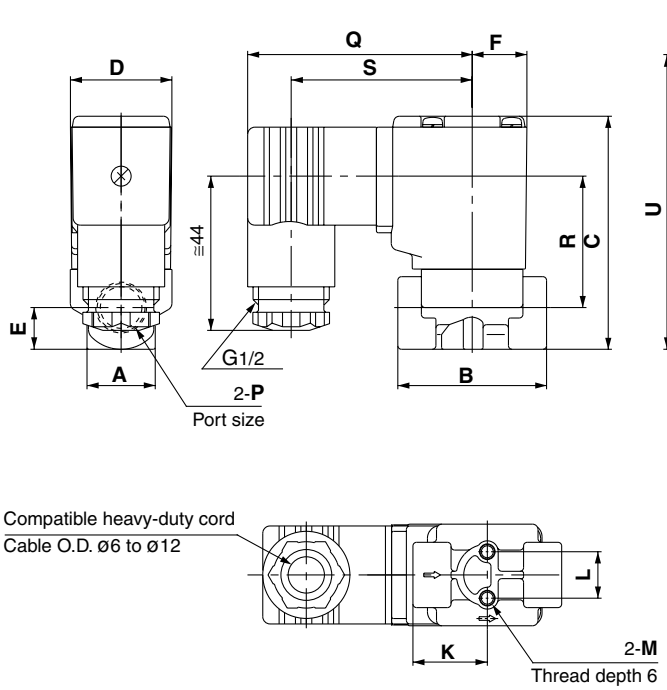
Grommet: G



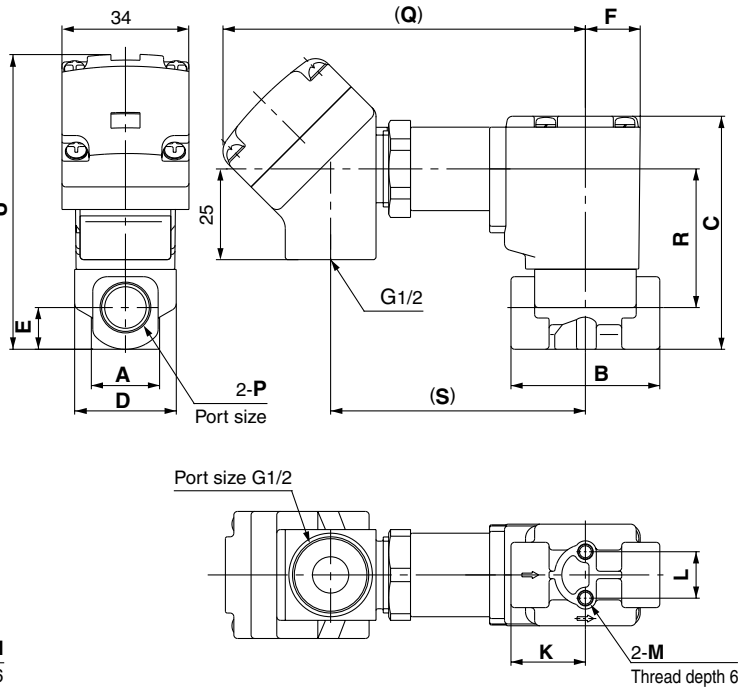
Conduit: C



DIN terminal: D



Conduit terminal: T



(mm)

Model	P Port size	A	B	C	D	E	F	K	L	M	Electrical entry										
											Grommet: G		Conduit: C		DIN terminal: D			Conduit terminal: T			
											Q	R	Q	R	Q	R	S	Q	R	S	U
VCA21	1/4	18	41	64	28	11.5	15	20.5	12.8	M4	27	40	46	36	63	35	51	98	36	68	81
VCA31	1/4, 3/8	24	50	76	34	14	17	25	19	M5	30	48	50	44	66	42	54	101	44	71	91.5
VCA41	3/8, 1/2	30	60	86	40	15	20	30	23	M5	32	56	52	53	69	51	57	104	53	74	101
	3/4	35	68	91	40	17.5	20	34	23	M5	32	58.5	52	55.5	69	53.5	57	104	55.5	74	103.5

How to Order Manifold (VCA20)

VV2C A 2 – 02 02 □ – □ – □

For air

Series

2	Class 2

Stations

02	2 stations
⋮	⋮
10	10 stations

OUT port size

02	1/4 (8A)

Thread type

Nil	Rc
F	G
N	NPT
T	NPTF

IN port direction

Nil	Side
A	Front

Electrical entry

Nil	Grommet, Conduit, DIN
T	Conduit terminal

How to Order Manifold Assembly

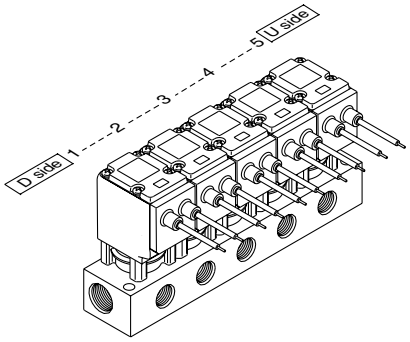
Enter the mounting valve and option part numbers under the manifold base part number.

<Ordering Example>

VV2CA2-0502 ····· 1 set Manifold part no.
∗ VCA23-5G-3 ····· 5 sets Valve part no. (Stations 1 to 5)

"∗" is the symbol for assembly. Add an "∗" in front of the part numbers for solenoid valves, etc., to be mounted.

Enter together in order, counting from station 1 on the D side.



How to Order Valves (VCA20)

VC A 2 3 □ – 1 G □ – 3

For air

Series

2	Class 2

Valve type

3	N.C. for manifold

Fluid

Nil	General air
A	Dry air

Voltage

1	100 VAC
2	200 VAC
3	110 VAC
4	220 VAC
5	24 VDC
6	12 VDC
36	230 VAC

∗ Please consult with SMC regarding other voltages.

Electrical entry

G	Grommet
C	Conduit
T	Conduit terminal
TL	Conduit terminal with indicator light
D	DIN terminal
DL	DIN terminal with indicator light
DO	DIN terminal (without connector)

∗ All types equipped with surge voltage suppressor.

Manual override

Nil	None
B	Slotted locking type (tool required)

Orifice size

Symbol	Orifice size (mmø)
3	3
5	5

How to Order Manifold (VCA30/40)

VV2C A 3 02 ☐ ☐

For air

Series

3	Class 3
4	Class 4

Stations

02	2 stations
⋮	⋮
10	10 stations

Thread type

Nil	Rc
F	G
N	NPT
T	NPTF

IN port direction

Nil	Side
A	Front

How to Order Manifold Assembly

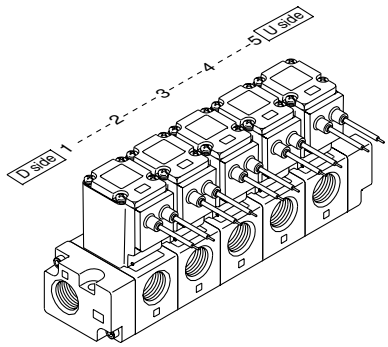
Enter the mounting valve and option part numbers under the manifold base part number.

<Ordering Example>

VV2CA3-05 ····· 1 set Manifold part no.
∗ VCA35-5G-4-03 ····· 5 sets Valve part no. (Stations 1 to 5)

"∗" is the symbol for assembly. Add an "∗" in front of the part numbers for solenoid valves, etc., to be mounted.

Enter together in order, countingfrom station 1 on the D side.



How to Order Valves (VCA30/40)

VC A 3 5 ☐ 1 G ☐ 4 03 ☐

For air

Series

3	Class 3
4	Class 4

Valve type

5	N.C. for manifold

Fluid

Nil	General air
A	Dry air

Voltage

1	100 VAC
2	200 VAC
3	110 VAC
4	220 VAC
5	24 VDC
6	12 VDC
36	230 VAC

∗ Please consult with SMC regarding other voltages.

Electrical entry

G	Grommet
C	Conduit
T	Conduit terminal
TL	Conduit terminal with indicator light
D	DIN terminal
DL	DIN terminal with indicator light
DO	DIN terminal (without connector)

∗ All types equipped with surge voltage suppressor.

Manual override

Nil	None
B	Slotted locking type (Tool required)

Orifice size

Symbol	Orifice size (mmø)	Class 3	Class 4
4	4	○	—
5	5	—	○
7	7	○	○
10	10	—	○

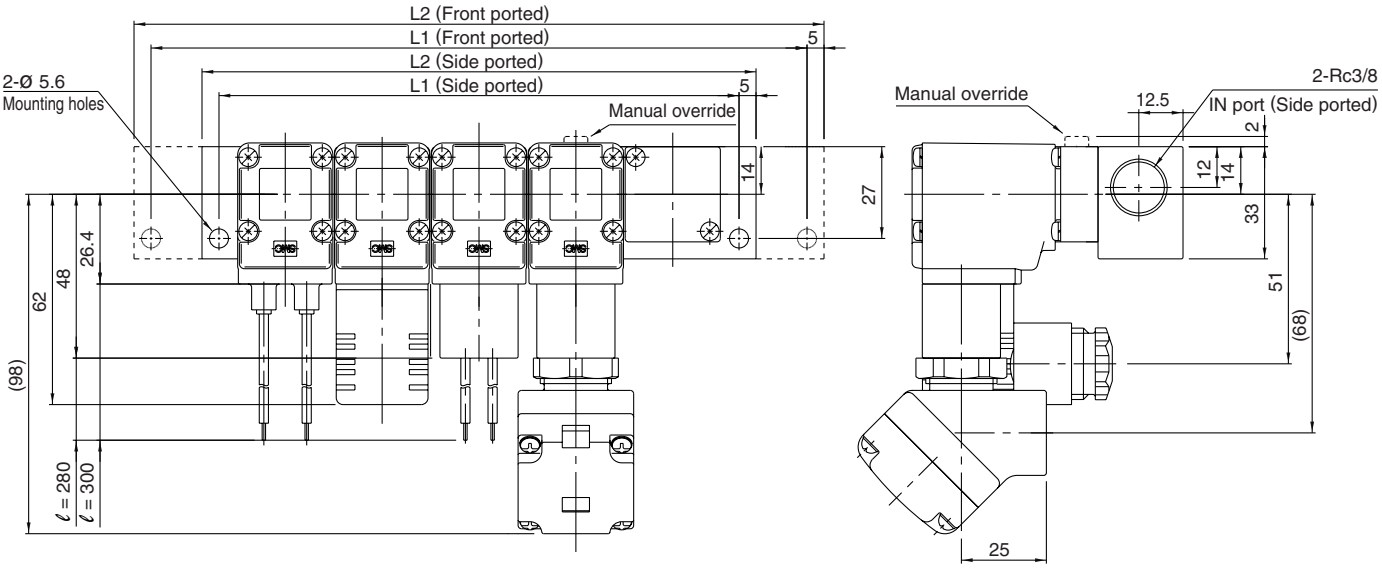
Port size (OUT)

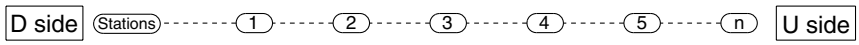
Symbol	Size	Class 3	Class 4
03	3/8 (10A)	○	—
04	1/2 (15A)	○	○
06	3/4 (20A)	—	○

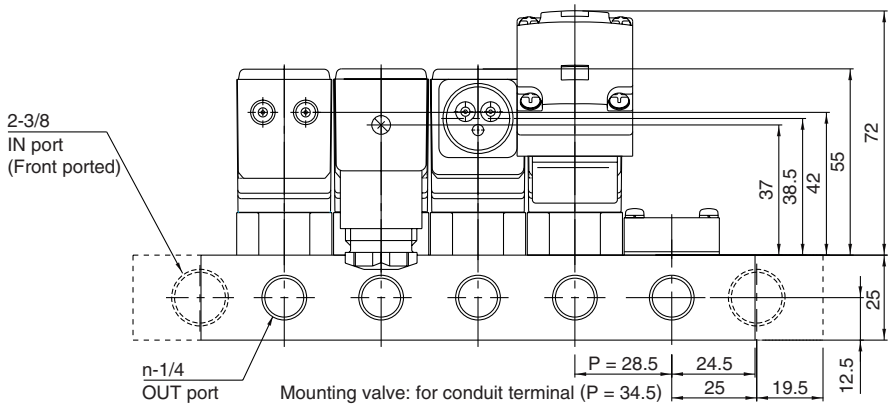
Thread type

Nil	Rc
F	G
N	NPT
T	NPTF

Dimensions: VCA20 Manifold







Dimensions

Side ported: L1 = n x 28.5 + 10.5 L2 = n x 28.5 + 20.5
Front ported: L1 = n x 28.5 + 50.5 L2 = n x 28.5 + 60.5

(mm)

IN port direction	L \ n	2	3	4	5	6	7	8	9	10
Side ported	L1	67.5	96	124.5	153	181.5	210	238.5	267	295.5
	L2	77.5	106	134.5	163	191.5	220	248.5	277	305.5
Front ported	L1	107.5	136	164.5	193	221.5	250	278.5	307	335.5
	L2	117.5	146	174.5	203	231.5	260	288.5	317	345.5

(When the electrical entry of a valve to be mounted is conduit terminal.)

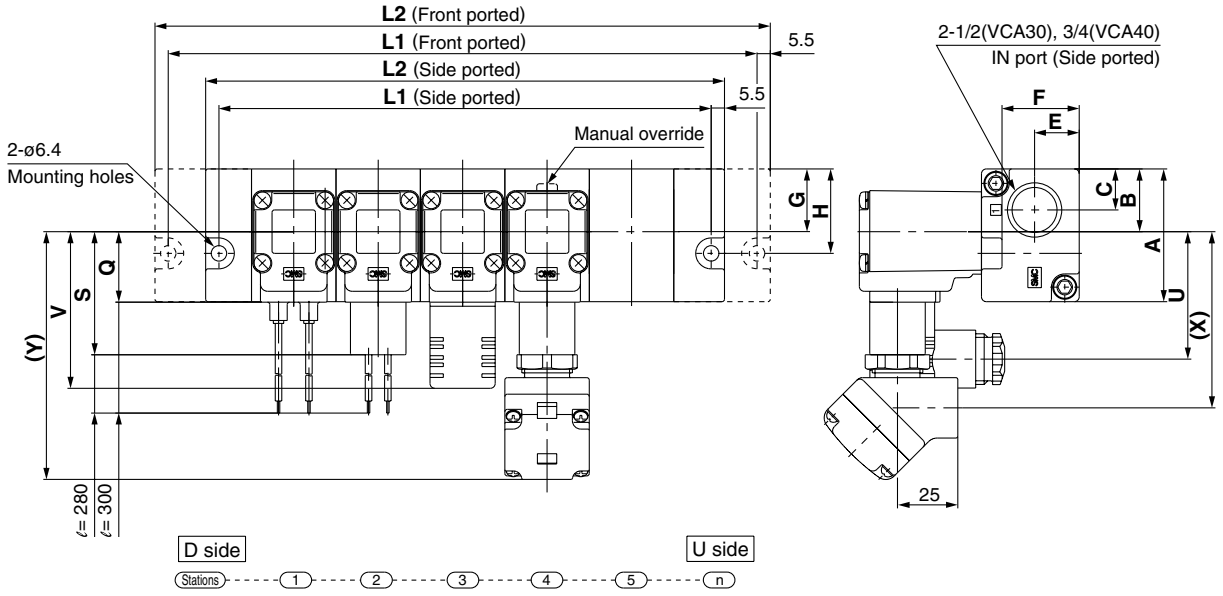
Dimensions

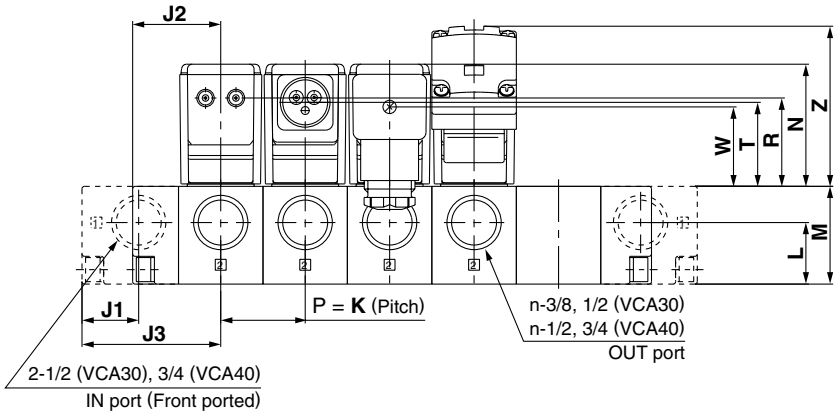
Side ported: L1 = n x 34.5 + 4.5 L2 = n x 34.5 + 14.5
Front ported: L1 = n x 34.5 + 44.5 L2 = n x 34.5 + 54.5

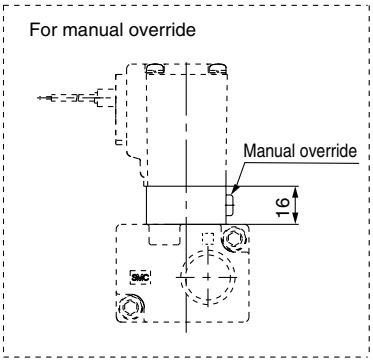
(mm)

IN port direction	L \ n	2	3	4	5	6	7	8	9	10
Side ported	L1	73.5	108	142.5	177	211.5	246	280.5	315	349.5
	L2	83.5	118	152.5	187	221.5	256	290.5	325	359.5
Front ported	L1	113.5	148	182.5	217	251.5	286	320.5	355	389.5
	L2	123.5	158	192.5	227	261.5	296	330.5	365	399.5

Dimensions: VCA30/40 Manifold







L Dimension

(mm)

Model	IN port direction	Dimensions	n (stations)								
			2	3	4	5	6	7	8	9	10
VV2CA3	Side ported	**L1**	103	138	173	208	243	278	313	348	383
		L2	114	149	184	219	254	289	324	359	394
	Front ported	**L1**	139	174	209	244	279	314	349	384	419
		L2	150	185	220	255	290	325	360	395	430
VV2CA4	Side ported	**L1**	117	158	199	240	281	322	363	404	445
		L2	128	169	210	251	292	333	374	415	456
	Front ported	**L1**	161	202	243	284	325	366	407	448	489
		L2	172	213	254	295	336	377	418	459	500

Formulas
VV2CA3
Side ported: L1 = n x 35 + 33, L2 = n x 35 + 44
Front ported: L1 = n x 35 + 69, L2 = n x 35 + 80
VV2CA4
Side ported: L1 = n x 41 + 35, L2 = n x 41 + 46
Front ported: L1 = n x 41 + 79, L2 = n x 41 + 90

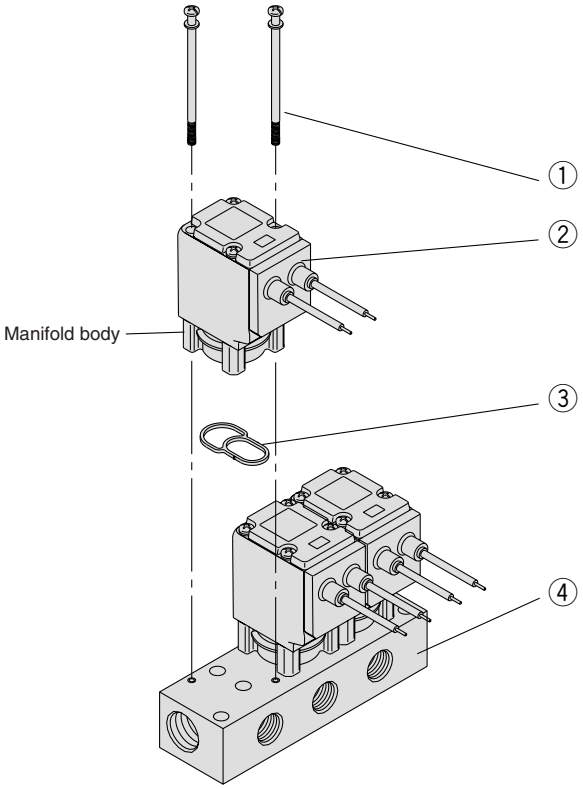
Dimensions

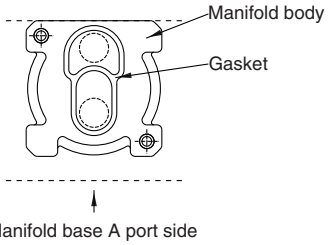
(mm)

Model	A	B	C	E	F	G	H	J1	J2	J3	K	L	M	N	Electrical entry									
															Grommet: G		Conduit: C		DIN terminal: D			Conduit terminal: T		
															Q	R	S	T	U	V	W	X	Y	Z
VV2CA3	55	26	17	19.5	33	26	35	23.5	39.5	57.5	35	26.5	41.5	50	30	36	50	32	54	66	30	71	101	65.5
VV2CA4	62	31	19	21	39.5	31	43	27	43.5	65.5	41	29	48	55	32	41	52	38	57	69	36	74	104	71

Manifold Exploded View

Series VCA20



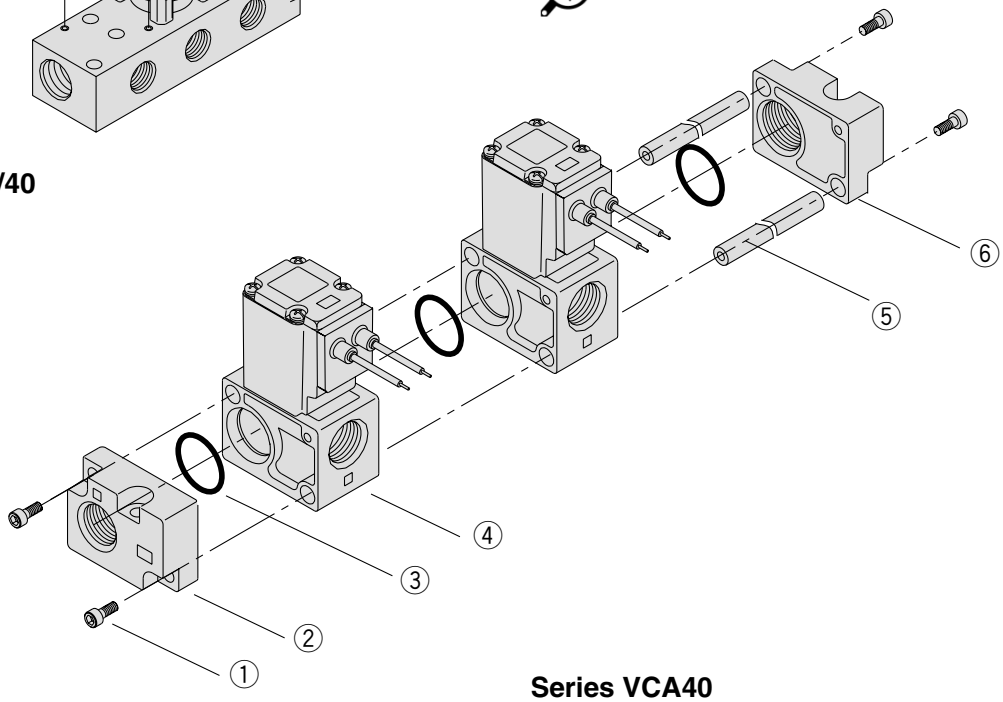


Mounting orientation exists when mounting valves onto manifold base. Mount it as shown above.

No.	Part no.	Description	Material
①	**M3 x 57**	Cross-recessed head machine screw	Steel
②	**VCA23□-□□□-□**	Valve for manifold (1)	
③	**VVCA20-3-1**	Gasket	HNBR
④	**VV2CA2-□□□-□**	Manifold base	Aluminum

Note 1) Gasket ③ is included with manifold valve ②.

Series VCA30/40



Series VCA30

No.	Part no.	Description	Material
①	**AXT632-69-1**	Mounting screw (side port)	Steel
	AXT632-69-2	Mounting screw (front port)	
②	**VVCA30-3A-04-2**	End plate assembly (D side, side port)	Aluminum
	VVCA30-3A-04-1	End plate assembly (D side, front port)	
③	**OR-2200-200-H**	O-ring (for VCA30)	HNBR
④	**VCA35□-□□-□-□□**	Manifold valve (2)	
⑤	**VVCA30-6-n**	Tie-rod	Steel
⑥	**VVCA30-4A-04-2**	End plate assembly (U side, side port)	Aluminum
	VVCA30-4A-04-1	End plate assembly (U side, front port)	

Note 2) O-ring ③ is included with manifold valve ④.

Series VCA40

No.	Part no.	Description	Material
①	**AXT632-69-1**	Mounting screw (side port)	Steel
	AXT632-69-2	Mounting screw (front port)	
②	**VVCA40-3A-06-2**	End plate assembly (D side, side port)	Aluminum
	VVCA40-3A-06-1	End plate assembly (D side, front port)	
③	**OR-3200-200-H**	O-ring (for VCA40)	HNBR
④	**VCA45□-□□-□-□□**	Manifold valve (2)	
⑤	**VVCA40-6-n**	Tie-rod	Steel
⑥	**VVCA40-4A-06-2**	End plate assembly (U side, side port)	Aluminum
	VVCA40-4A-06-1	End plate assembly (U side, front port)	

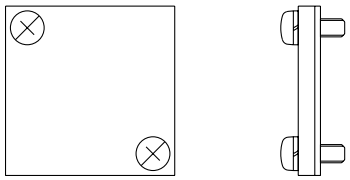
Note 2) O-ring ③ is included with manifold valve ④.

Manifold Option Parts

Blanking plate assembly (VCA20)

VVCA20 − 4A

This is used when a blanking plate is mounted on a manifold as preparation for a planned valve installation. (With gasket, 2 mounting screws)

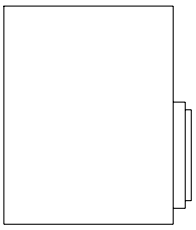


Blanking block assembly (VCA30, 40)

VVCA 3 0 − 2A − 00

3	Series VCA30
4	Series VCA40

This is used when a blanking plate is mounted on a manifold as preparation for a planned valve installation. (With O-ring)

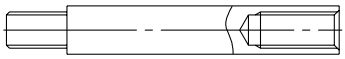


Tie-rod for additional stations (Set of 2 pcs for 1 station) (VCA30, 40)

VVCA 3 0 −6 −1A

3	Series VCA30
4	Series VCA40

Mounted on the tie-rod when adding one station.



Direct Operated 2 Port Solenoid Valve For Heated Water

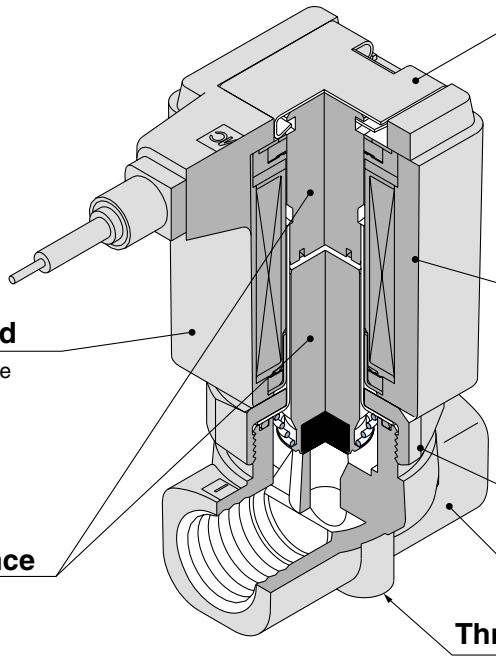
Series VCB

Improved durability (Nearly twice the life of the previous series)

Resistance of moving parts has been reduced through the use of a unique magnetic material. Service life, wear resistance, and corrosion resistance are improved.

Large flow rate: Av factor 3.84 to 50.40 x 10^{-6} m^2

Compact: Single valve volume reduced by –15% (Class 3)



Clip type

Ease of maintenance has been improved.
Changing of the coil is made easy by means of clip design.

Flame resistant molded coil material
Flame resistance equivalent to UL94 standard V-0

Coil size and weight reduced
New compact coil reduces the overall size and weight of the valve.
Volume: –15%
Weight: –20%
SMC comparison (Class 3)

Threaded assembly
Simplifies maintenance

Improved corrosion resistance
Special material introduced.

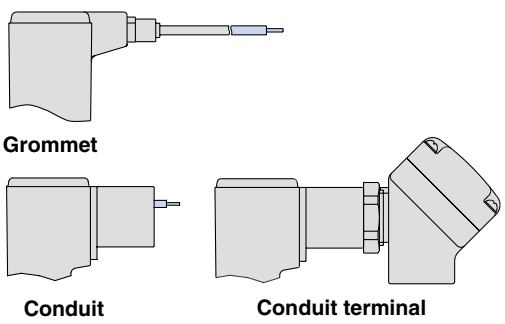
Improved corrosion resistance

Threaded for bottom mounting
Spacial bracket can be mounted.

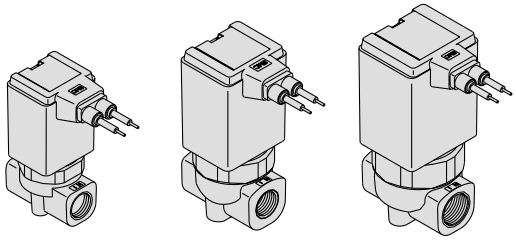
Enclosure: Dusttight/Low jetproof (Equivalent to IP65)

Wiring Specifications (Class H coil)

Wiring Variations



Lined Up by Compact Design



VCB2 Class 2 | VCB3 Class 3 | VCB4 Class 4

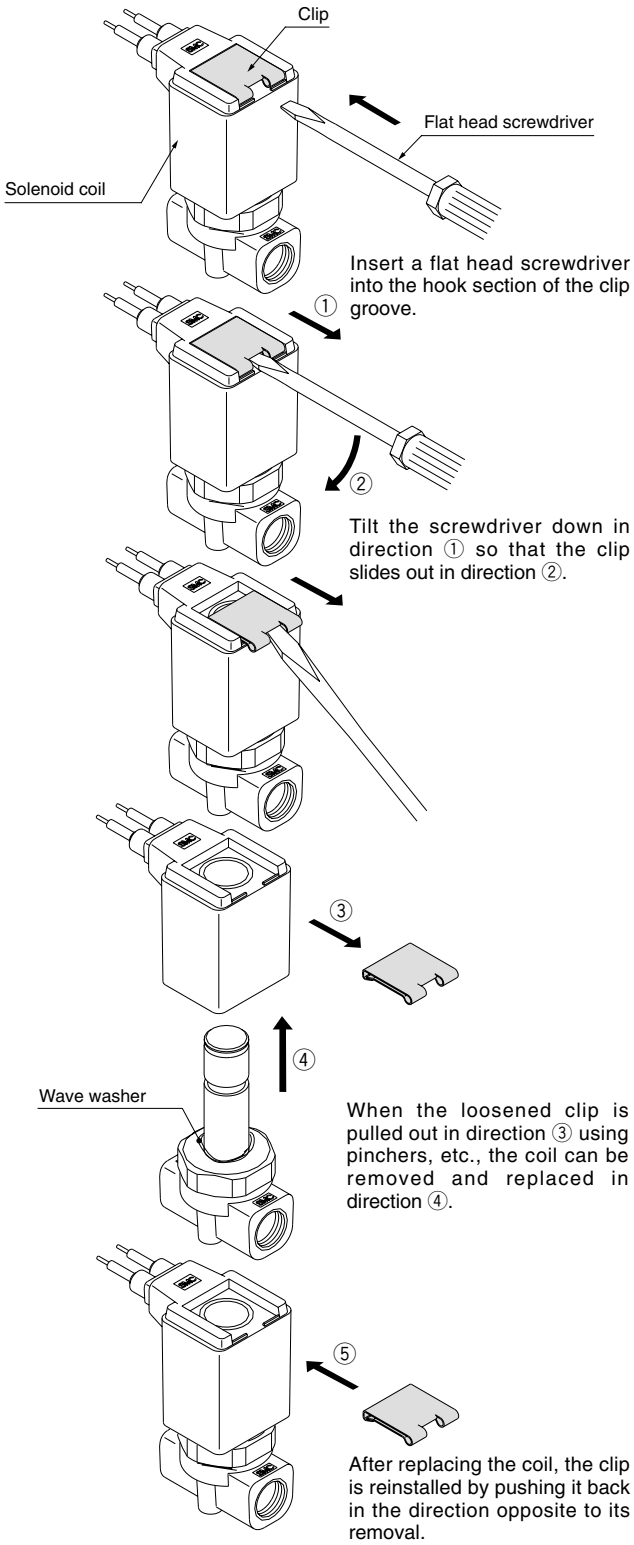
⚠ Precautions

Be sure to read before handling. Refer to page 17-6-3 for Safety Instructions and Solenoid Valve Precautions.

Replacing the Solenoid Coils

⚠ Caution

The valve will reach high temperatures from high temperature fluids such as heated water. Confirm that the valve has cooled sufficiently before performing works. If touched inadvertently, there is a danger of being burned.



Replacement Parts

● **Solenoid coil part no.**

VCS | **20** | **1** | **G** | ☐

Series

20	Class 2
30	Class 3
40	Class 4

Voltage

1	100 VAC
2	200 VAC
3	110 VAC
4	220 VAC
36	230 VAC

Lead wire length

Nil	300 mm
L1	600 mm
L2	1000 mm
L3	1500 mm
L4	3000 mm

Note) Grommet type only

Electrical entry

G	Grommet
C	Conduit
T	Conduit terminal

● **Clip part no.**

AZ-T-VCB — **Valve model no. on page 17-2-24**

Note) Indicate the valve model no. as a label will be attached to the clip.

● **Seal part no.**

Valve

For VCB20

OR-1860-120-F

F: FKM
E: EPDM

For VCB30

OR-2380-130-F

F: FKM
E: EPDM

For VCB40

OR-2600-180-F

F: FKM
E: EPDM

When external leakage occurs after disassembling a valve, replace the above seals.

● **Wave washer part no.**

For VCB20: 41014
For VCB30: 41016
For VCB40: 41018

⚠ Precautions

Be sure to read before handling. Refer to page 17-6-3 for Safety Instructions and Solenoid Valve Precautions.

Glossary

Pressure

1. Maximum operating pressure differential

This indicates the maximum pressure differential (the difference between the inlet and outlet pressure) which can be allowed for operation with the valve closed or open. When the outlet pressure is 0 MPa, this becomes the maximum operating pressure.

2. Maximum operating pressure

This indicates the limit of pressure that can be applied inside the pipelines. (line pressure)
(The pressure differential of the solenoid valve unit must be no more than the maximum operating pressure differential.)

3.Withstand pressure

The pressure which must be withstood without deterioration in performance when the valve returns to the operating pressure range (The value under the specified conditions).

Electricity

1. Surge voltage

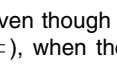
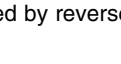
A high voltage which is momentarily generated in the shut-off unit by shutting off the power.

Others

1. Material

FKM: Fluoro rubber = FPM — Trade names: Viton®, Dai-El®, etc.
EPDM: Ethylene propylene rubber
CAC406: Bronze (BC6)
C37: Brass
SUS: Stainless steel

2. JIS symbol

According to JIS symbol, even though () IN and OUT shows the blocked state (), when there is reverse pressure (OUT > IN), there is limited blocking ability. To describe the fact that it cannot be blocked by reverse pressure, () symbol is used here.

Direct Operated 2 Port Solenoid Valve For Heated Water

Series VCB

How to Order Valves

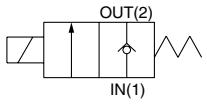
VC B 2 1 – 1 G – 2 – 02 □ – □ – □

For heated water
When no symbol is shown for "Material and insulation type"
- Body material: CAC406
- Seal material: FKM
- Coil insulation: Class H

Series

2	Class 2
3	Class 3
4	Class 4

Valve type

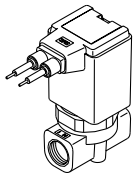
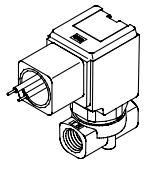
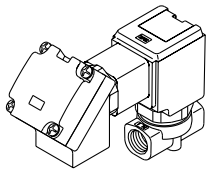
1	N.C. 

Voltage

1	100 VAC
2	200 VAC
3	110 VAC
4	220 VAC
36	230 VAC

∗ Please consult with SMC regarding other voltages.

Electrical entry

G – Grommet	C – Conduit
	
T – Conduit terminal	
	

∗ Available types of electrical entry are either G, C and T. (Surge voltage suppressor is not equipped.)

Orifice size

Symbol	Orifice size (mmø)	Class 2	Class 3	Class 4
2	2	○	—	—
3	3	○	○	○
4	4	○	○	○
5	5	○	○	○
7	7	—	○	○
10	10	—	○	○

∗ Refer to the below table for orifice and port size combinations.

Port size

Symbol	Port size	Class 2	Class 3	Class 4
01	1/8 (6A)	○	—	—
02	1/4 (8A)	○	○	○
03	3/8 (10A)	—	○	○
04	1/2 (15A)	—	○	○
06	3/4 (20A)	—	—	○

Thread type

Nil	Rc
N	NPT
F	G

Material and insulation type

Symbol	Body material	Seal material	Coil insulation type
Nil	CAC406 (BC6)	FKM	Class H
M		EPDM	
N	SUS	FKM	
P		EPDM	

Option

Nil	None
F	Foot type bracket

Orifice and Port Size Combinations

Class	Port size	Orifice size (mmø) 2	3	4	5	7	10
2	1/8 (6A)	●	●	●	●	—	—
	1/4 (8A)	●	●	●	●	—	—
3	1/4 (8A)	—	●	●	●	●	—
	3/8 (10A)	—	●	●	●	●	●
	1/2 (15A)	—	—	—	—	—	●
4	1/4 (8A)	—	●	●	●	●	—
	3/8 (10A)	—	●	●	●	●	●
	1/2 (15A)	—	—	—	—	—	●
	3/4 (20A)	—	—	—	—	—	●

Standard Specifications

Valve specifications	Valve construction		Direct operated poppet
	Fluid		Heated water (99°C or less)
	Withstand pressure (MPa)		5.0
	Body material		CAC406 (BC6), Stainless steel
	Seal material		FKM, EPDM
	Ambient temperature (°C)		–20 to 100
	Fluid temperature (°C)		1 to 99
	Enclosure		Dusttight, low jetproof (equivalent to IP65)
	Environment		Location without corrosive or explosive gases
	Valve leakage cm^3/min		0 (With water pressure)
	Mounting orientation		Unrestricted
	Vibration/Impact resistance (m/s^2) Note)		30/150 or less
Coil specifications	Rated voltage		100 VAC, 110 VAC, 200 VAC, 220 VAC, 230 VAC (50/60 Hz)
	Allowable voltage fluctuation		±10% of rated voltage
	Coil insulation type		Class H
	Power consumption (W) 50/60 Hz		VCB2: 4.9/4.1, VCB3: 7.7/6.6, VCB4: 10.5/9.3
	Apparent power (VA) 50/60 Hz	Inrush	VCB2: 22/19, VCB3: 36/30, VCB4: 45/37
		Holding	VCB2: 10/8, VCB3: 15/13, VCB4: 19/16

Note1) Vibration resistance ···· Conditions when tested with one sweep of 10 to 250 Hz in the axial direction and at a right angle to the armature, in both energized and deenergized states. No malfunction occurred when tested. (Value at the initial state)

Impact resistance ···· Conditions when tested with a drop tester in the axial direction and at a right angle to the armature, one time each in energized and deenergized states. No malfunction occurred when tested. (Value at the initial state)

Characteristic Specifications

Model	Class	Port size (1)	Orifice size (mmø) (1)	Max. operating pressure differential (MPa)	Flow characteristics		Max. operating pressure (MPa)	Weight (kg)
					Av x 10^{-6}(m^2)	Cv converted		
VCB2	2	1/8 (6A) 1/4 (8A)	2	2.0	3.8	0.16	3.0	1/8 : 0.21 1/4 : 0.24
			3	0.8	7.9	0.33		
			4	0.5	12	0.51		
			5	0.3	16	0.65		
VCB3	3	1/4 (8A) 3/8(10A) 1/2(15A)	3	2.0	8.4	0.35	3.0	1/4 : 0.42 3/8 : 0.40 1/2 : 0.49
			4	0.8	13	0.54		
			5	0.5	19	0.80		
			7	0.2	33	1.4		
			10	0.1	50	2.1		
VCB4	4	1/4 (8A) 3/8(10A) 1/2(15A) 3/4(20A)	3	3.0	8.4	0.35	3.0	1/4 : 0.58 3/8 : 0.55 1/2 : 0.62 3/4 : 0.78
			4	1.3	14	0.60		
			5	0.7	20	0.85		
			7	0.3	33	1.4		
			10	0.12	50	2.1		

Note 1) Refer to model selection on page 17-2-24 regarding port size and orifice size combinations.
Note 2) The weight is the value for the grommet type.

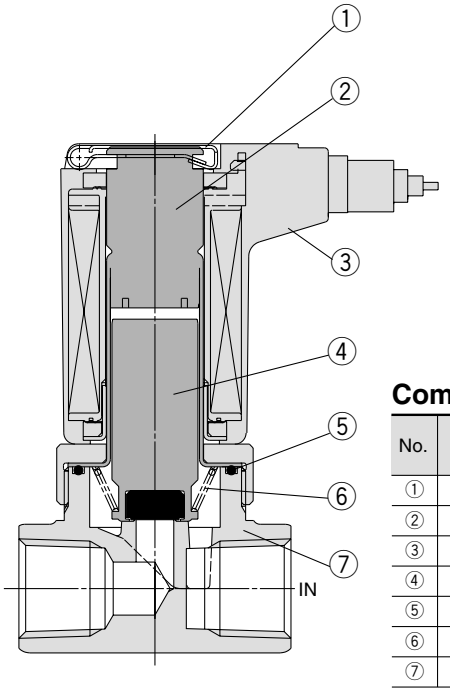
Made to Order Specifications

Please contact SMC for detailed specifications, delivery, and price.

Oil-free specifications

VCB–□□–□□–□–□□–□–□–X10

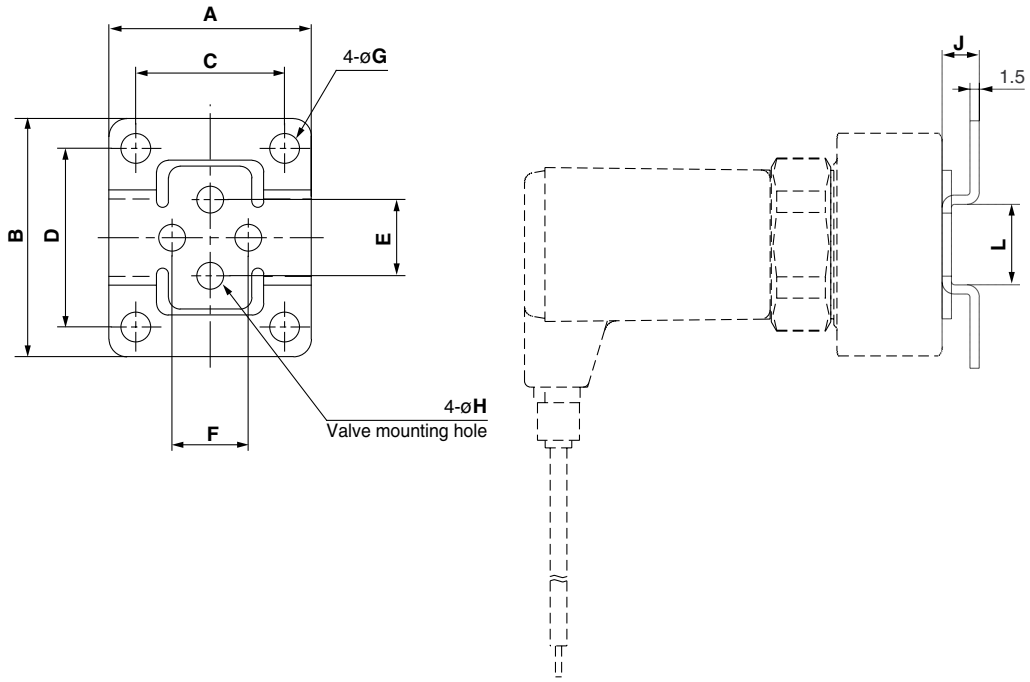
Construction



Component Parts

No.	Description	Material	
		Standard	Option
①	Clip	Stainless steel	—
②	Tube assembly	Stainless steel/Cu	Stainless steel/Ag
③	Coil assembly	Class H	—
④	Armature assembly	Stainless steel/FKM	Stainless steel/EPDM
⑤	Seal	FKM	EPDM
⑥	Return spring	Stainless steel	—
⑦	Body	CAC406	Stainless steel

Dimensions: Bracket



Bracket Mounting Dimensions/Bracket Material: Stainless Steel

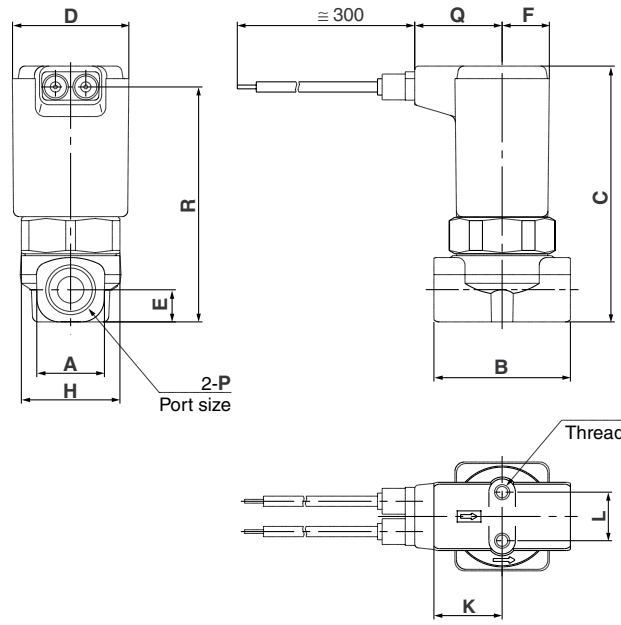
(mm)

Valve model	Port size	Bracket part no.	A	B	C	D	E	F	G	H	J	L
VCB2□	1/8, 1/4	**VCW20-12-01A**	34	40	25	30	12.8	12.8	5	4.5	6	13
VCB3□	1/4, 3/8	**VCW30-12-02A**	42	52	30	40	19	19	6	5.5	7	19
	1/2	**VCW30-12-04A**[Note 1)]	48	56	36	44	23	23	6	5.5	7	23
VCB4□	1/4, 3/8	**VCW40-12-02A**	42	52	30	40	23	23	6	5.5	7	19
	1/2	**VCW30-12-04A**[Note 1)]	48	56	36	44	23	23	6	5.5	7	23
	3/4	**VCW40-12-06A**	56	65	44	53	28.2	28.2	6	5.5	7	26

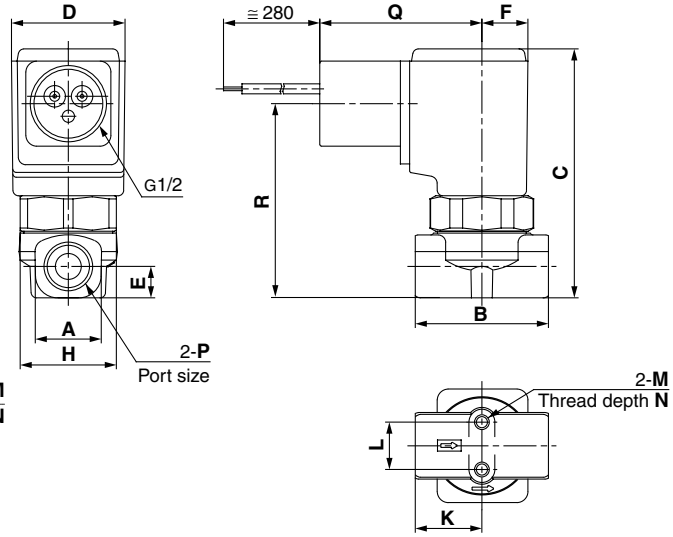
∗ 2 mounting screws (for mounting bracket) are included in bracket part no.
Note 1) The same bracket is used for VCB3□ and VCB4□ (port size 1/2).

Dimensions

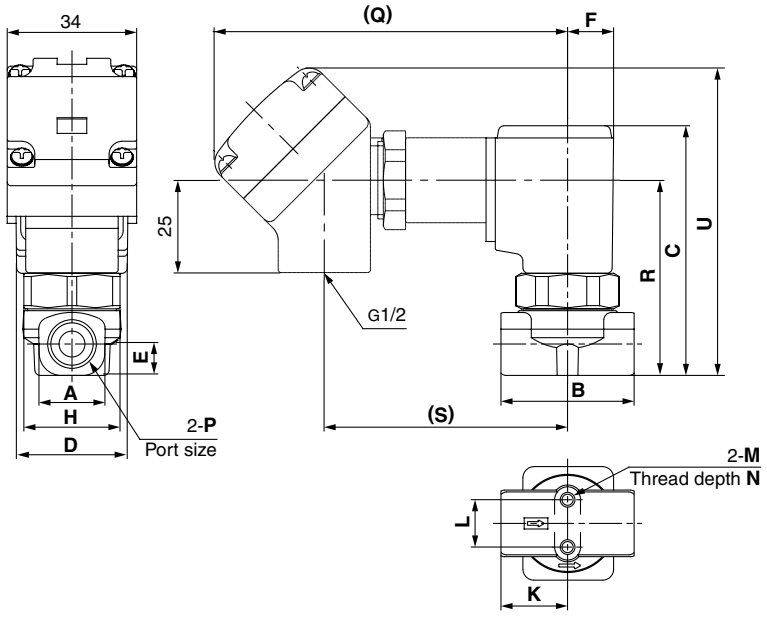
Grommet : G



Conduit: C



Conduit terminal: T



(mm)

Model	P Port size	A	B	C	D	E	F	H	K	L	M	N	Electrical entry							
													Grommet:G		Conduit:C		Conduit terminal:T			
													Q	R	Q	R	Q	R	S	U
VCB21	1/8	13.5	28	64	31	6.5	12.5	28	14	12.8	M4	4.5	22	59	44	50	99	50	66	83
	1/4	18	36	67.5	31	8.5	12.5	28	18	12.8	M4	6	22	62	44	53	99	53	66	86
VCB31	1/4, 3/8	22	40	81.5	36.5	11	15	32	20	19	M5	8	24	76	46	66.5	101	66.5	68	99
	1/2	30	50	86	36.5	13.5	15	32	25	23	M5	8	24	80	46	71	101	71	68	104
VCB41	1/4, 3/8	22	45	90	41	11	17	36	22.5	23	M5	8	26	84	48	74.5	103	74.5	70	107
	1/2	30	50	94	41	13.5	17	36	25	23	M5	8	26	88	48	78.5	103	78.5	70	111.5
	3/4	35	60	102	41	17.5	17	36	30	28.2	M5	8	26	96	48	86.5	103	86.5	70	119

Direct Operated 2 Port Solenoid Valve For Oil

Series VCL

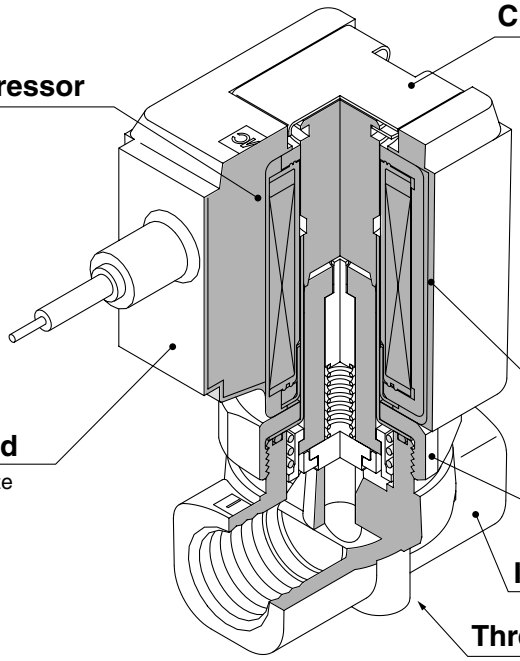
Kerosene, Fuel oil Class 1 (fuel oil A), Silicone oil, Machine oil, Compressor oil, Gas oil, Hydraulic fluid, Turbine oil

Improved durability (Nearly twice the life of the previous series)

The internal resistance of moving parts has been reduced through the use of a unique magnetic material. Service life, wear resistance, and corrosion resistance are improved.

High speed response (Nearly twice the previous series)

Compact: Single valve volume reduced by –15% (Class 3)
Manifold length reduced by –18% (Class 3: 5 stations) (SMC comparison)



Clip type

Built-in surge voltage suppressor (Class B coil)

Built-in rectifying circuit (AC)
- AC/DC switchover is possible by simply changing the coil.
- Noise prevention

Note) For Class B coil

Large flow rate: Av factor 3.84 to 50.40 x 10^{-6} m^2

Ease of maintenance has been improved.
Changing of the coil is made easy by means of clip design.

Flame resistant molded coil material
Flame resistance equivalent to UL94 standard V-0

Coil size and weight reduced
New compact coil reduces the overall size and weight of the valve.
Volume: –15% } SMC comparison
Weight: –20% } (Class 3)

Threaded assembly
Simplifies maintenance

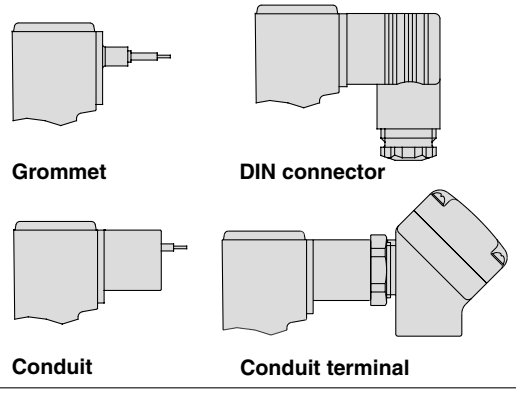
Improved corrosion resistance

Threaded for bottom mounting
Spacial bracket can be mounted.

A variety of wiring options (Class B coil)
Grommet, DIN terminal, Conduit, Conduit terminal

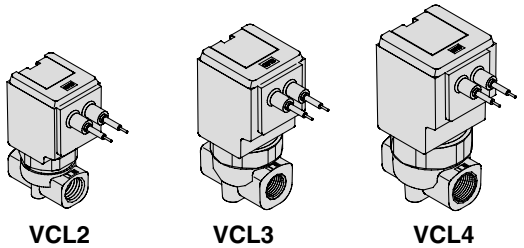
Wiring Specifications (Class B coil)

Wiring Variations



Enclosure: Dusttight/Low jetproof (Equivalent to IP65)

Lined Up by Compact Design



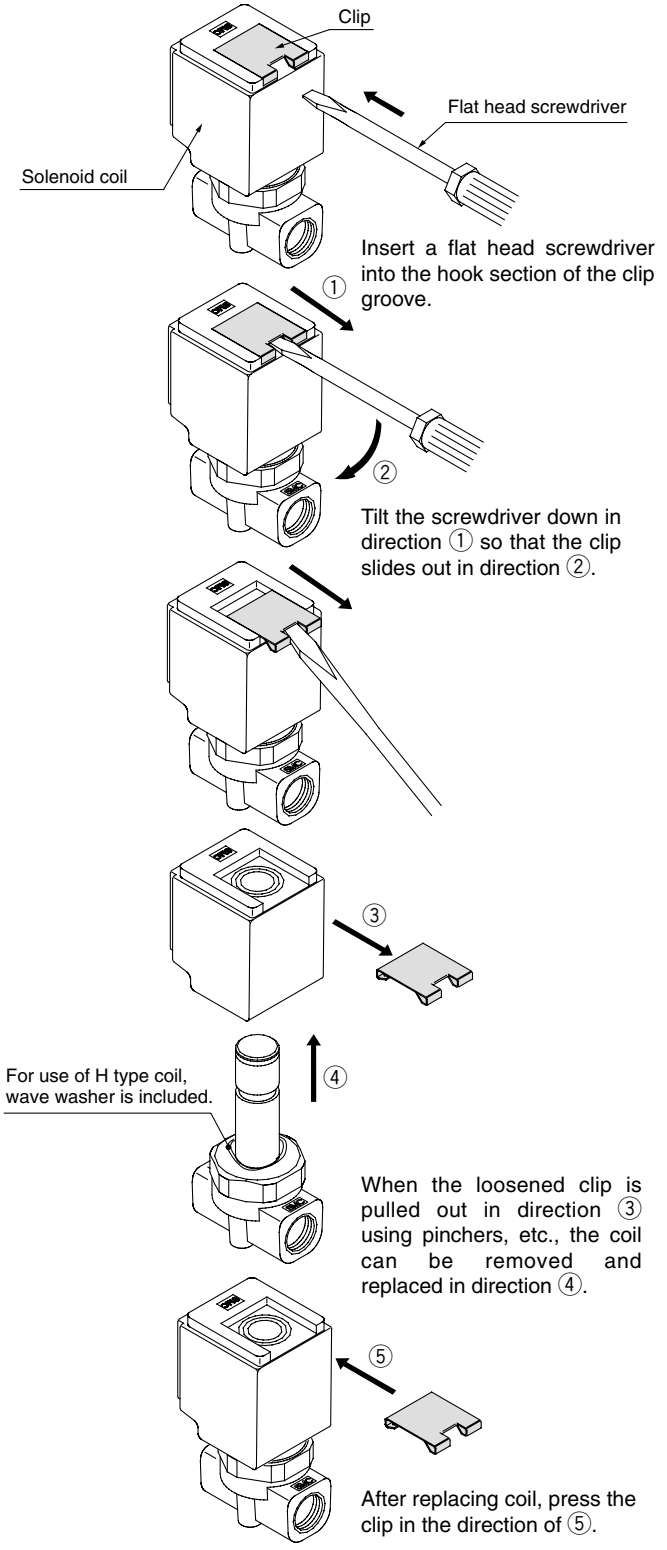
⚠ Precautions

Be sure to read before handling. Refer to page 17-6-3 for Safety Instructions and Solenoid Valve Precautions.

Replacing the Solenoid Coils

⚠ Caution

The valve will reach high temperatures from high temperature fluids such as steam. Confirm that the valve has cooled sufficiently before performing work. If touched inadvertently, there is a danger of being burned.



Replacement Parts

● **Solenoid coil part no. (Type B)**

VCW 20 — 1 G — □

Series

20	Class 2
30	Class 3
40	Class 4

Voltage

1	100 VAC
2	200 VAC
3	110 VAC
4	220 VAC
5	24 VDC
6	12 VDC
36	230 VAC

Electrical entry

G	Grommet
D	DIN terminal
DL	DIN terminal with light
DO	DIN terminal (without connector)
C	Conduit
T	Conduit terminal
TL	Conduit terminal with indicator light

Lead wire length

Nil	300 mm
L1	600 mm
L2	1000 mm
L3	1500 mm
L4	3000 mm

● **Solenoid coil part no. (Type H)**

VCS 20 — 1 G — □

Series

20	Class 2
30	Class 3
40	Class 4

Voltage

1	100 VAC
2	200 VAC
3	110 VAC
4	220 VAC
36	230 VAC

Electrical entry

G	Grommet
C	Conduit
T	Conduit terminal
TL	Conduit terminal with indicator light

Lead wire length

Nil	300 mm
L1	600 mm
L2	1000 mm
L3	1500 mm
L4	3000 mm

● **Clip part no.**

AZ-T-VCL **Valve model no. on page 17-2-32/36.**

Note) Indicate the valve model no. as a label will be attached to the clip.

⚠ Precautions

Be sure to read before handling. Refer to page 17-6-3 for Safety Instructions and Solenoid Valve Precautions.

Replacement Parts

● **Seal part no.**

Valve

For VCL20

OR-1860-120-F — F: FKM

For VCL30

OR-2380-130-F — F: FKM

For VCL40

OR-2600-180-F — F: FKM

Manifold

For VCL20

OR-1400-178-F — F: FKM

OR-2670-178-F — F: FKM

For VCL30, 40

OR-1717-178-F — F: FKM

OR-3305-178-F — F: FKM

● **Wave washer part no. (Type H)**

For VCL20: 41014
For VCL30: 41016
For VCL40: 41018

Glossary

Pressure

1. Maximum operating pressure differential

This indicates the maximum pressure differential (inlet and outlet pressure differential) which can be allowed for operation with the valve closed or open. When the downstream pressure is 0 MPa, this becomes the maximum operating pressure.

2. Maximum system pressure

This indicates the limit of pressure that can be applied inside the pipelines. (Line pressure)
(The pressure differential of the solenoid valve unit must be no more than the maximum operating pressure differential.)

3. Withstand pressure

The pressure which must be withstood without a drop in performance after returning to the operating pressure range (The value under the prescribed conditions).

Electricity

1. Surge voltage

A high voltage which is momentarily generated in the shut-off unit by shutting off the power.

Others

1. Material

FKM: Fluoro rubber = FPM — Trade names: Viton®, Dai-El®, etc.
C37: Brass
SUS: Stainless steel

2.JIS symbol

In the JIS symbol ( ) IN and OUT are in a blocked condition ( ), but actually in the case of reverse pressure (OUT > IN), there is a limit to the blocking capability.
( ) is used to indicate that blocking of reverse pressure is not possible.

Direct Operated 2 Port Solenoid Valve For Oil

Series VCL

How to Order Valves (Single Unit)

VC L 2 1 – 1 G – 2 – 02 □ – □ – □

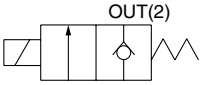
For oil

When no symbol is shown for "Material and insulation type"
- Body material: C37
- Seal material: FKM
- Coil insulation: Class B

Series

2	Class 2
3	Class 3
4	Class 4

Valve type

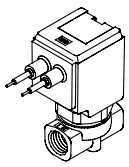
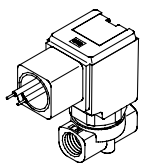
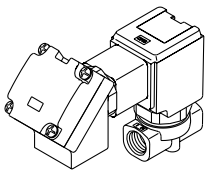
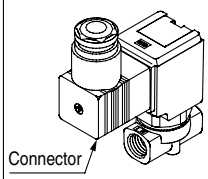
1	N.C. OUT(2)  IN(1)

Voltage

1	100 VAC
2	200 VAC
3	110 VAC
4	220 VAC
5	24 VDC
6	12 VDC
36	230 VAC

∗ Class B in AC has a rectifying circuit built-in.
∗∗ Class H is AC only. No rectifying circuit.
∗∗∗ Please consult with SMC regarding other voltages.

Electrical entry

G – Grommet	**C – Conduit**
	
T – Conduit terminal **TL – Conduit terminal with indicator light** (Note 1)	**D – DIN terminal** **DL – DIN terminal with light** **DO – DIN terminal (without connector)**
	

∗ All class B coils come with surge voltage suppressor.
∗∗ Available types of electrical entry for type H coil are either G,C and T.
(Surge voltage suppressor is not equipped.)
Note 1) TL is available only for standard specifications valve.

Option

Nil	None
F	Foot type bracket

Material and insulation type

Symbol	Body material	Seal material	Coil insulation type
Nil	C37	FKM	Class B
D			Class H
H	SUS		Class B
N			Class H

Thread type

Nil	Rc
N	NPT
F	G

Port size

Symbol	Port size	Class 2	Class 3	Class 4
01	1/8 (6A)	○	—	—
02	1/4 (8A)	○	○	○
03	3/8 (10A)	—	○	○
04	1/2 (15A)	—	○	○
06	3/4 (20A)	—	—	○

Orifice size

Symbol	Orifice size (mmø)	Class 2	Class 3	Class 4
2	2	○	—	—
3	3	○	○	○
4	4	○	○	○
5	5	○	○	○
7	7	—	○	○
10	10	—	○	○

∗ Refer to the below table for orifice and port size combinations.

Orifice and Port Size Combinations

Class	Port size	Orifice size (mmø)					
		2	**3**	**4**	**5**	**7**	**10**
2	1/8 (6A)	●	●	●	●	—	—
	1/4 (8A)	●	●	●	●	—	—
3	1/4 (8A)	—	●	●	●	●	—
	3/8 (10A)	—	●	●	●	●	●
	1/2 (15A)	—	—	—	—	—	●
4	1/4 (8A)	—	●	●	●	●	—
	3/8 (10A)	—	●	●	●	●	●
	1/2 (15A)	—	—	—	—	—	●
	3/4 (20A)	—	—	—	—	—	●

Specifications

			Standard specifications	High temperature specifications
Valve specifications	Valve construction		Direct operated poppet	
	Fluid		Oil [50 mm²/s] or less	
	Withstand pressure (MPa)		5.0	
	Body material		C37, Stainless steel	
	Seal material		FKM	
	Ambient temperature (°C) (1)		–20 to 60	–20 to 100
	Fluid temperature (°C) (1)		–10 to 60 (No freezing)	–10 to 100
	Enclosure		Dusttight, Low jetproof (equivalent to IP65)	
	Environment		Location without corrosive or explosive gases	
	Valve leakage (cm³/min)		0 (with oil pressure)	
	Mounting orientation		Unrestricted	
	Vibration/Impact resistance (m/s²) (3)		30/150 or less	
Coil specifications	Rated voltage		24, 12 VDC, 100, 110, 200, 220, 230 VAC (50/60 Hz)	100, 200, 220, 230 VAC (50/60 Hz)
	Allowable voltage fluctuation		±10% of rated voltage	
	Coil insulation type		Class B	Class H
	Power consumption	DC	VCL20: 6 W, VCL30: 8 W, VCL40: 11.5 W	—
	Apparent power	AC 50/60 Hz	(2) VCL20: 8.5 VA, VCL30: 10 VA, VCL40: 13 VA	Inrush: VCL20: 22/19 VA, VCL30: 36/30 VA, VCL40: 45/37 VA; Holding: VCL20: 10/8 VA, VCL30: 15/13 VA, VCL40: 19/16 VA

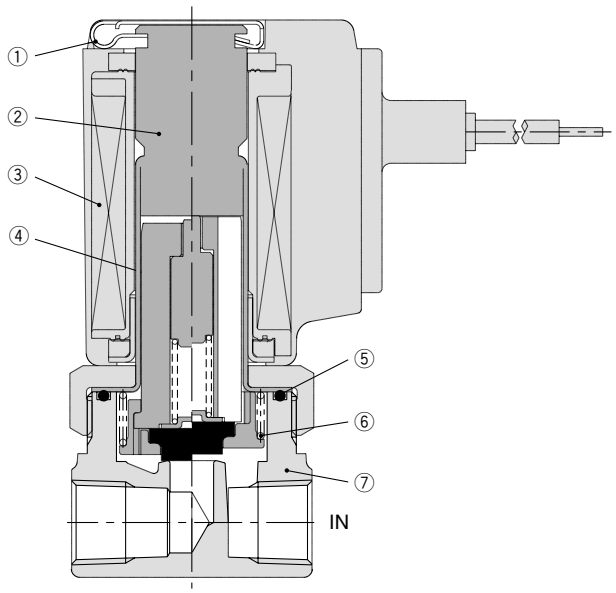
Note 1) When the ambient temperature or fluid temperature is 60°C or more, use high temperature specifications (class H coil).
Note 2) Since a rectifier circuit is used for class B coils with AC, there is no difference in apparent power between inrush and holding.
Note 3) Vibration resistance ···· Conditions when tested with one sweep 10 to 250 Hz in the axial direction and at a right angle to the armature, in both energized and deenergized states No malfunction occurred when tested. (Value at the initial state)
Impact resistance ···· Conditions when tested with a drop tester in the axial direction and at a right angle to the armature, one time each in energized and deenergized states.
No malfunction occurred when tested. (Value at the initial state)

Characteristic Specifications

Model	Class	Port size (1)	Orifice size (mmø) (1)	N.C. Max.operating pressure differential (MPa)	Flow characteristics: Av x 10^{-6}(m²)	Flow characteristics: Cv converted	Max.system pressure (MPa)	Weight (kg) (2)
VCL2	2	1/8 (6A) 1/4 (8A)	2	1.5	3.8	0.16	2.0	1/8 : 0.21 1/4 : 0.24
			3	0.8	7.9	0.33		
			4	0.4	12	0.51		
			5	0.25	16	0.65		
VCL3	3	1/4 (8A) 3/8 (10A) 1/2 (15A)	3	1.5	8.4	0.35	2.0	1/4 : 0.42 3/8 : 0.40 1/2 : 0.49
			4	0.8	13	0.54		
			5	0.5	19	0.80		
			7	0.2	33	1.4		
			10	0.1	50	2.1		
VCL4	4	1/4 (8A) 3/8 (10A) 1/2 (15A) 3/4 (20A)	3	2.0	8.4	0.35	2.0	1/4 : 0.58 3/8 : 0.55 1/2 : 0.62 3/4 : 0.78
			4	1.1	14	0.60		
			5	0.7	20	0.85		
			7	0.3	33	1.4		
			10	0.12	50	2.1		

Note 1) Refer to page 17-2-32 in model selection regarding port size and orifice size combinations.
Note 2) The weight is the value for the grommet type.

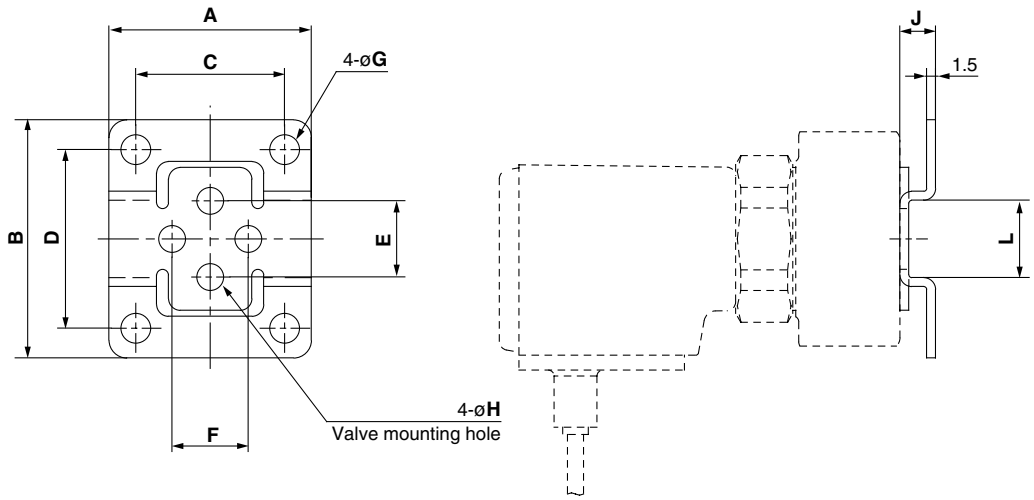
Construction



Component Parts

No.	Description	Material	
		Standard	Option
①	Clip	Stainless steel	—
②	Tube assembly	Stainless steel	Stainless steel, Cu (for class H coil)
③	Coil assembly	Class B	Class H
④	Armature assembly	Stainless steel, FKM	—
⑤	O-ring	FKM	—
⑥	Return spring	Stainless steel	—
⑦	Body	C37	Stainless steel

Dimensions: Bracket



Bracket Mounting Dimensions/Bracket Material: Stainless Steel

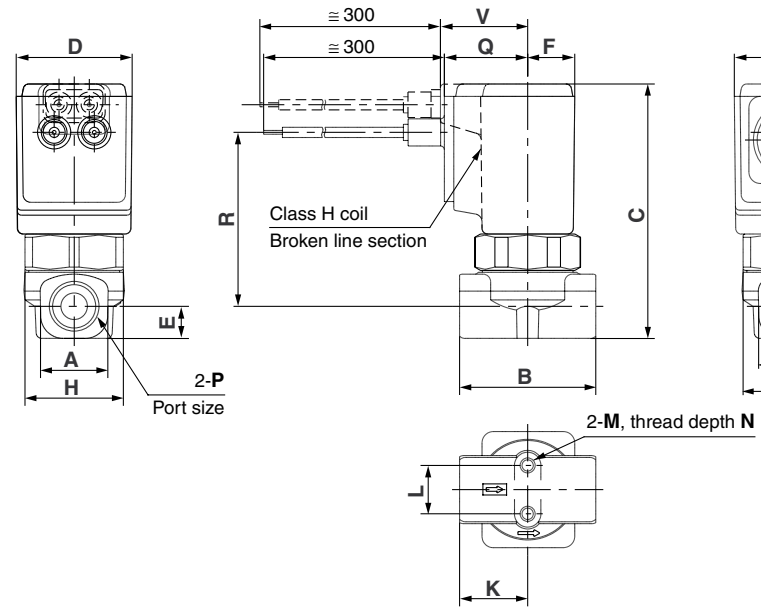
(mm)

Valve model	Port size	Bracket part no.	A	B	C	D	E	F	G	H	J	L
VCL2□	1/8, 1/4	**VCW20-12-01A**	34	40	25	30	12.8	12.8	5	4.5	6	13
VCL3□	1/4, 3/8	**VCW30-12-02A**	42	52	30	40	19	19	6	5.5	7	19
	1/2	**VCW30-12-04A** Note 1)	48	56	36	44	23	23	6	5.5	7	23
VCL4□	1/4, 3/8	**VCW40-12-02A**	42	52	30	40	23	23	6	5.5	7	19
	1/2	**VCW30-12-04A** Note 1)	48	56	36	44	23	23	6	5.5	7	23
	3/4	**VCW40-12-06A**	56	65	44	53	28.2	28.2	6	5.5	7	26

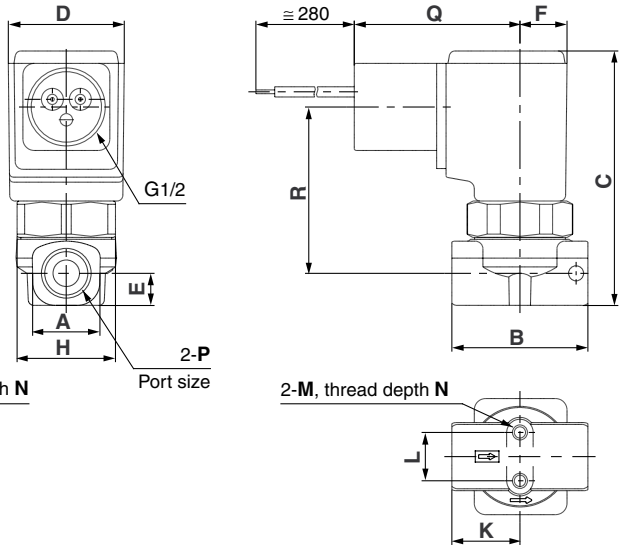
∗ 2 Mounting screws (for mounting bracket) are included in bracket part no.
Note 1) The same bracket is used for VCL3□ and VCL4□ (port size 1/2).

Dimensions (N.C.)

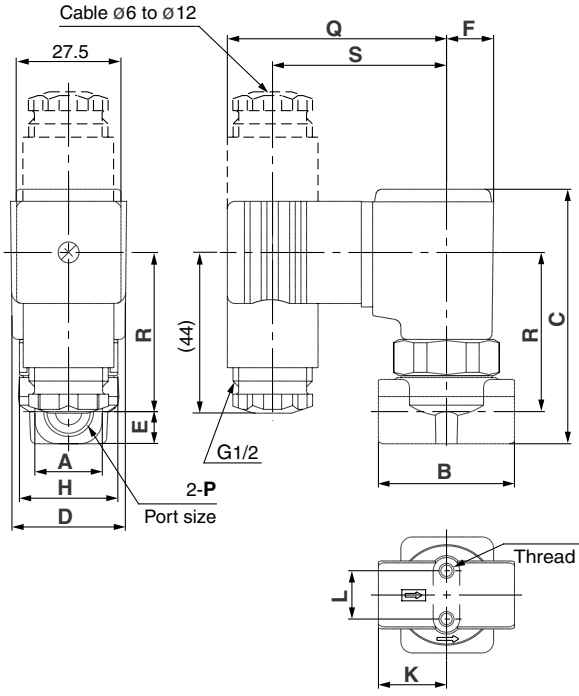
Grommet: G



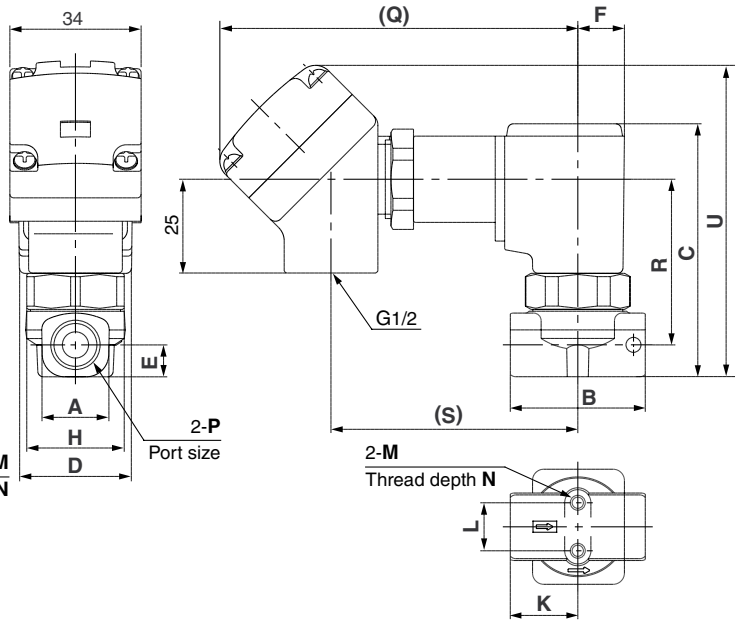
Conduit: C



DIN terminal: D



Conduit terminal: T



N.C. Dimensions

(mm)

Model	P Port size	A	B	C	D	E	F	H	K	L	M	N	Grommet: G			Conduit: C		DIN terminal: D			Conduit terminal: T			
													Q	V Note)	R	Q	R	Q	R	S	Q	R	S	U
VCL21	1/8	13.5	28	64	31	6.5	12.5	28	14	12.8	M4	4.5	22	23	45	44	43	58	40.5	46.5	99	43	66	83
	1/4	18	36	67.5	31	8.5	12.5	28	18	12.8	M4	6	22	23	46	44	44	58	41.5	46.5	99	44	66	86
VCL31	1/4, 3/8	22	40	81.5	36.5	11	15	32	20	19	M5	8	24	25	56.5	46	54.5	60	52	48.5	101	54.5	68	99
	1/2	30	50	86	36.5	13.5	15	32	25	23	M5	8	24	25	59	46	57	60	54.5	48.5	101	57	68	104
VCL41	1/4, 3/8	22	45	90	41	11	17	36	22.5	23	M5	8	26	26.5	64.5	48	62.5	62	60	50.5	103	62.5	70	107
	1/2	30	50	94	41	13.5	17	36	25	23	M5	8	26	26.5	66.5	48	64.5	62	62	50.5	103	64.5	70	111.5
	3/4	35	60	102	41	17.5	17	36	30	28.2	M5	8	26	26.5	70	48	68	62	65.5	50.5	103	68	70	119

Note) For class H

How to Order Manifold

VV2C L 2 □ 02 01 □

For oil

In the case of no symbol for material
- Base material: C37
- Seal material: FKM (4 stations or more)

Series

2	Class 2
3	Class 3
4	Class 4

Material

Symbol	Base material	Seal material
Nil	C37	FKM
H	Stainless steel	

Stations

02	2 stations
⋮	⋮
10	10 stations

∗ Refer to page 17-2-37 in the L dimension table regarding the maximum number of stations.

Thread type

Symbol	Thread type
Nil	Rc
N	NPT
F	G

OUT port size

Symbol	Port size
01	1/8 (6A)
02	1/4 (8A)

∗ All IN ports are 3/8.

How to Order Manifold Assembly

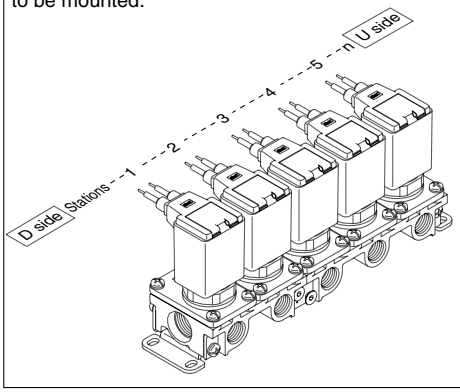
Enter the mounting valve and option part numbers under the manifold base part number.

<Ordering Example>

VV2CL2-0501 ····· 1 set Manifold part no.
∗ VCL23-5G-2 ····· 5 sets Valve part no. (Stations 1 to 5)

"∗" is the symbol for assembly. Add an "∗" in front of the part numbers for solenoid valves, etc., to be mounted.

Enter together in order, counting from station 1 on the D side.



How to Order Valves (For manifold)

VC L 2 3 1 G 2 □

For oil

When there is no symbol for oil material and insulation type
- Body material: C37
- Seal material: FKM
- Coil insulation: Class B

Series

2	Class 2
3	Class 3
4	Class 4

Valve type

3	N.C. for manifold

Voltage

1	100 VAC
2	200 VAC
3	110 VAC
4	220 VAC
5	24 VDC
6	12 VDC
36	230 VAC

∗ Class B in AC has a rectifying circuit built-in.
∗∗ Class H is AC only. No rectifying circuit.
∗∗∗Please consult with SMC regarding other voltages.

Material and insulation type

Symbol	Body material	Seal material	Coil insulation type
Nil	C37	FKM	Class B
D			Class H
H	Stainless steel		Class B
N			Class H

Orifice size

Symbol	Orifice size (mmø)	Class 2	Class 3	Class 4
2	2	○	—	—
3	3	○	○	○
4	4	○	○	○
5	5	○	○	○
7	7	—	○	○

Electrical entry

G	Grommet
C	Conduit
T	Conduit terminal
TL	Conduit terminal with indicator light Note 1)
D	DIN terminal
DL	DIN terminal with indicator light
DO	DIN terminal (without connector)

∗ All class B coils come with surge voltage suppressor.
∗∗ Available types of electrical entry for type H coil are either G, C or T. (without surge voltage suppressor.)
Note 1) TL is available only for standard specifications valve.

Manifold Option

Blanking plate assembly

VVCW 2 1486 − 3A − H

Series

2	Class 2
3	Class 3
4	Class 4

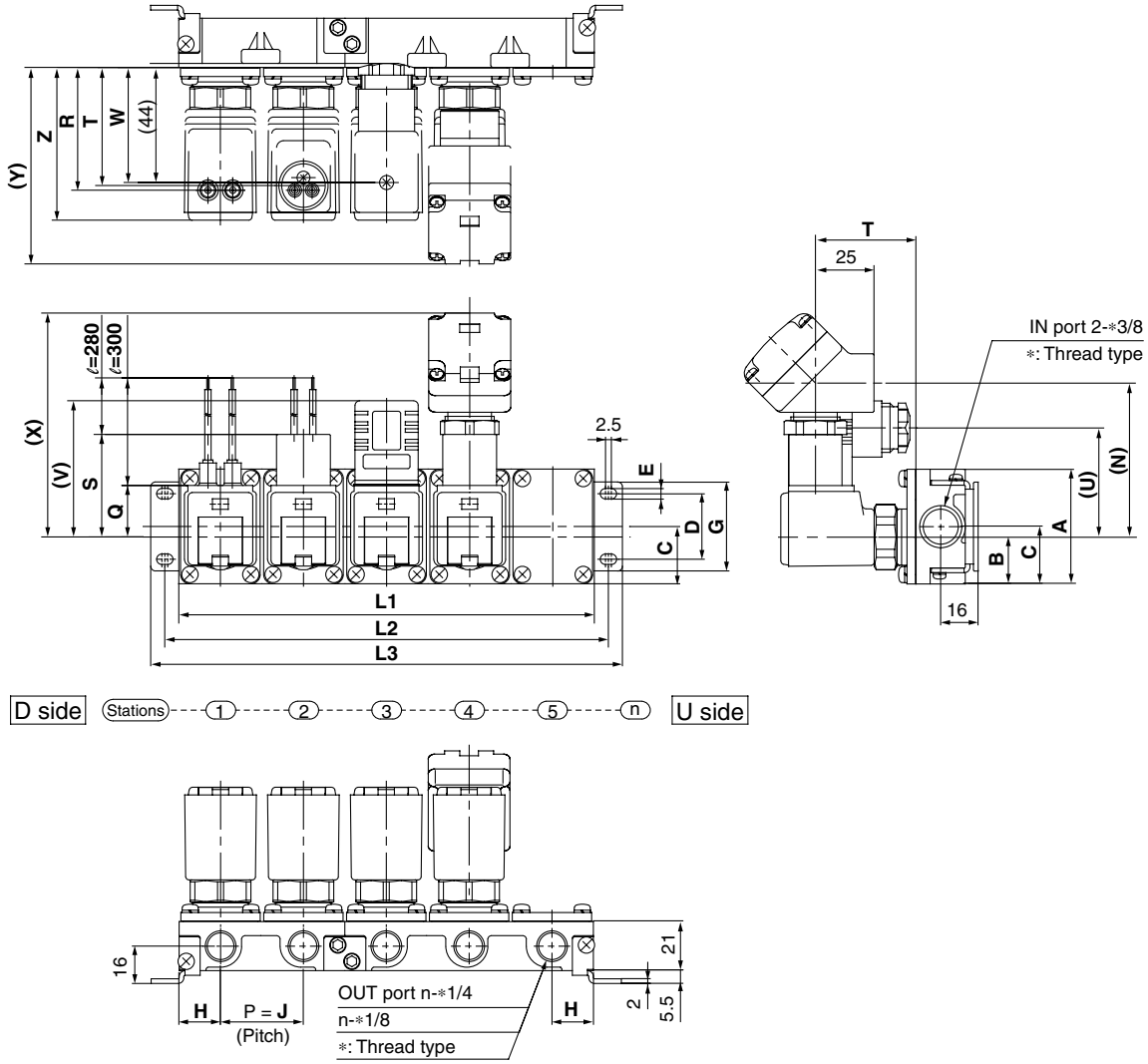
Material

Symbol	Plate material	Seal material
H	Stainless steel	FKM

JIS Symbol

This is used by mounting it on the manifold block when a valve is removed for maintenance or when the mounting of an additional valve is planned, etc.

Dimensions (N.C.)



L Dimension

(mm)

Model	Dimensions	n (stations)								
		2	**3**	4	**5**	**6**	**7**	**8**	**9**	**10**
VV2CL2	**L1**	69	103.5	138	172.5	207	241.5	276	310.5	345
	L2	81	115.5	150	184.5	219	253.5	288	322.5	357
	L3	93	127.5	162	196.5	231	265.5	300	334.5	369
VV2CL3	**L1**	77	115.5	154	192.5	231	269.5	308	346.5	385
	L2	89	127.5	166	204.5	243	281.5	320	358.5	397
	L3	101	139.5	178	216.5	255	293.5	332	370.5	409
VV2CL4	**L1**	83	124.5	166	207.5	249	290.5	332	373.5	415
	L2	95	136.5	178	219.5	261	302.5	344	385.5	427
	L3	107	148.5	190	231.5	273	314.5	356	397.5	439
Manifold composition		2 stns. x 1	3 stns. x 1	2 stns. x 2	2 stns. + 3 stns.	3 stns. x 2	2 stns. x 2 + 3 stns.	2 stns. + 3stns. x 2	3 stns. x 3	2 stns. x 2 + 3 stns. x 2

Note) Manifold base is consisted of the junction of 2 and 3 station bases.

Dimensions

(mm)

Model	A	B	C	D	E	G	H	J	Z	Electrical entry									
										Grommet		Conduit		DIN terminal			Conduit terminal		
										Q	**R**	**S**	**T**	**U**	**V**	**W**	**N**	**X**	**Y**
VV2CL2	49	20	24.5	28	4.5	38	17.3	34.5	56	22	45.5	44	43.5	46	58	41.5	66	99	77
VV2CL3	57	25.5	28.5	30	5.5	42	19.3	38.5	66	24	55	45.5	53	48	60	51	68	101	86.5
VV2CL4	57	25.5	28.5	30	5.5	42	20.8	41.5	74	26	62.5	47.5	60.5	50	62	58.5	70	103	94

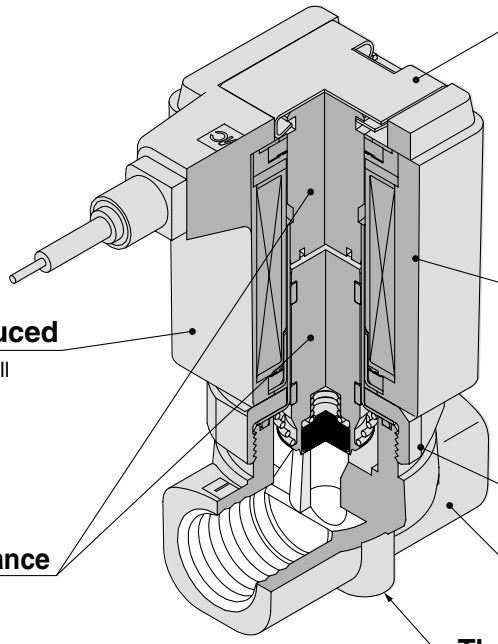
Direct Operated 2 Port Solenoid Valve For Steam

Series VCS

Improved durability (Nearly twice the life of the previous series)
Resistance of moving parts has been reduced through the use of a unique magnetic material. Service life, wear resistance, and corrosion resistance are improved.

Large flow rate: Av factor 3.84 to 50.40 x 10^{-6} m^2

Compact: Single valve volume reduced by –15% (Class 3)
Manifold length reduced by –18% (Class 3: 5 stations) (SMC comparison)



Clip type

Ease of maintenance has been improved.
Changing of the coil is made easy by means of clip design.

Flame resistant molded coil material
Flame resistance equivalent to UL94 standard V-0

Coil size and weight reduced
New compact coil reduces the overall size and weight of the valve.
Volume: –15%
Weight: –20%
} SMC comparison (Class 3)

Threaded assembly
Simplifies maintenance

Improved corrosion resistance
Special material introduced.

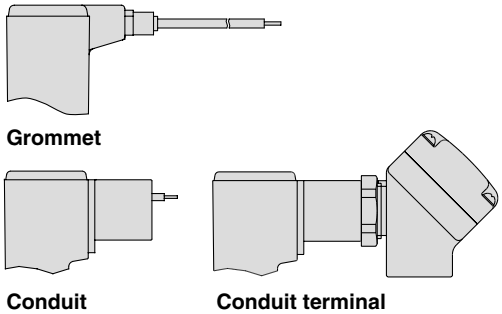
Improved corrosion resistance

Threaded for bottom mounting
Spacial bracket can be mounted.

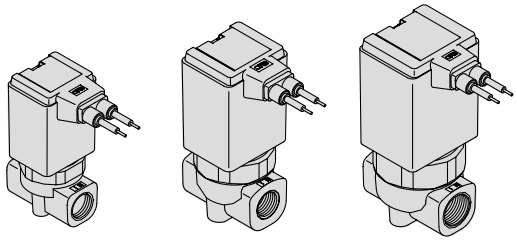
Enclosure: Dusttight/Low jetproof (Equivalent to IP65)

Wiring Specifications (Class H coil)

Wiring Variations



Lined Up by Compact Design



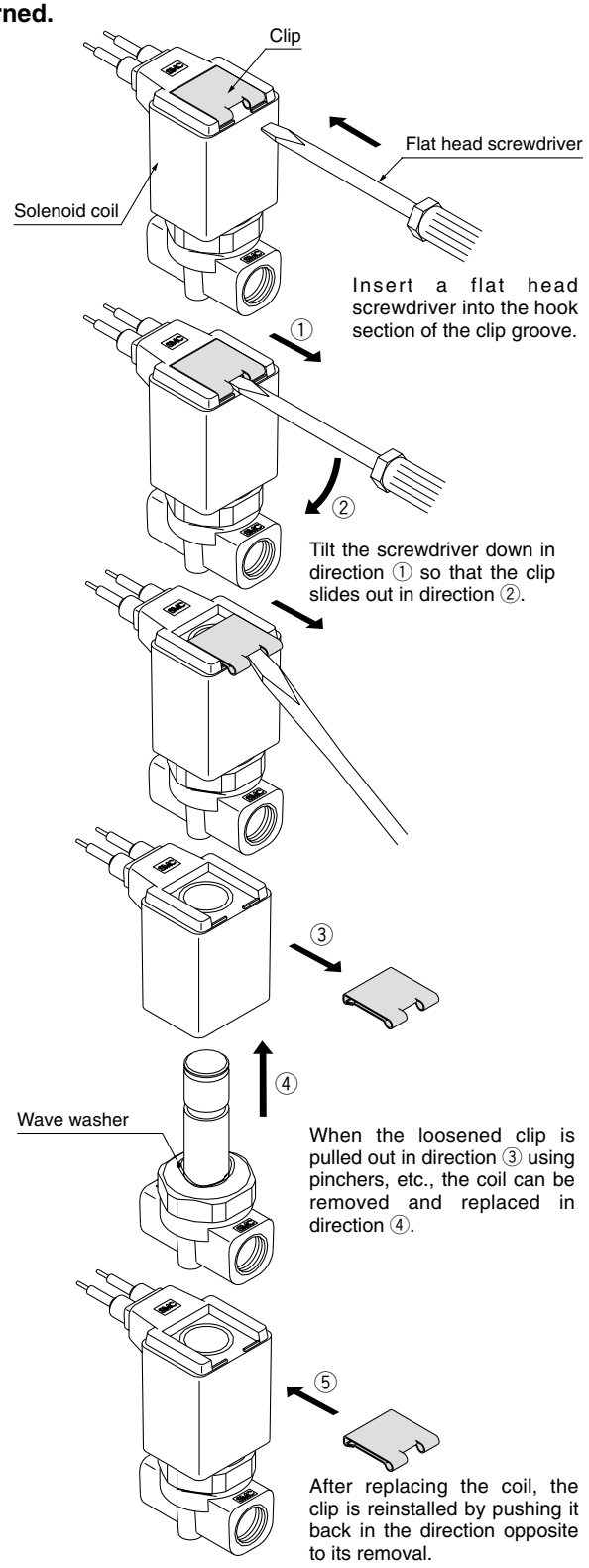
⚠ Precautions

Be sure to read before handling. Refer to page 17-6-3 for Safety Instructions and Solenoid Valve Precautions.

Replacing the Solenoid Coils

⚠ Caution

The valve will reach high temperatures from high temperature fluids such as steam. Confirm that the valve has cooled sufficiently before performing work. If touched inadvertently, there is a danger of being burned.



Replacement Parts

● **Solenoid coil part no.**

VCS [20] — [1] [G] — [ ]

Series

20	Class 2
30	Class 3
40	Class 4

Voltage

1	100 VAC
2	200 VAC
3	110 VAC
4	220 VAC
36	230 VAC

Electrical entry

G	Grommet
C	Conduit
T	Conduit terminal

Lead wire length

Nil	300 mm
L1	600 mm
L2	1000 mm
L3	1500 mm
L4	3000 mm

● **Clip part no.**

AZ-T-VCS **Valve model no. on page 17-2-42/46**

Note) Indicate the valve model no. as a label will be attached to the clip.

● **Seal part no.**

Valve

For VCS20

OR-1860-120-P

P: PTFE
F: FKM

For VCS30

OR-2380-130-P

P: PTFE
F: FKM

For VCS40

OR-2600-180-P

P: PTFE
F: FKM

Manifold

For VCS20

OR-1400-178-P

P: PTFE
F: FKM

OR-2670-178-P

P: PTFE
F: FKM

For VCS30, 40

OR-1717-178-P

P: PTFE
F: FKM

OR-3305-178-P

P: PTFE
F: FKM

When external leakage occurs after disassembling a valve, replace the above seals.

● **Wave washer part no.**

For VCS20:41014
For VCS30:41016
For VCS40:41018

⚠ Precautions

Be sure to read before handling. Refer to page 17-6-3 for Safety Instructions and Solenoid Valve Precautions.

Glossary

Pressure

1. Maximum operating pressure differential

This indicates the maximum pressure differential (inlet and outlet pressure differential) which can be allowed for operation with the valve closed or open. When the downstream pressure is 0 MPa, this becomes the maximum operating pressure.

2. Maximum system pressure

This indicates the limit of pressure that can be applied inside the pipelines. (Line pressure)

(The pressure differential of the solenoid valve unit must be no more than the maximum operating pressure differential.)

3. Withstand pressure

The pressure which must be withstood without a drop in performance after returning to the operating pressure range (The value under the prescribed conditions).

Electricity

1. Surge voltage

A high voltage which is momentarily generated in the shut-off unit by shutting off the power.

Others

1. Material

PTFE: Polytetrafluoroethylene resin
– Trade names: Teflon®, Polyflon®, etc.
FKM: Fluoro rubber = FPM – Trade names: Viton®, Dai-El®, etc.
C37: Brass
SUS: Stainless steel

2. JIS symbol

According to JIS symbol, even though () IN and OUT shows the blocked state (), when there is reverse pressure (OUT>IN), there is limited blocking ability. To describe the fact that it cannot be blocked by reverse pressure, () symbol is used here.

Direct Operated 2 Port Solenoid Valve For Steam

Series VCS

How to Order Valves (Single Unit)

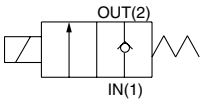
VC S 2 1 – 1 G – 2 – 02 □ – □ – □

For steam
When no symbol is shown for "Material and insulation type"
- Body material: C37
- Seal material: PTFE
- Coil insulation: Class H

Series

2	Class 2
3	Class 3
4	Class 4

Valve type

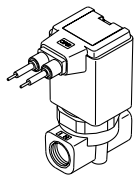
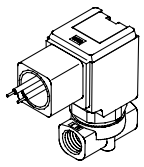
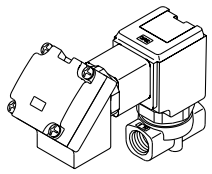
1	N.C. 

Voltage

1	100 VAC
2	200 VAC
3	110 VAC
4	220 VAC
36	230 VAC

∗ Please consult with SMC regarding other voltages.

Electrical entry

G – Grommet	C – Conduit
	
T – Conduit terminal	
	

∗ Available types of electrical entry are either G, C and T. (Surge voltage suppressor is not equipped.)

Orifice size

Symbol	Orifice size (mmø)	Class 2	Class 3	Class 4
2	2	○	—	—
3	3	○	○	○
4	4	○	○	○
5	5	○	○	○
7	7	—	○	○
10	10	—	○	○

∗ Refer to the below table for orifice and port size combinations.

Port size

Symbol	Port size	Class 2	Class 3	Class 4
01	1/8 (6A)	○	—	—
02	1/4 (8A)	○	○	○
03	3/8 (10A)	—	○	○
04	1/2 (15A)	—	○	○
06	3/4 (20A)	—	—	○

Thread type

Nil	Rc
N	NPT
F	G

Material and insulation type

Symbol	Body material	Seal material	Coil insulation type
Nil	C37	PTFE	Class H
D		FKM	
R	SUS	PTFE	
N		FKM	

Option

Nil	None
F	Foot type bracket

Orifice and Port Size Combinations

Class	Port size	Orifice size (mmø) 2	3	4	5	7	10 (1)
2	1/8 (6A)	●	●	●	●	—	—
	1/4 (8A)	●	●	●	●	—	—
3	1/4 (8A)	—	●	●	●	●	—
	3/8 (10A)	—	●	●	●	●	●
	1/2 (15A)	—	—	—	—	—	●
4	1/4 (8A)	—	●	●	●	●	—
	3/8 (10A)	—	●	●	●	●	●
	1/2 (15A)	—	—	—	—	—	●
	3/4 (20A)	—	—	—	—	—	●

Note) ø10 is available with seal material FKM only.

Standard Specifications

Valve specifications	Valve construction		Direct operated poppet
	Fluid		Steam (184°C or less)
	Withstand pressure MPa		5.0
	Body material		C37, Stainless steel
	Seal material		PTFE (FKM)
	Ambient temperature (°C)		–20 to 100
	Fluid temperature (°C)		184 or less (PTFE), 120 or less (FKM) (1)
	Enclosure		Dusttight, low jetproof (equivalent to IP65)
	Environment		Location without corrosive or explosive gases
	Valve leakage (cm^3/min)		300 (PTFE), 1 (FKM) measured by air
	Mounting orientation		Unrestricted
	Vibration/Impact resistance (m/s^2) (2)		30/150 or less
Coil specifications	Rated voltage		100 VAC, 110 VAC, 200 VAC, 220 VAC, 230 VAC (50/60 Hz)
	Allowable voltage fluctuation		±10% of rated voltage
	Coil insulation type		Class H
	Power consumption (W) 50/60 Hz		VCS2: 4.9/4.1, VCS3: 7.7/6.6, VCS4: 10.5/9.3
	Apparent power (VA) 50/60 Hz	Inrush	VCS2: 22/19, VCS3: 36/30, VCS4: 45/37
		Holding	VCS2: 10/8, VCS3: 15/13, VCS4: 19/16

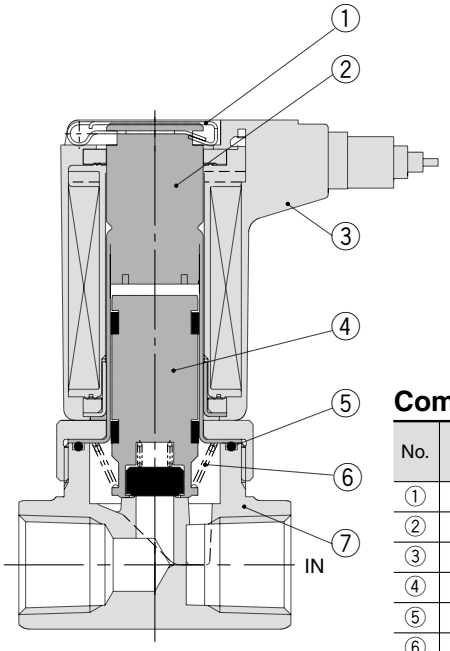
Note 1) For low pressure steam at a temperature of 120°C or less, use FKM for the seal material.
Note 2) Vibration resistance ···· Conditions when tested with one sweep of 10 to 250 Hz in the axial direction and at a right angle to the armature, in both energized and deenergized states
No malfunction occurred when tested. (Value at the initial state)
Impact resistance ····· Conditions when tested with a drop tester in the axial direction and at a right angle to the armature, one time each in energized and deenergized states.
No malfunction occurred when tested. (Value at the initial state)

Characteristic Specifications

Model	Class	Port size (1)	Orifice size (1) (mmø)	Max. operating pressure differential MPa	Flow characteristics		Max. system pressure MPa	Weight (kg)
					Av x 10^{-6} (m^2)	Cv converted		
VCS2	2	1/8 (6A) 1/4 (8A)	2	1.0	3.8	0.16	1.0	1/8: 0.21 1/4: 0.24
			3	0.8	7.9	0.33		
			4	0.5	12	0.51		
			5	0.3	16	0.65		
VCS3	3	1/4 (8A) 3/8 (10A) 1/2 (15A)	3	1.0	8.4	0.35	1.0	1/4: 0.42 3/8: 0.40 1/2: 0.49
			4	0.8	13	0.54		
			5	0.5	19	0.80		
			7	0.2	33	1.4		
			10	0.1	50	2.1		
VCS4	4	1/4 (8A) 3/8 (10A) 1/2 (15A) 3/4 (20A)	3	1.0	8.4	0.35	1.0	1/4: 0.58 3/8: 0.55 1/2: 0.62 3/4: 0.78
			4	1.0	14	0.60		
			5	0.7	20	0.85		
			7	0.3	33	1.4		
			10	0.12	50	2.1		

Note 1) Refer to page 17-2-42 in model selection regarding port size and orifice size combinations.
Note 2) The weight is the value for the grommet type.

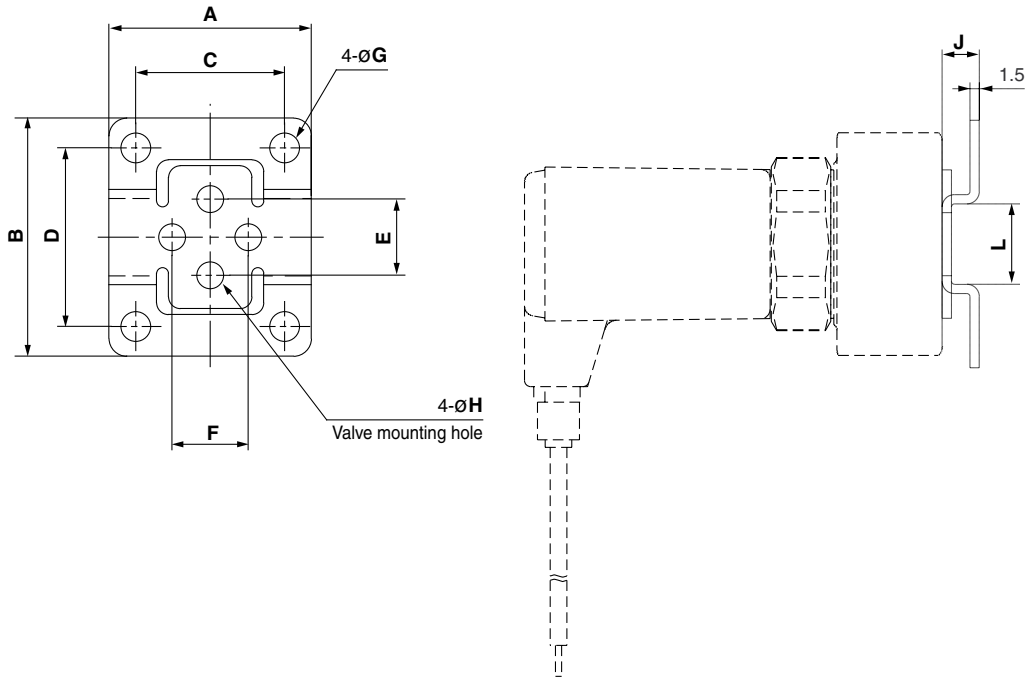
Construction



Component Parts

No.	Description	Material	
		Standard	Option
①	Clip	Stainless steel	—
②	Tube assembly	Stainless steel, Cu	Stainless steel/Ag
③	Coil assembly	Class H	—
④	Armature assembly	Stainless steel, PTFE	Stainless steel, FKM
⑤	Seal	PTFE	FKM
⑥	Return spring	Stainless steel	—
⑦	Body	C37	Stainless steel

Dimensions: Bracket



Bracket Mounting Dimensions/Bracket Material: Stainless Steel

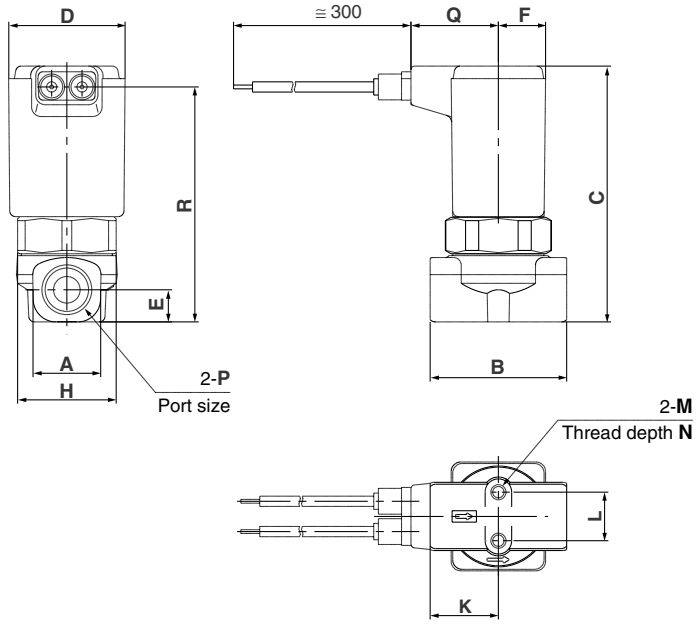
(mm)

Valve model	Port size	Bracket part no.	A	B	C	D	E	F	G	H	J	L
VCS21	1/8, 1/4	**VCW20-12-01A**	34	40	25	30	12.8	12.8	5	4.5	6	13
VCS31	1/4, 3/8	**VCW30-12-02A**	42	52	30	40	19	19	6	5.5	7	19
	1/2	**VCW30-12-04A**Note 1)	48	56	36	44	23	23	6	5.5	7	23
VCS41	1/4, 3/8	**VCW40-12-02A**	42	52	30	40	23	23	6	5.5	7	19
	1/2	**VCW30-12-04A**Note 1)	48	56	36	44	23	23	6	5.5	7	23
	3/4	**VCW40-12-06A**	56	65	44	53	28.2	28.2	6	5.5	7	26

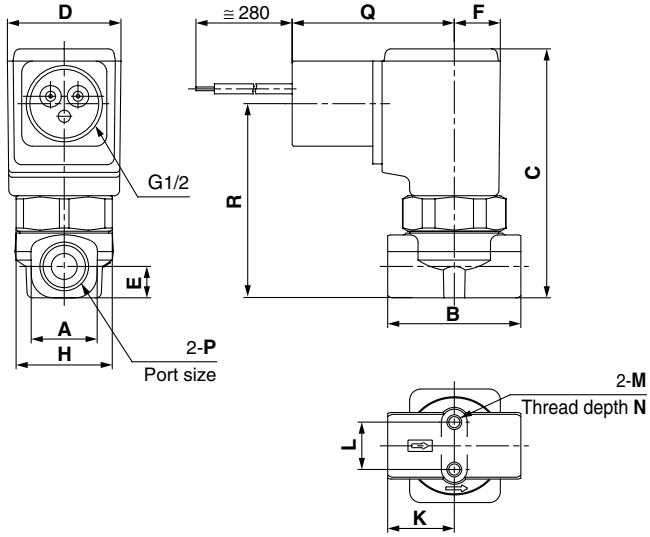
∗ 2 mounting screws (for mounting bracket) are included in bracket part no.
Note 1) The same bracket is used for VCS3□ and VCS4□ (port size 1/2).

Dimensions

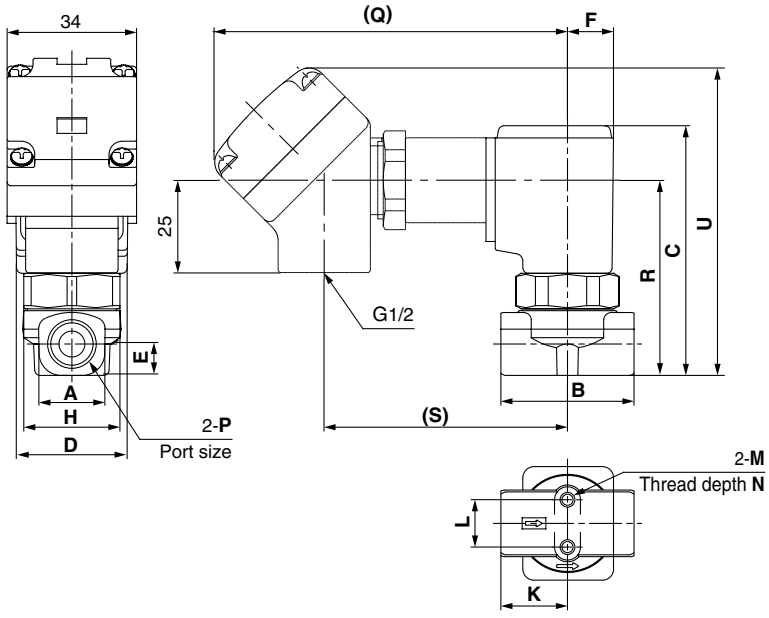
Grommet: G



Conduit: C



Conduit terminal: T



N.C.

(mm)

Model	P Port size	A	B	C	D	E	F	H	K	L	M	N	Electrical entry							
													Grommet: G		Conduit: C		Conduit terminat: T			
													Q	R	Q	R	Q	R	S	U
VCS21	1/8	13.5	28	64	31	6.5	12.5	28	14	12.8	M4	4.5	22	59	44	50	99	50	66	83
	1/4	18	36	67.5	31	8.5	12.5	28	18	12.8	M4	6	22	62	44	53	99	53	66	86
VCS31	1/4, 3/8	22	40	81.5	36.5	11	15	32	20	19	M5	8	24	76	46	66.5	101	66.5	68	99
	1/2	30	50	86	36.5	13.5	15	32	25	23	M5	8	24	80	46	71	101	71	68	104
VCS41	1/4, 3/8	22	45	90	41	11	17	36	22.5	23	M5	8	26	84	48	74.5	103	74.5	70	107
	1/2	30	50	94	41	13.5	17	36	25	23	M5	8	26	88	48	78.5	103	78.5	70	111.5
	3/4	35	60	102	41	17.5	17	36	30	28.2	M5	8	26	96	48	86.5	103	86.5	70	119

How to Order Manifold

VV2C S 2 D 02 01 □

For steam
In the case of no symbol for material
- Base material: C37
- Seal material: FKM (4 stations or more)

Series

2	Class 2
3	Class 3
4	Class 4

Material

Symbol	Body material	Seal material
D	C37	FKM
N	Stainless steel	

Stations

02	2 stations
⋮	⋮
10	10 stations

∗ Refer to page 17-2-47 in the L dimension table regarding the maximum number of stations.

OUT port size

Symbol	Port size
01	1/8 (6A)
02	1/4 (8A)

∗ All IN ports are 3/8.

Thread type

Symbol	Thread type
Nil	Rc
N	NPT
F	G

How to Order Manifold Assembly

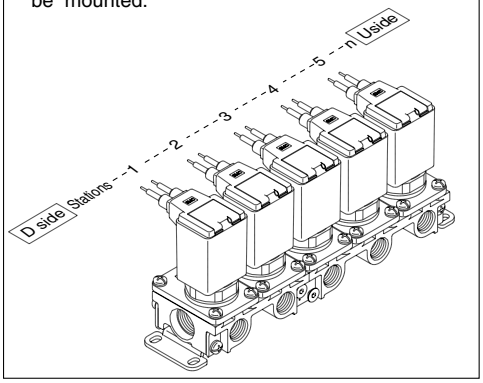
Enter the mounting valve and option part numbers under the manifold base part number.

<Ordering Example>

VV2CS2-D0501 ····· 1 set Manifold part no.
∗VCS23-1G-2 ····· 5 sets Valve part no. (Stations 1 to 5)

"∗" is the symbol for assembly. Add a "∗" in front of the part numbers for solenoid valves, etc., to be mounted.

Enter together in order, counting from station 1 on the D side.



How to Order Valves (For manifold)

VC S 2 3 1 G 2 □

For steam
Material and insulation type
When there is no symbol for
- Body material: C37
- Seal material: PTFE
- Coil insulation: Class H

Series

2	Class 2
3	Class 3
4	Class 4

Valve type

3	N.C. for manifold

Voltage

1	100 VAC
2	200 VAC
3	110 VAC
4	220 VAC
36	230 VAC

∗ Please consult SMC regarding other voltages.

Material and insulation type

Symbol	Body material	Seal material	Coil insulation type
Nil	C37	PTFE	Class H
D		FKM	
R	Stainless steel	PTFE	
N		FKM	

Note) High corrosion resistant specification, used for armature material.

Orifice size

Symbol	Orifice size (mmø)	Class 2	Class 3	Class 4
2	2	○	—	—
3	3	○	○	○
4	4	○	○	○
5	5	○	○	○
7	7	—	○	○

Electrical entry

G	Grommet
C	Conduit
T	Conduit terminal

∗ Available types of electrical entry are either G, C and T.
(Surge voltage suppressor is not equipped.)

Manifold Option

Blanking plate assembly

VVCW 2 1486 − 3A K

Series

2	Class 2
3	Class 3
4	Class 4

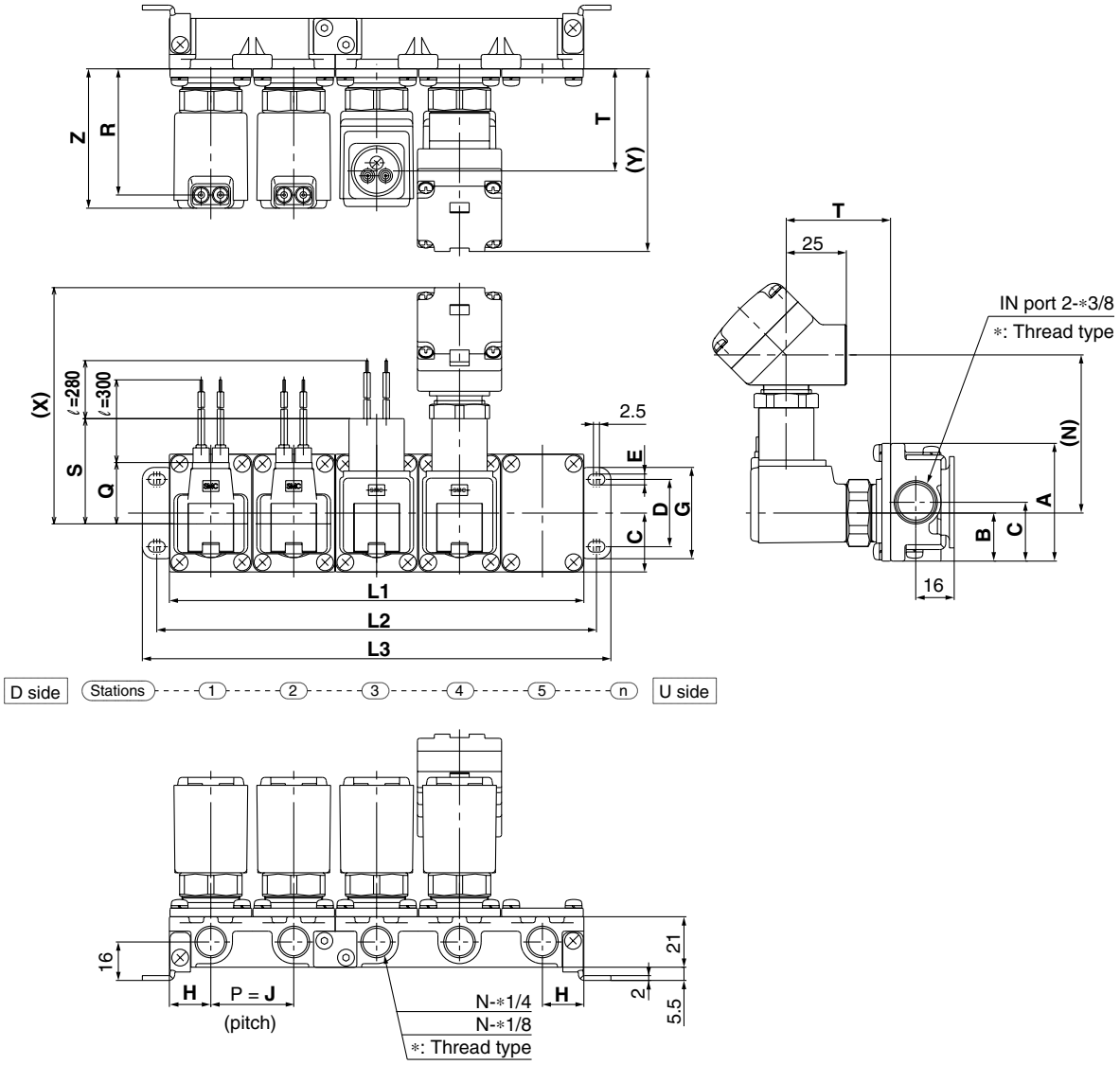
Material

Symbol	Plate material	Seal material
K	Stainless steel	PTFE
H		FKM

JIS symbol

This is used by mounting it on the manifold block when a valve is removed for maintenance or when the mounting of an additional valve is planned, etc.

Dimensions



L Dimension

(mm)

Model	Dimensions	n (stations)								
		2	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
VV2CS2	**L1**	69	103.5	138	172.5	207	241.5	276	310.5	345
	L2	81	115.5	150	184.5	219	253.5	288	322.5	357
	L3	93	127.5	162	196.5	231	265.5	300	334.5	369
VV2CS3	**L1**	77	115.5	154	192.5	231	269.5	308	346.5	385
	L2	89	127.5	166	204.5	243	281.5	320	358.5	397
	L3	101	139.5	178	216.5	255	293.5	332	370.5	409
VV2CS4	**L1**	83	124.5	166	207.5	249	290.5	332	373.5	415
	L2	95	136.5	178	219.5	261	302.5	344	385.5	427
	L3	107	148.5	190	231.5	273	314.5	356	397.5	439
Manifold composition		2 stns. x 1	3 stns. x 1	2 stns. x 2	2 stns. + 3 stns.	3 stns. x 2	2 stns. x 2+ 3 stns.	2 stns. + 3 stns x 2	3 stns. x 3	2 stns. x 2 + 3 stns. x 2

Note) Manifold base is consisted of the junction of 2 and 3 station bases.

Dimensions

(mm)

Model	**A**	**B**	**C**	**D**	**E**	**G**	**H**	**J**	**Z**	Electrical entry						
										Grommet: G		Conduit: C		Conduit terminal: T		
										Q	**R**	**S**	**T**	**N**	**X**	**Y**
VV2CS2	49	20	24.5	28	4.5	38	17.3	34.5	56	22	50.5	44	41.5	66	99	77
VV2CS3	57	25.5	28.5	30	5.5	42	19.3	38.5	66	24	60	45.5	51	68	101	86.5
VV2CS4	57	25.5	28.5	30	5.5	42	20.8	41.5	74	26	68	47.5	58.5	70	103	94

Direct Operated 2 Port Solenoid Valve For Water

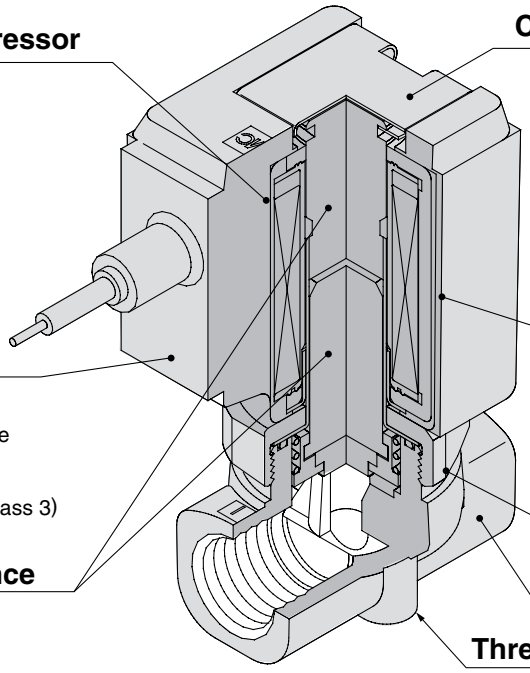
Series VCW

Improved durability (Nearly twice the life of the previous series)

Resistance of moving parts has been reduced through the use of a unique magnetic material. Service life, wear resistance, and corrosion resistance are improved.

Large flow rate: Av factor 3.84 to 50.40 x 10^{-6} m^2

Compact: Single valve volume reduced by –15% (Class 3)
Manifold length reduced by –18% (Class 3: 5 stations) (SMC comparison)



Built-in surge voltage suppressor

Built-in rectifying circuit (AC)
- AC/DC switchover is possible by simply changing the coil.
- Noise prevention

Clip type

Ease of maintenance has been improved.
Changing of the coil is made easy by means of clip design.

Flame resistant molded coil material
Flame resistance equivalent to UL94 standard V-0

Miniaturized coil

Compact and lightweight
New compact coil reduces the overall size and weight of the valve.
Volume: –15%
Weight: –20%
} SMC comparison (Class 3)

Threaded assembly
Simplifies maintenance

Improved corrosion resistance
Special material introduced.

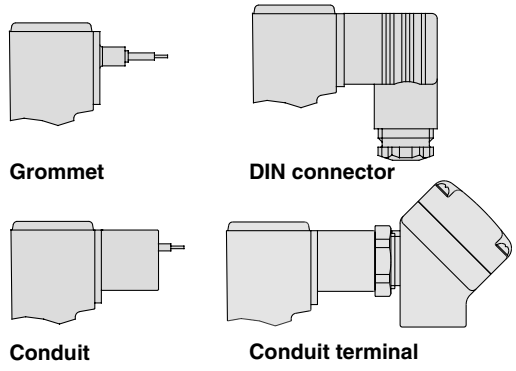
Improved corrosion resistance

Threaded for bottom mounting
Spacial bracket can be mounted.

A variety of wiring options
Grommet, DIN terminal, Conduit, Conduit terminal

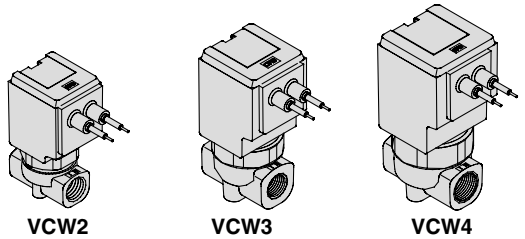
Wiring Specifications (Class B coil)

Wiring Variations



Enclosure: Dusttight/Low jetproof (Equivalent to IP65)

Lined Up by Compact Design

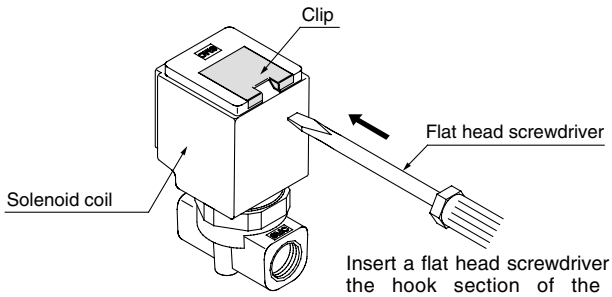


⚠ Precautions

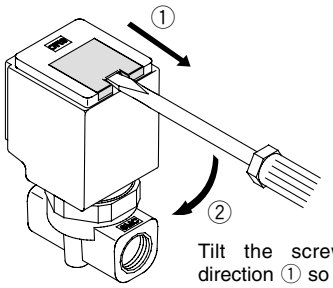
Be sure to read before handling. Refer to page 17-6-3 for Safety Instructions and Solenoid Valve Precautions.

Replacing the Solenoid Coils

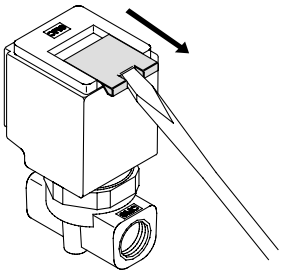
⚠ Caution

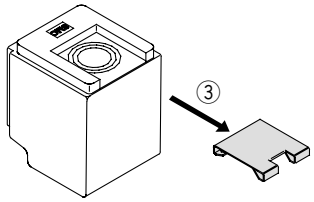


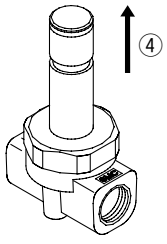
Insert a flat head screwdriver into the hook section of the clip groove.



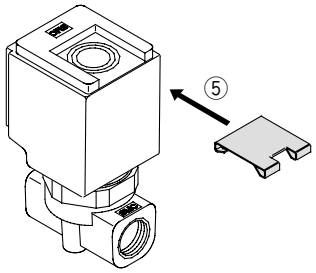
Tilt the screwdriver down in direction ① so that the clip slides out in direction ②.







When the loosened clip is pulled out in direction ③ using pinchers, etc., the coil can be removed and replaced in direction ④.



After replacing coils, press the clip in the direction of ⑤.

Replacement Parts

● **Solenoid coil part no.**

VCW [20] — [1] [G] — [ ]

Series

20	Class 2
30	Class 3
40	Class 4

Voltage

1	100 VAC
2	200 VAC
3	110 VAC
4	220 VAC
5	24 VDC
6	12 VDC
36	230 VAC

Electrical entry

G	Grommet
D	DIN terminal
DL	DIN terminal with indicator light
DO	DIN terminal (without terminal)
C	Conduit
T	Conduit terminal
TL	Conduit terminal with indicator light

Lead wire length

Nil	300 mm
L1	600 mm
L2	1000 mm
L3	1500 mm
L4	3000 mm

● **Clip part no.**

AZ-T-VCW — **Valve model no. on page 17-2-52/57.**

Note) Indicate the valve model no. as a label will be attached to the clip.

● **Seal part no.**

Valve

For VCW20

OR-1860-120- [ ]

For VCW30

OR-2380-130- [ ]

For VCW40

OR-2600-180- [ ]

Manifold

For VCW20

OR-1400-178- [ ]

OR-2670-178- [ ]

For VCW30, 40

OR-1717-178- [ ]

OR-3305-178- [ ]

Nil: NBR
F: FKM
E: EPDM
P: PTFE

⚠ Precautions

Be sure to read before handling. Refer to page 17-6-3 for Safety Instructions and Solenoid Valve Precautions.

Glossary

Pressure

1. Maximum operating pressure differential

This indicates the maximum pressure differential (inlet and outlet pressure differential) which can be allowed for operation with the valve closed or open. When the downstream pressure is 0 MPa, this becomes the maximum operating pressure.

2. Maximum system pressure

This indicates the limit of pressure that can be applied inside the pipelines. (Line pressure)
(The pressure differential of the solenoid valve unit must be no more than the maximum operating pressure differential.)

3. Withstand pressure

The pressure which must be withstood without a drop in performance after returning to the operating pressure range (The value under the prescribed conditions).

Electricity

1. Surge voltage

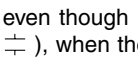
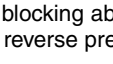
A high voltage which is momentarily generated in the shut-off unit by shutting off the power.

Others

1. Material

NBR: Nitrile rubber
FKM: Fluoro rubber = FPM – Trade names: Viton®, Dai-El®, etc.
EPDM: Ethylene propylene rubber = EPR
PTFE: Polytetrafluoroethylene resin – Trade names: Teflon®, Polyflon®. etc.
C37: Brass
SUS: Stainless steel

2. JIS symbol

According to JIS symbol, even though () IN and OUT shows the blocked state (), when there is reverse pressure (OUT > IN), there is limited blocking ability. To describe the fact that it cannot be blocked by reverse pressure, () symbol is used here.

For details about certified products conforming to international standards, visit us at www.smcworld.com.

Direct Operated 2 Port Solenoid Valve For Water

Series VCW

How to Order Valves (Single Unit)

VC W 2 1 — 1 G — 2 — 02 — — —

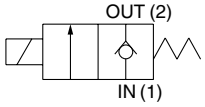
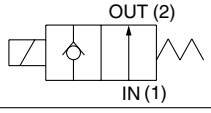
For water

When no symbol is shown for "Material and insulation type"
- Body material: C37
- Seal material: NBR
- Coil insulation: Class B

Series

2	Class 2
3	Class 3
4	Class 4

Valve type

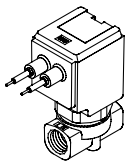
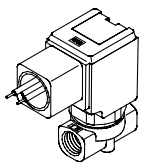
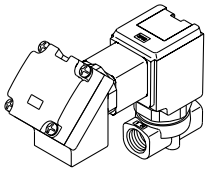
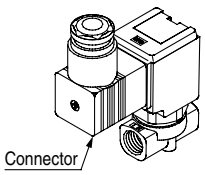
1	N.C. OUT (2)  IN (1)
2	N.O. OUT (2)  IN (1)

Voltage

1	100 VAC
2	200 VAC
3	110 VAC
4	220 VAC
5	24 VDC
6	12 VDC
36	230 VAC

∗ Please consult with SMC regarding other voltages.

Electrical entry

G - Grommet	**C - Conduit**
	
T - Conduit terminal **TL - Conduit terminal with indicator light**	**D - DIN terminal** **DL - DIN terminal with indicator light** **DO - DIN terminal (without connector)**
	 Connector

∗ All types are equipped with surge voltage suppressor.

Option

Nil	None
F	Foot type bracket

Material and insulation type

Symbol	Body material	Seal material	Coil insulation type	Note
Nil	C37	NBR	B	
A		FKM		
B		EPDM		
C		PTFE		
G	SUS	NBR		
H		FKM		
J		EPDM		
K		PTFE		
L		FKM		For pure water Note)

Note)
High corrosion resistant specification used for armature material.

Thread type

Nil	Rc
F	G
N	NPT

Port size

Symbol	Port size	Class 2	Class 3	Class 4
01	1/8 (6A)	○	—	—
02	1/4 (8A)	○	○	○
03	3/8 (10A)	—	○	○
04	1/2 (15A)	—	○	○
06	3/4 (20A)	—	—	○

Orifice size

Symbol	Orifice size (mmø)	Class 2	Class 3	Class 4
2	2	○	—	—
3	3	○	○	○
4	4	○	○	○
5	5	○	○	○
7	7	—	○	○
10	10 Note)	—	○	○

Note) ø10 is available only for N.C. (normally closed).
∗ Refer to the below table for orifice and port size combinations.

Orifice and Port Size Combinations

Class	Port size	Orifice size (mmø)					
		2	**3**	**4**	**5**	**7**	**10** Note)
2	1/8 (6A)	●	●	●	●	—	—
	1/4 (8A)	●	●	●	●	—	—
3	1/4 (8A)	—	●	●	●	●	—
	3/8 (10A)	—	●	●	●	●	●
	1/2 (15A)	—	—	—	—	—	●
4	1/4 (8A)	—	●	●	●	●	—
	3/8 (10A)	—	●	●	●	●	●
	1/2 (15A)	—	—	—	—	—	●
	3/4 (20A)	—	—	—	—	—	●

Note) ø10 is available only for N.C. (normally closed).

Standard Specifications

Valve specifications	Valve construction		Direct operated poppet
	Fluid (1)		Water Pure water (Except waste water or agricultural water)
	Withstand pressure (MPa)		5.0
	Body material		C37, Stainless steel
	Seal material		NBR, FKM, EPDM, PTFE
	Ambient temperature (°C)		–20 to 60
	Fluid temperature (°C)		1 to 60 (No freezing)
	Enclosure		Dusttight/low jetproof (equivalent to IP65)
	Environment		Location without corrosive or explosive gases
	Valve leakage (cm^3/min)		0 (With water pressure) (3)
	Mounting orientation		Unrestricted
	Vibration/Impact resistance (m/s^2) (4)		30/150 or less
Coil specifications	Rated voltage		24 VDC,12 VDC,100 VAC,110 VAC, 200 VAC, 220 VAC (50/60 Hz)
	Allowable voltage fluctuation		±10% of rated voltage
	Coil insulation type		Class B
	Power consumption	DC	VCW2: 6W, VCW3: 8 W, VCW4: 11.5W
		AC 50/60 Hz (2)	VCW2: 8.5VA, VCW3: 10VA, VCW4: 13VA

Note 1) When using pure water, select "L" for the type of material (Stainless steel, FKM).
Note 2) Since AC coil uses a rectifying circuit, there is no difference in power consumption between inrush and holding.
Note 3) When using seal material PTFE at 15 cm^3/min (under water pressure) or less.
Note 4) Vibration resistance ···· Conditions when tested with one sweep of 10 to 250 Hz in the axial direction and at a right angle to the armature, in both energized and deenergized states. No malfunction occurred when tested (value at the initial state).
Impact resistance ···· Conditions when tested with a drop tester in the axial direction and at a right angle to the armature, one time each in energized and deenergized states. No malfunction occurred when tested. (Value at the initial state).

Characteristic Specifications

Model	Class	Port size (1)	Orifice size (mmø) (1)	Maximum operating pressure differential N.C. (MPa)	Maximum operating pressure differential N.O. (MPa)	Flow characteristics Av x 10^{-6} m^2	Flow characteristics Cv converted	Max. system pressure (MPa)	Weight (kg) (2)
VCW2	2	1/8 (6A) 1/4 (8A)	2	2.0	0.9	3.8	0.16	3.0	1/8: 0.21 1/4: 0.24
			3	0.8	0.45	7.9	0.33		
			4	0.5	0.25	12	0.51		
			5	0.3	0.15	16	0.65		
VCW3	3	1/4 (8A) 3/8 (10A) 1/2 (15A)	3	2.0	0.8	8.4	0.35	3.0	1/4: 0.42 3/8: 0.40 1/2: 0.49
			4	0.8	0.42	13	0.54		
			5	0.5	0.23	19	0.80		
			7	0.2	0.13	33	1.4		
			10	0.1	—	50	2.1		
VCW4	4	1/4 (8A) 3/8 (10A) 1/2 (15A) 3/4 (20A)	3	3.0	1.2	8.4	0.35	3.0	1/4: 0.58 3/8: 0.55 1/2: 0.62 3/4: 0.78
			4	1.3	0.73	14	0.60		
			5	0.7	0.47	20	0.85		
			7	0.3	0.22	33	1.4		
			10	0.12	—	50	2.1		

Note 1) Refer to page 17-2-52 in model selection regarding port size and orifice size combinations.
Note 2) The weight is the value for the grommet type.

Made to Order Specifications

Please contact SMC for detailed specifications, delivery, and price. Made to Order

Non-leak (10^{-6} Pa·m^3/sec), vacuum (0.1 Pa·abs) specifications

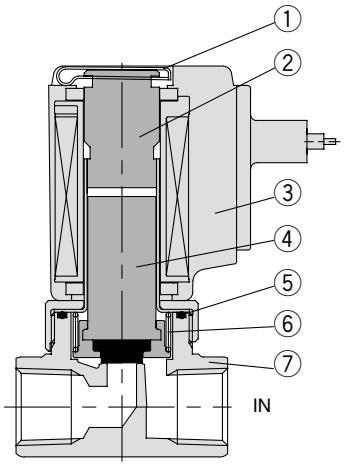
VCW□□–□□–□–□□–$\frac{A}{L}$–□–X35

Oil-free specifications

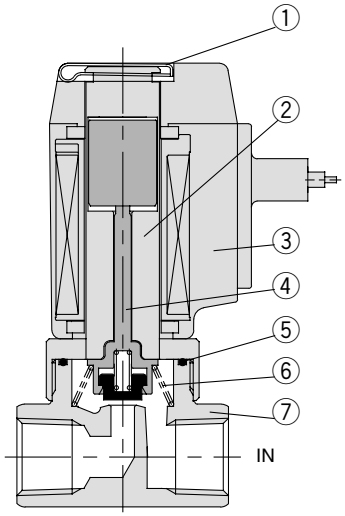
VCW□□–□□–□–□□–□–□–X40

Construction

N.C.



N.O.



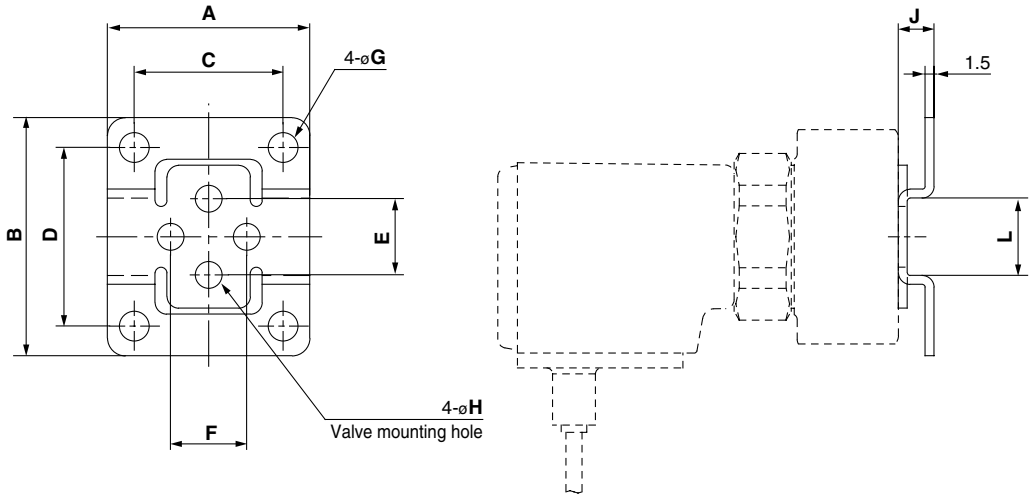
Component Parts

No.	Description	Material	
		Standard	Option
①	Clip	Stainless steel	—
②	Tube assembly	Stainless steel	—
③	Coil assembly	Class B	—
④	Armature assembly	Class 2 Stainless steel, PPS, NBR Class $\frac{3}{4}$ Stainless steel, NBR	Stainless steel, NBR/Stainless steel, FKM, Stainless steel, EPDM/Stainless steel, PTFE
⑤	O-ring	NBR	FKM, EPDM, PTFE
⑥	Return spring	Stainless steel	—
⑦	Body	Brass	Stainless steel

Component parts

No.	Description	Material	
		Standard	Option
①	Clip	Stainless steel	—
②	Tube assembly	Stainless steel, PTFE	—
③	Coil assembly	Class B	—
④	Push rod assembly	PPS·NBR	PPS, NBR/PPS, FKM PPS, EPDM/PPS, PTFE
⑤	O-ring	NBR	FKM, EPDM, PTFE
⑥	Return spring	Stainless steel	—
⑦	Body	Brass	Stainless steel

Dimensions: Bracket



Bracket Mounting Dimensions/Bracket Material: Stainless Steel

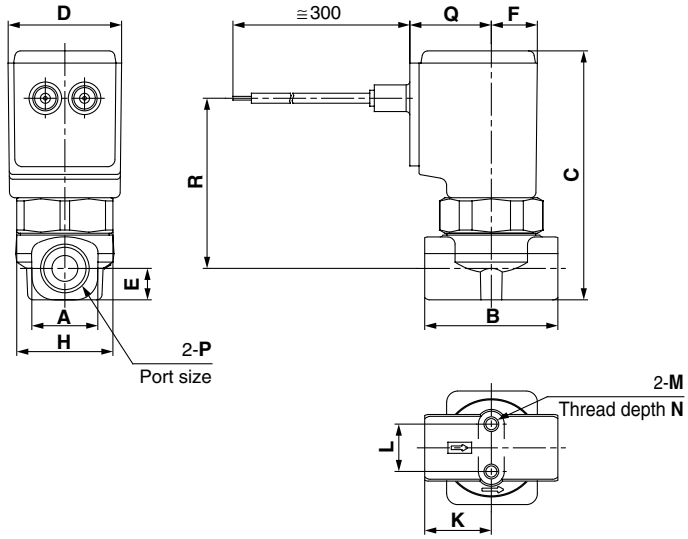
(mm)

Valve model	Port size	Bracket part no.	A	B	C	D	E	F	G	H	J	L
VCW2□	1/8, 1/4	**VCW20-12-01A**	34	40	25	30	12.8	12.8	5	4.5	6	13
VCW3□	1/4, 3/8	**VCW30-12-02A**	42	52	30	40	19	19	6	5.5	7	19
	1/2	**VCW30-12-04A**Note 1)	48	56	36	44	23	23	6	5.5	7	23
VCW4□	1/4, 3/8	**VCW40-12-02A**	42	52	30	40	23	23	6	5.5	7	19
	1/2	**VCW30-12-04A**Note 1)	48	56	36	44	23	23	6	5.5	7	23
	3/4	**VCW40-12-06A**	56	65	44	53	28.2	28.2	6	5.5	7	26

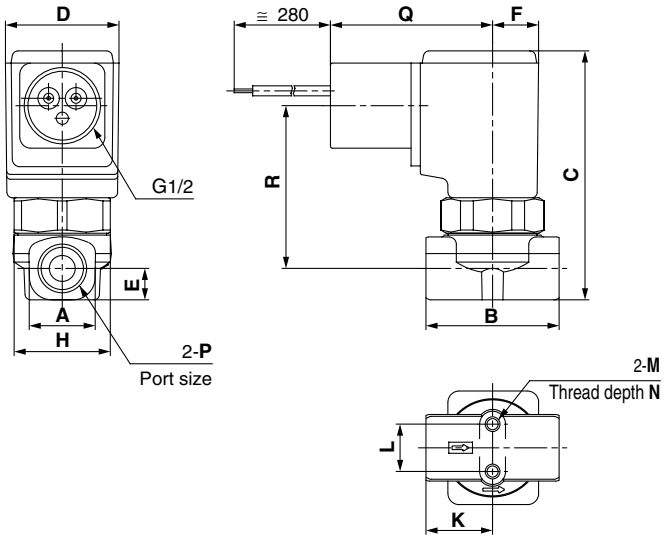
∗ 2 mounting screws (for mounting bracket) are included in bracket part no.
Note 1) The same bracket is used for VCW3□ and VCW4□ (port size 1/2).

Dimensions (N.C.)

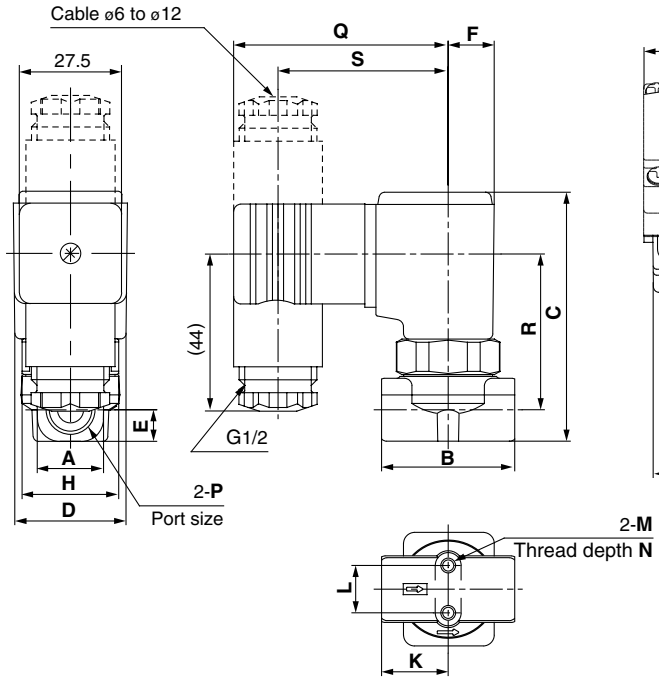
Grommet: G



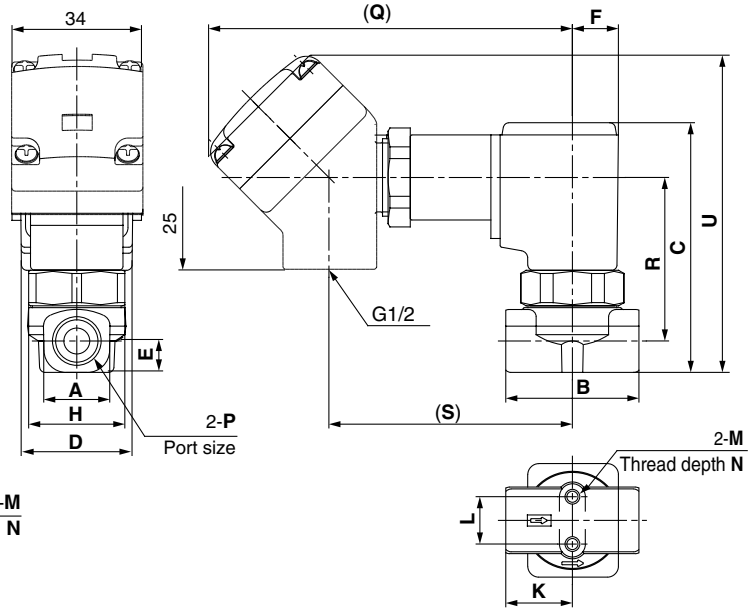
Conduit: C



DIN terminal: D



Conduit terminal: T



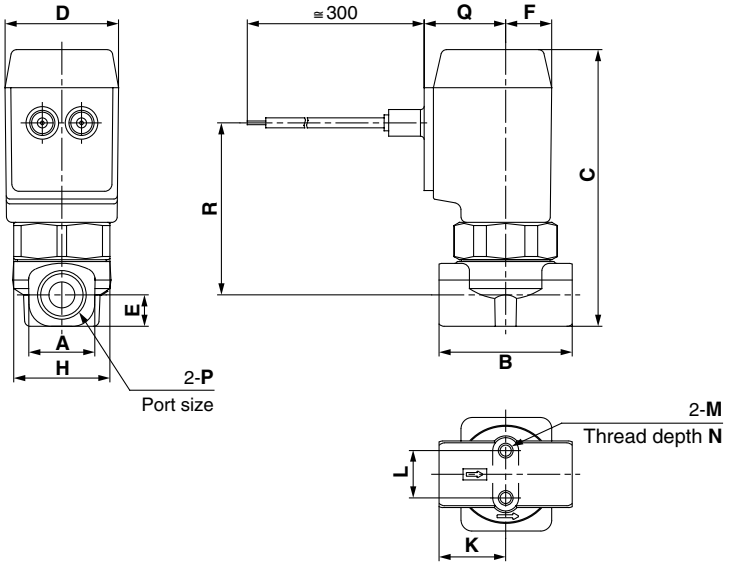
N.C.

(mm)

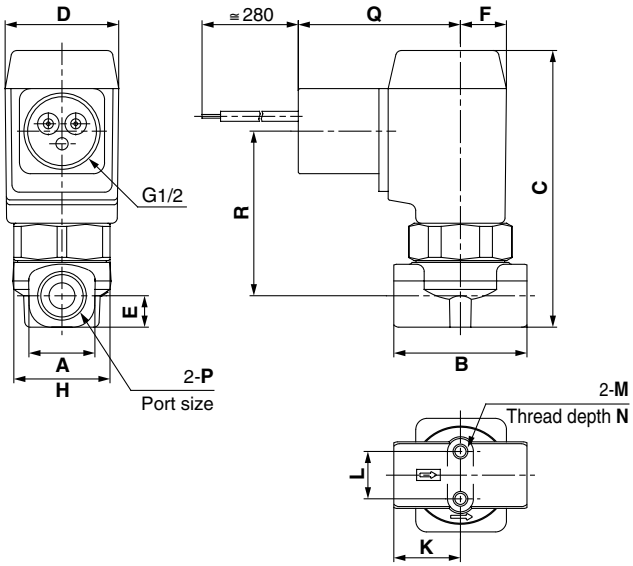
Model	P Port size	A	B	C	D	E	F	H	K	L	M	N	Electrical entry										
													Grommet: G		Conduit: C		DIN terminal: D			Conduit terminal: T			
													Q	R	Q	R	Q	R	S	Q	R	S	U
VCW21	1/8	13.5	28	64	31	6.5	12.5	28	14	12.8	M4	4.5	22	45	44	43	58	40.5	46.5	99	43	66	83
	1/4	18	36	67.5	31	8.5	12.5	28	18	12.8	M4	6	22	46	44	44	58	41.5	46.5	99	44	66	86
VCW31	1/4, 3/8	22	40	81.5	36.5	11	15	32	20	19	M5	8	24	56.5	46	54.5	60	52	48.5	101	54.5	68	99
	1/2	30	50	86	36.5	13.5	15	32	25	23	M5	8	24	59	46	57	60	54.5	48.5	101	57	68	104
VCW41	1/4, 3/8	22	45	90	41	11	17	36	22.5	23	M5	8	26	64.5	48	62.5	62	60	50.5	103	62.5	70	107
	1/2	30	50	94	41	13.5	17	36	25	23	M5	8	26	66.5	48	64.5	62	62	50.5	103	64.5	70	111.5
	3/4	35	60	102	41	17.5	17	36	30	28.2	M5	8	26	70	48	68	62	65.5	50.5	103	68	70	119

Dimensions (N.O.)

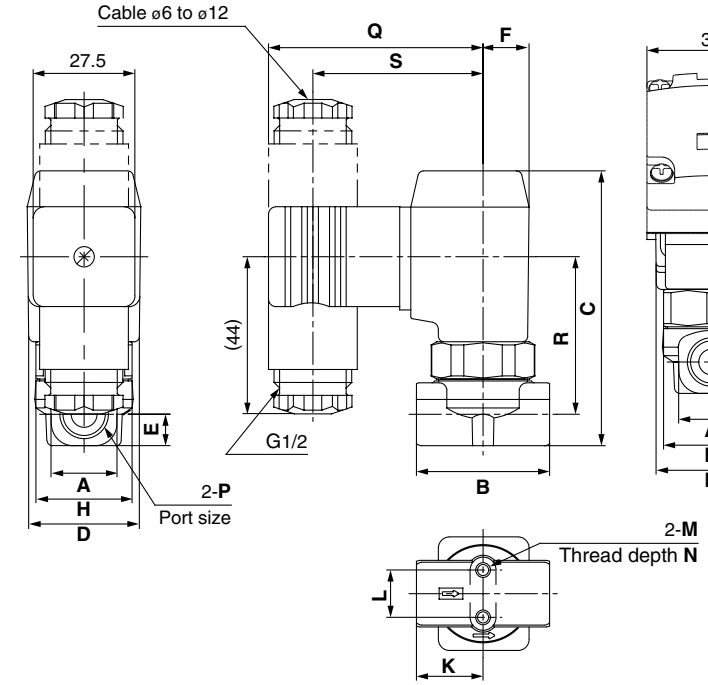
Grommet: G



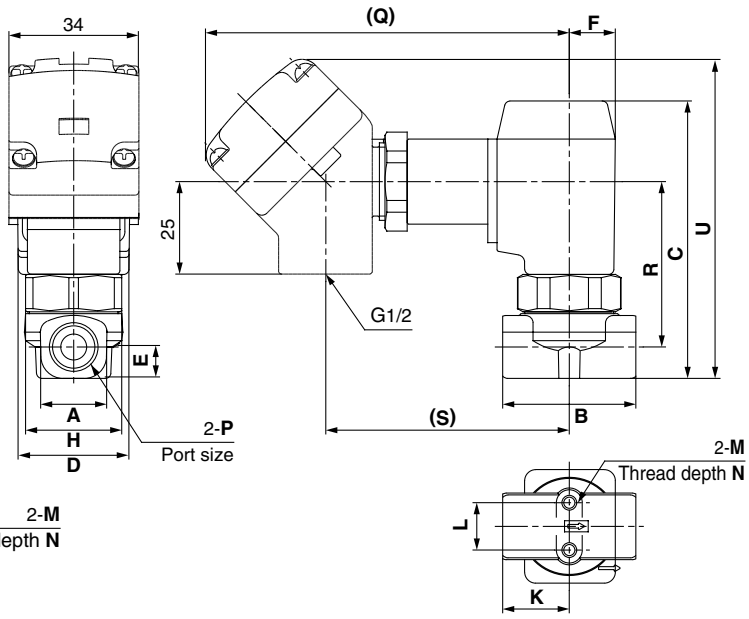
Conduit: C



DIN terminal: D



Conduit terminal: T



N.O.

(mm)

Model	P Port size	A	B	C	D	E	F	H	K	L	M	N	Electrical entry										
													Grommet: G		Conduit: C		DIN terminal: D			Conduit terminal: T			
													Q	R	Q	R	Q	R	S	Q	R	S	U
VCW22	1/8	13.5	28	71.5	31	6.5	12.5	28	14	12.8	M4	4.5	22	45.5	44	43.5	58	41	46.5	99	43.5	66	83
	1/4	18	36	75	31	8.5	12.5	28	18	12.8	M4	6	22	46.5	44	44.5	58	42	46.5	99	44.5	66	86
VCW32	1/4, 3/8	22	40	89.5	36.5	11	15	32	20	19	M5	8	24	57	46	55	60	52.5	48.5	101	55	68	99
VCW42	1/4, 3/8	22	45	97.5	41	11	17	36	22.5	23	M5	8	26	65	48	63	62	60.5	50.5	103	63	70	107
	1/2	30	50	101.5	41	13.5	17	36	25	23	M5	8	26	67	48	65	62	62.5	50.5	103	65	70	111.5

How to Order Manifold

VV2C W 2 □ 02 01 □

For water
When there is no symbol for material
- Manifold material: C37
- Seal material: NBR (4 stations or more)

Series

2	Class 2
3	Class 3
4	Class 4

Material

Symbol	Base material	Seal material
Nil	C37	NBR
A		FKM
B		EPDM
C		PTFE
G	Stainless steal	NBR
H		FKM
J		EPDM
K		PTFE

Stations

02	2 stations
⋮	⋮
10	10 stations

∗ Refer to page 17-2-58/59 in the L dimension table regarding the maximum number of stations.

Thread type

Symbol	Thread type
Nil	Rc
N	NPT
F	G

OUT port size

Symbol	Port size
01	1/8 (6A)
02	1/4 (8A)

∗ All IN ports are 3/8.

How to Order Manifold Assembly

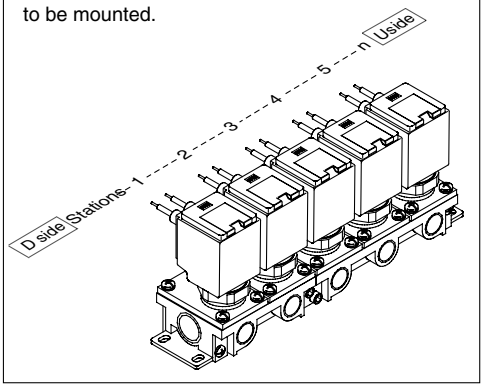
Enter the mounting valve and option part numbers under the manifold base part number.

<Ordering Example>

VV2CW2-0501····· 1 set (Manifold part no.)
∗ VCW23-5G-2····· 5 sets (Valve part no. (Stations 1 to 5))

"∗" is the symbol for assembly.
Add an "∗" in front of the part numbers for solenoid valves, etc., to be mounted.

Enter together in order, counting from station 1 on the D side.



How to Order Valves (For Manifold)

VC W 2 3 1 G 2 □

For water
When there is no symbol for material and type of insulation
- Body material: C37
- Seal material: NBR
- Coil insulation: Class B

Series

2	Class 2
3	Class 3
4	Class 4

Valve type

3	N.C. for manifold
4	N.O. for manifold

Voltage

1	100 VAC
2	200 VAC
3	110 VAC
4	220 VAC
5	24 VDC
6	12 VDC
36	230 VAC

∗ Please consult with SMC regarding other voltages.

Electrical entry

G	Grommet
C	Conduit
T	Conduit terminal
TL	Conduit terminal with indicator light
D	DIN terminal
DL	DIN terminal with indicator light
DO	DIN terminal (without connector)

∗ All types are equipped with surge voltage suppressor.

Material and insulation type

Symbol	Body material	Seal material	Coil insulation type	Note
Nil	C37	NBR	B	
A		FKM		
B		EPDM		
C		PTFE		
G	SUS	NBR		
H		FKM		
J		EPDM		
K		PTFE		
L		FKM		For pure water Note)

Note) High corrosion resistant specification used for armature material.

Orifice size

Symbol	Orifice size (mmø)	Class 2	Class 3	Class 4
2	2	○	—	—
3	3	○	○	○
4	4	○	○	○
5	5	○	○	○
7	7	—	○	○

Manifold Option

Blanking plate assembly

VVCW 2 0 — 3A — G

Series

2	Class 2
3	Class 3
4	Class 4

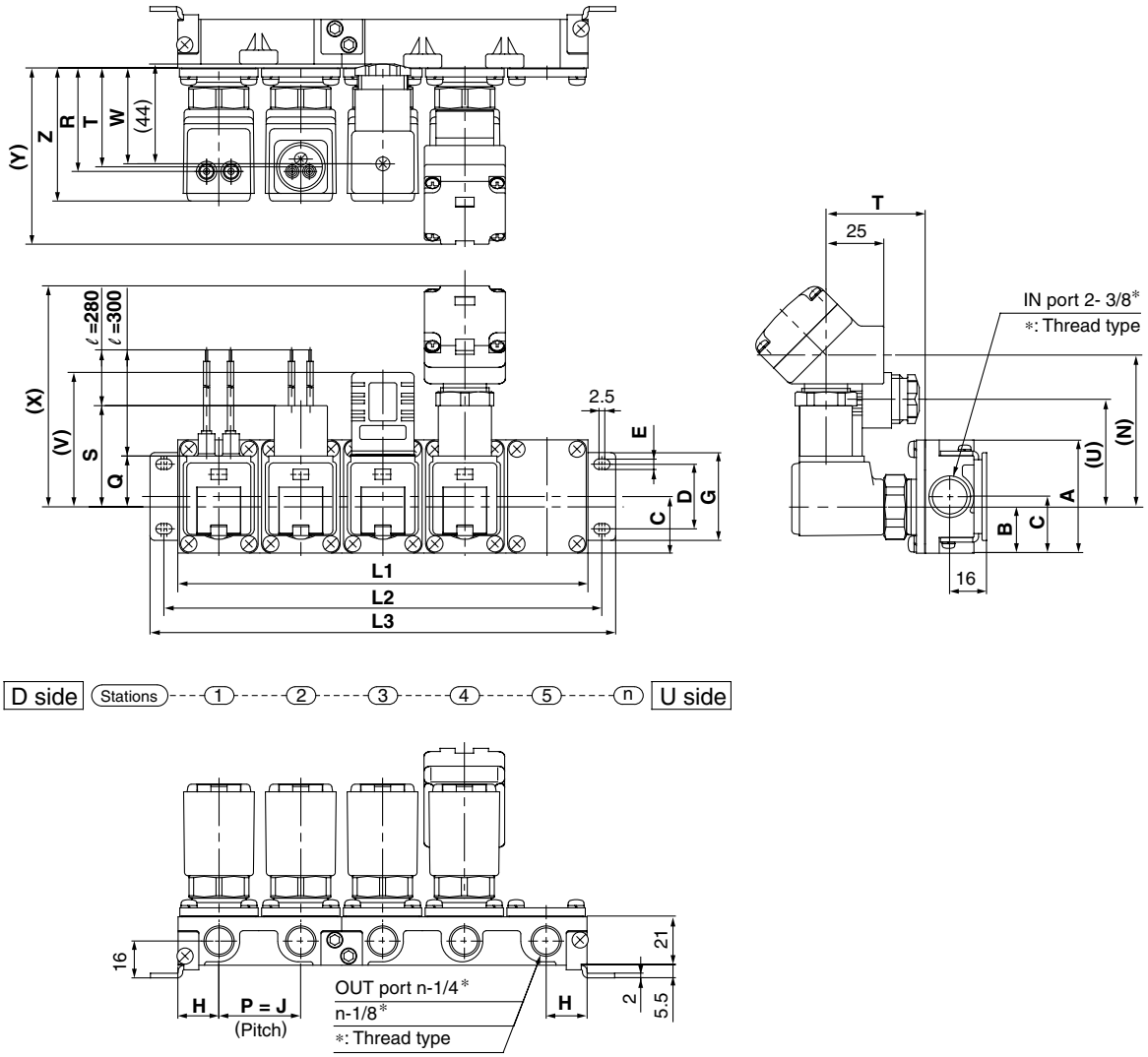
Material

Symbol	Plate material	Seal material
G	Stainless steel	NBR
H		FKM
J		EPDM
K		PTFE

JIS Symbol

This is used by mounting it on the manifold block when a valve is removed for maintenance or when the mounting of an additional valve is planned, etc.

Dimensions (N.C.)



L Dimension

(mm)

Model	Dimensions	n (stations)								
		2	3	4	5	6	7	8	9	10
VV2CW2	L1	69	103.5	138	172.5	207	241.5	276	310.5	345
	L2	81	115.5	150	184.5	219	253.5	288	322.5	357
	L3	93	127.5	162	196.5	231	265.5	300	334.5	369
VV2CW3	L1	77	115.5	154	192.5	231	269.5	308	346.5	385
	L2	89	127.5	166	204.5	243	281.5	320	358.5	397
	L3	101	139.5	178	216.5	255	293.5	332	370.5	409
VV2CW4	L1	83	124.5	166	207.5	249	290.5	332	373.5	415
	L2	95	136.5	178	219.5	261	302.5	344	385.5	427
	L3	107	148.5	190	231.5	273	314.5	356	397.5	439
Manifold composition		2 stns. x 1	3 stns. x 1	2 stns. x 2	2 stns. + 3stns.	3 stns. x 2	2 stns. x 2 + 3 stns.	2 stns. + 3 stns. x 2	3 stns. x 3	2 stns. x 2 + 3 stns. x 2

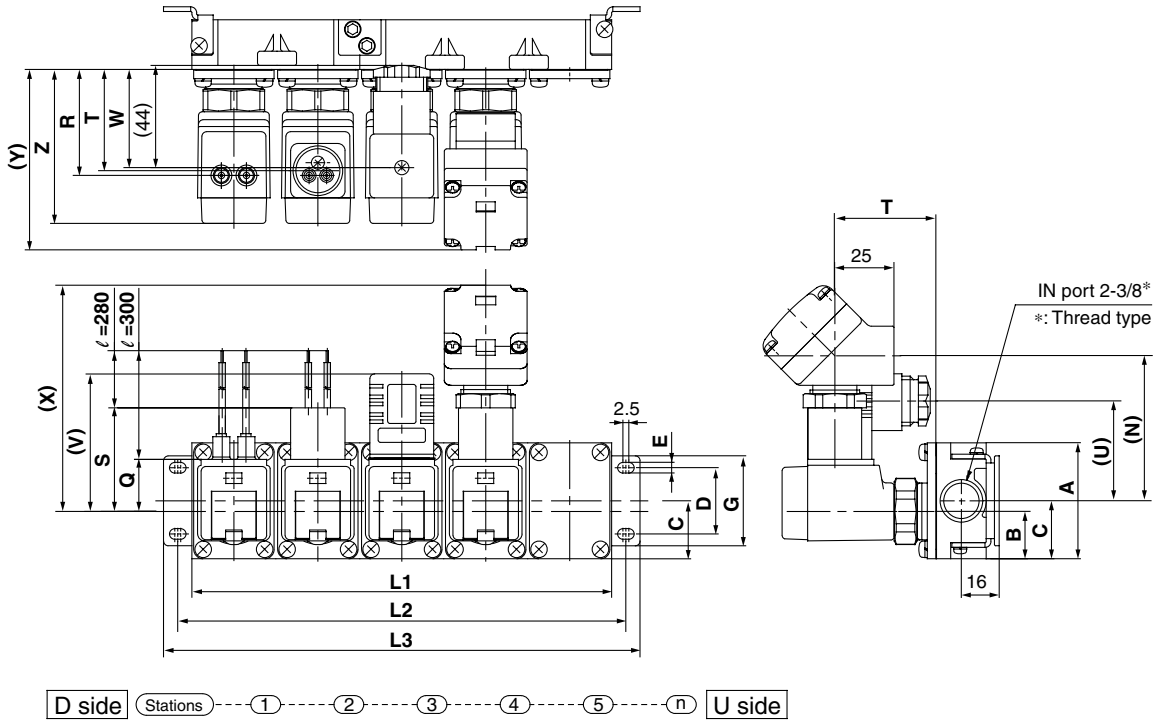
Note) Manifold base is consisted of the junction of 2 and 3 station bases.

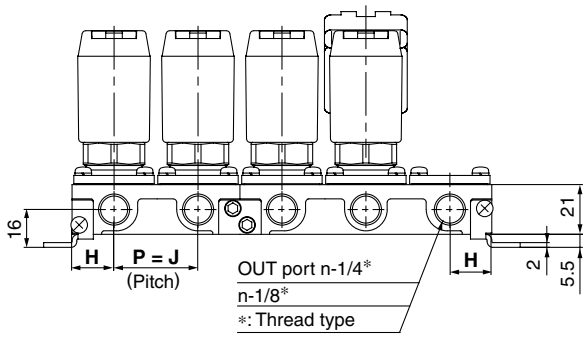
Dimensions

(mm)

Model	A	B	C	D	E	G	H	J	Z	Electrical entry									
										Grommet		Conduit		DIN terminal			Conduit terminal		
										Q	R	S	T	U	V	W	N	X	Y
VV2CW2	49	20	24.5	28	4.5	38	17.3	34.5	56	22	45.5	44	43.5	46	58	41.5	66	99	77
VV2CW3	57	25.5	28.5	30	5.5	42	19.3	38.5	66	24	55	45.5	53	48	60	51	68	101	86.5
VV2CW4	57	25.5	28.5	30	5.5	42	20.8	41.5	74	26	62.5	47.5	60.5	50	62	58.5	70	103	94

Dimensions (N.O.)





L Dimension

(mm)

Model	Dimensions	n (stations)								
		2	3	4	5	6	7	8	9	10
VV2CW2	L1	69	103.5	138	172.5	207	241.5	276	310.5	345
	L2	81	115.5	150	184.5	219	253.5	288	322.5	357
	L3	93	127.5	162	196.5	231	265.5	300	334.5	369
VV2CW3	L1	77	115.5	154	192.5	231	269.5	308	346.5	385
	L2	89	127.5	166	204.5	243	281.5	320	358.5	397
	L3	101	139.5	178	216.5	255	293.5	332	370.5	409
VV2CW4	L1	83	124.5	166	207.5	249	290.5	332	373.5	415
	L2	95	136.5	178	219.5	261	302.5	344	385.5	427
	L3	107	148.5	190	231.5	273	314.5	356	397.5	439
Manifold composition		2 stns. x 1	3 stns. x 1	2 stns. x 2	2 stns. + 3 stns.	3 stns. x 2	2 stns. x 2 + 3 stns.	2 stns. + 3 stns. x 2	3 stns. x 3	2 stns. x 2 + 3 stns. x 2

Note) Manifold base is consisted of the junction of 2 and 3 station bases.

Dimensions

(mm)

Model	A	B	C	D	E	G	H	J	Z	Electrical entry									
										Grommet		Conduit		DIN terminal			Conduit terminal		
										Q	R	S	T	U	V	W	N	X	Y
VV2CW2	49	20	24.5	28	4.5	38	17.3	34.5	63.5	22	45.5	44	43.5	46	58	41.5	66	99	77
VV2CW3	57	25.5	28.5	30	5.5	42	19.3	38.5	74	24	55	45.5	53	48	60	51	68	101	86.5
VV2CW4	57	25.5	28.5	30	5.5	42	20.8	41.5	81.5	26	62.5	47.5	60.5	50	62	58.5	70	103	94

Safety Instructions

These safety instructions are intended to prevent a hazardous situation and/or equipment damage. These instructions indicate the level of potential hazard by labels of **"Caution", "Warning"** or **"Danger"**. To ensure safety, be sure to observe ISO 4414 Note 1), JIS B 8370 Note 2) and other safety practices.

⚠ Caution : Operator error could result in injury or equipment damage.

⚠ Warning : Operator error could result in serious injury or loss of life.

⚠ Danger : In extreme conditions, there is a possible result of serious injury or loss of life.

Note 1) ISO 4414: Pneumatic fluid power--General rules relating to systems.
Note 2) JIS B 8370: General Rules for Pneumatic Equipment

⚠ Warning

1. The compatibility of pneumatic equipment is the responsibility of the person who designs the pneumatic system or decides its specifications.

Since the products specified here are used in various operating conditions, their compatibility for the specific pneumatic system must be based on specifications or after analysis and/or tests to meet your specific requirements. The expected performance and safety assurance will be the responsibility of the person who has determined the compatibility of the system. This person should continuously review the suitability of all items specified, referring to the latest catalog information with a view to giving due consideration to any possibility of equipment failure when configuring a system.

2. Only trained personnel should operate pneumatically operated machinery and equipment.

Compressed air can be dangerous if an operator is unfamiliar with it. Assembly, handling or repair of pneumatic systems should be performed by trained and experienced operators.

3. Do not service machinery/equipment or attempt to remove components until safety is confirmed.

1. Inspection and maintenance of machinery/equipment should only be performed once measures to prevent falling or runaway of the driver objects have been confirmed.
2. When equipment is to be removed, confirm the safety process as mentioned above. Cut the supply pressure for this equipment and exhaust all residual compressed air in the system.
3. Before machinery/equipment is restarted, take measures to prevent shooting-out of cylinder piston rod, etc.

4. Contact SMC if the product is to be used in any of the following conditions:

1. Conditions and environments beyond the given specifications, or if product is used outdoors.
2. Installation on equipment in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverages, recreation equipment, emergency stop circuits, clutch and brake circuits in press applications, or safety equipment.
3. An application which has the possibility of having negative effects on people, property, or animals, requiring special safety analysis.

2/3 Port Process Valve Precautions 1

Be sure to read before handling.
For detailed precautions on every series, refer to main text.

Caution on Design

⚠ Warning

1. Cannot be used as an emergency shutoff valve, etc.
The valves presented in this catalog are not designed for safety applications such as an emergency shutoff valve. If the valves are used in this type of system, other reliable safety assurance measures should also be adopted.

2. Extended periods of continuous energization
Please consult with SMC if valves will be continuously energized for extended periods of time.

3. Solenoid valves are not allowed to use as an explosion proof one.

4. Maintenance space
The installation should allow sufficient space for maintenance activities (removal of valve, etc.).

5. Liquid rings
In cases with a flowing liquid, provide a by-pass valve in the system to prevent the liquid from entering the liquid seal circuit.

6. Operation of actuator
When an actuator, such as a cylinder, is to be driven using a valve, take appropriate measures to prevent potential danger caused by actuator operation.

7. Holding pressure (including vacuum)
Since the valve may have slight internal air leakage, it may not be suitable for holding pressure (including vacuum) in a tank or other vessel for an extended period of time.

8. When the conduit type is used as equivalent to an IP65 enclosure, install a wiring conduit, etc. (Series VC)
For details, refer to page 17-6-7.

Selection

⚠ Warning

1. Check the specifications.
Give careful consideration to operating conditions such as the application, fluid and environment, and use within the operating ranges specified in this catalog.

2. Operating fluids
1) Type of operating fluids
Select model according to the operating fluid for its material. Viscosity of the operating fluids must be less than 50 cst in general.
Please contact SMC for further information.
2) Flammable oil or gases
Confirm the specifications for the internal/external leakage.
3) Corrosive gases
Since corrosive gases may cause stress corrosion, cracking or other accidents, it is not applicable for valves in this catalog.
4) Use a Non-lube valve when impurities such as oil should not be in the fluid passage.
5) Option and fluids may not be usable on the operating conditions. General use of option and fluids are shown in the catalog to be referred for model selection.

Selection

⚠ Warning

3. Quality of operating fluids
Since the use of fluid which contains foreign matter can cause problems such as malfunction and seal failure by promoting wear of the valve seat and core, and by sticking to the sliding parts of the armature, etc., install a suitable filter (strainer) immediately upstream from the valve. As a general rule, use 80 to 100 mesh.
When used to supply water to boilers, substances such as calcium and magnesium which generate hard scale and sludge are included. Since this scale and sludge can cause valve malfunction, install water softening equipment, and a filter (strainer) directly upstream from the valve to remove these substances.

4. Quality of operating air
1) **Use clean air.**
If the compressed air supply includes chemicals, synthetic materials (including organic solvents), salinity, corrosive gas, etc., it can lead to damage or malfunction.
2) **Install an air filter.**
Install an air filter at the up stream side to the valve. Filtration degree should be 5 μm or less.
3) **Install an air dryer, after cooler, etc.**
Compressed air that includes excessive drainage may cause malfunction of valves and other pneumatic equipment. To prevent this, install an air dryer or after cooler, etc.
4) **If excessive carbon powder is seen, install a mist separatoron the upstream side of the valve.**
If excessive carbon powder is generated by the compressor, it may adhere to the inside of valves and cause malfunction.
For compressed air quality, refer to “Air Cleaning Equipment” catalog.

5. Ambient environment
Operate within the ambient operating temperature range. After confirming the compatibility of the product’s component materials with the ambient environment, operate so that fluid does not adhere to the product’s exterior surfaces.

6. Countermeasures for static electricity
Since static electricity may be generated depending on the fluid being used, implement suitable countermeasures.

2/3 Port Process Valve Precautions 2

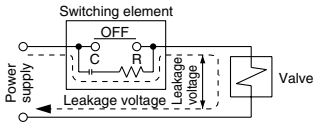
Be sure to read before handling.
For detailed precautions on every series, refer to main text.

Selection

⚠ Caution

1. Leakage voltage

Particularly when using a resistor in parallel with a switching element and using a C-R element (surge voltage suppressor) to protect the switching element, take note that leakage current will flow through the resistor and C-R element, etc., creating a danger that the valve may not shut OFF.



Series VC, VD, VQ

AC coil: 10% or less of rated voltage
DC coil: 2% or less of rated voltage

Series VX

AC coil: 20% or less of rated voltage
DC coil: 2% or less of rated voltage

Series VN

AC coil: 15% or less of rated voltage
DC coil: 3% or less of rated voltage

2. Low temperature operation

1) Valve use is possible to temperature extremes of –10°C. Take appropriate measures to avoid freezing of drainage, moisture etc. by using an air dryer.
2) When using valves for water application in cold climates, take appropriate countermeasures to prevent the freezing in tubing after cutting the water supply from the pump, e.g. drain the water, etc. When heating by steam, be careful not to expose the coil portion to steam. Installation of dryer, heat retaining of the body are recommended to prevent the freezing in condition that dew-point temperature is high and ambient temperature is low.

Mounting

⚠ Warning

1. If air leakage increases or equipment does not operate properly, stop operation.

Check mounting conditions after air and power supplies are connected. Initial function and leakage tests should be performed after installation.

2. Do not apply external force to the coil section.

Apply spanner to the external connection part when tightening.

3. Avoid installing the coil downward.

Foreign materials in the fluid may stick to the armature and it could cause malfunction. (In the case of VX series)

4. Do not warm the coil assembly part by the heat insulating material, etc.

Tape heater for anti-freezing is applicable to use only for piping or body.

5. Other than fittings made of stainless steel or copper should be tightened with a bracket.

6. Do not use in locations subjected to vibrations. If impossible, arm from the body should be as short as possible to prevent resonance.

7. Instruction manual

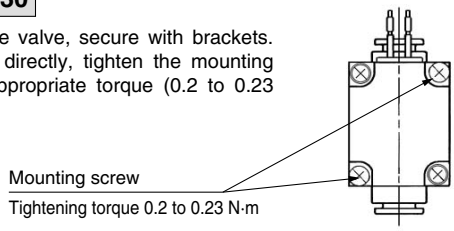
Install only after reading and understanding the safety instructions. Keep the catalog on life so that it can be referred to when necessary.

8. Coating

Warnings or specifications indicated on the product should not be erased, removed, or covered up.

Series VQ20/30

When mounting the valve, secure with brackets. When mounting it directly, tighten the mounting screws with the appropriate torque (0.2 to 0.23 N·m).



Port Direction

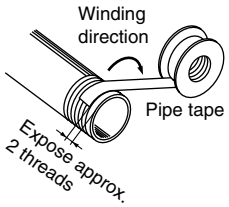
⚠ Caution

1. Preparation before piping

Before piping is connected, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil and other debris from inside the pipe.
Install piping so that it does not apply pulling, pressing, bending or other forces on the valve body.

2. Sealant tape

When installing piping or fitting into a port, ensure that sealant material does not enter the port internally.
Furthermore, when sealant tape is used, leave 1.5 to 2 thread ridges exposed at the end of the threads.



3. Avoid connection of ground lines to piping, as this may cause electric corrosion of the system.

4. Always tighten threads with the proper tightening torque.

When screwing fittings into valves, tighten with the proper tightening torque shown below.

Tightening Torque for Piping

Connection thread	Applicable tightening torque (N·m)
M5	1.5 to 2
Rc 1/8	7 to 9
Rc 1/4	12 to 14
Rc 3/8	22 to 24
Rc 1/2	28 to 30
Rc 3/4	28 to 30
Rc 1	36 to 38
Rc 11/4	40 to 42
Rc 11/2	48 to 50
Rc 2	48 to 50

∗ Reference
How to tighten M5 threads on the fittings
After tightening by hand, use a tightening tool to add about 1/6 turn more. But when using miniature fittings, after tightening by hand, use a tightening tool to add 1/4 turn more. (When there are gaskets for universal elbow, universal tee, etc. in 2 locations, tighten them with twice as 1/2 turn.)

5. Connection of piping to products

When connecting piping to a product, avoid mistakes regarding the supply port, etc.

6. Steam generated in a boiler contains a large amount of drainage.
Be sure to operate with a drain trap installed.

7. In applications such as vacuum and non-leak specifications, use caution specifically against the contamination of foreign matters or airtightness of the fittings.

2/3 Port Process Valve Precautions 3

Be sure to read before handling.
For detailed precautions on every series, refer to main text.

Port Direction

⚠ Caution

Series LV

1. Use the tightening torques shown below when making connections to the pilot port.

Operating Port Tightening Torque

Operating port	Torque (N·m)
M5	1/6 turn with a tightening tool after first tightening by hand 0.8 to 1.0
Rc, NPT 1/8	0.8 to 1.0

2. Use of metal fittings
Do not use metal fittings for piping on taper threads made of resin, as this may cause damage to the threads.

3. Use pilot ports and sensor (breathing) ports as indicated below.

	PA Port	PB port	Sensor (breathing) port
N.C.	Pressure	Exhaust	Exhaust
N.O.	Exhaust	Pressure	Exhaust
Double acting	Pressure	Pressure	Exhaust

In the case of N.C. and N.O. types, the port which does not receive operating pressure is released to atmosphere. When intake and exhaust directly from the valve is not desired due to problems with the ambient environment or scattering of dust, etc., install piping and perform intake and exhaust at a location which does not present a problem.

4. For tubing connections, refer to pages 17-5-38 to 39.

Wiring

⚠ Caution

1. Use electrical wires for piping with more than 0.5 to 1.25 mm².
Further, do not allow excessive force to be applied to the lines.

2. Use electrical circuits which do not generate chattering in their contacts.

3. Use voltage which is within 10% of the rated voltage. In cases with a DC power supply where importance is placed on responsiveness, stay within 5% of the rated value. The voltage drop is the value in the lead wire section connecting the coil.

4. When electrical circuit is not acceptable for surge voltage generated by solenoid, install a surge absorber in parallel to the solenoid or use a optional type with surge killer.
(VCB, VCL: Class H coil, Series VCS, VDW, VX, VQ)

5. Series VX, VQ
Use the option with surge voltage suppressor, with surge voltage protection circuit.

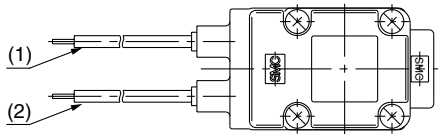
Electrical Connections

⚠ Caution

Series VC

Grommet

Class H coil: AWG18
Class B coil: AWG20



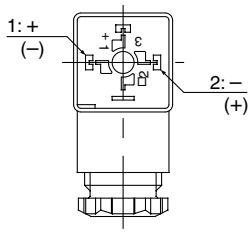
Rated voltage	Lead wire color	
	(1)	(2)
DC (Type B only)	Black	Red
100 VAC	Blue	Blue
200 VAC	Red	Red
Other AC	Gray	Gray

∗ There is no polarity.

Series VC, VX

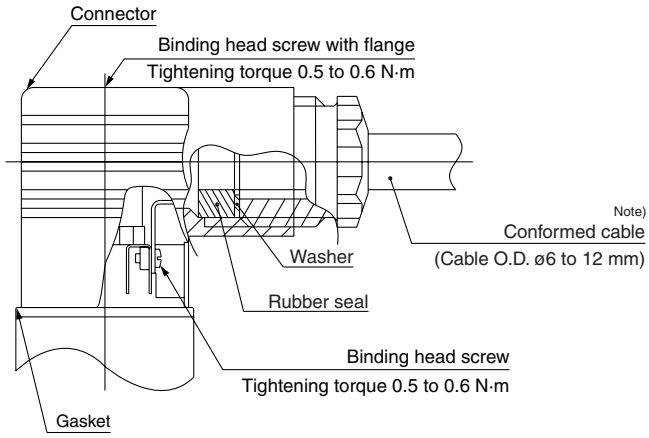
DIN terminal (Class B only)

The figure below shows the internal connection of DIN terminal, so connect DIN terminals with power supply.



Terminal no.	1	2
DIN terminal	+ (–)	– (+)

∗ There is no polarity.
• Heavy-duty cord can be used up to the cable O.D. ø6 to 12.
• Use the tightening torques below for each section.



Note) For the one with outside diameter of the cable ø9 to 12 mm, remove the internal parts of the rubber seal before using.

2/3 Port Process Valve Precautions 4

Be sure to read before handling.
For detailed precautions on every series, refer to main text.

Electrical Connections

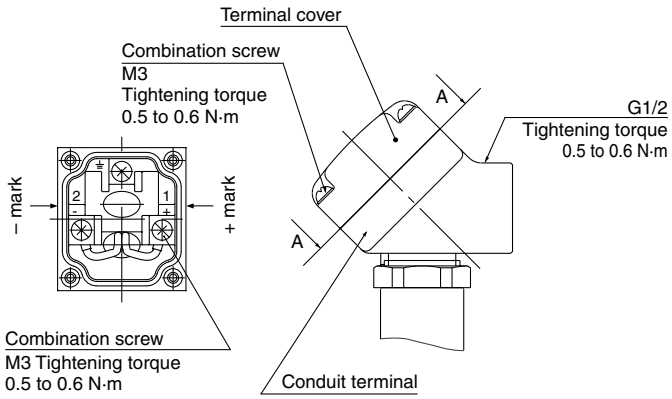
⚠ Warning

Series VC, VX

Conduit terminal

In the case of the conduit terminal, make connections according to the marks shown below.

- Use the tightening torques below for each section.
- Properly seal the terminal connection (G 1/2) with the special wiring conduit, etc.



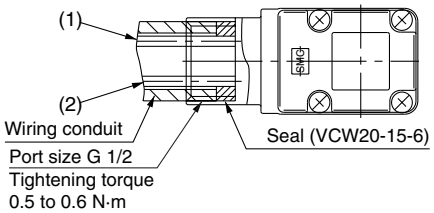
View A-A
(Internal connection diagram)

Series VC

Conduit

When used as an IP65 equivalent, use seal (Part no. VCW20-15-6) to install the wiring conduit. Also, use the tightening torque below for the conduit.

Class H coil: AWG18
Class B coil: AWG20



Rated voltage	Lead wire color	
	(1)	(2)
DC	Black	Red
100 VAC	Blue	Blue
200 VAC	Red	Red
Other AC	Gray	Gray

∗ There is no polarity.

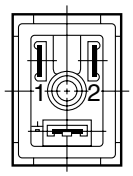
Description	Part no.
Seal	VCW20-15-6

Note) Please order separately.

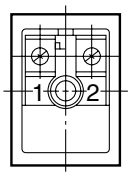
Series VN

The figures below show the internal connection of DIN terminal or terminal box, so connect them with power supply.

With DIN terminal box

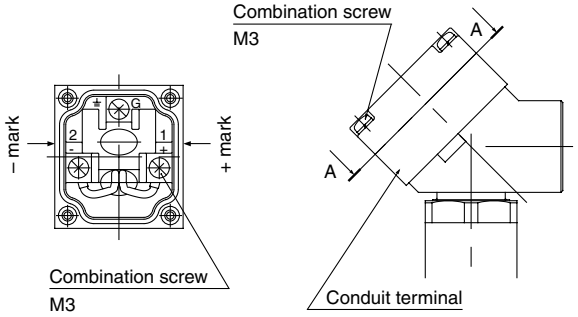


With terminal box



Terminal no.	1	2
DIN terminal	+	–
Terminal	+	–

Connect the conduit terminal according to the marks shown below.



View A-A
(Internal connection diagram)

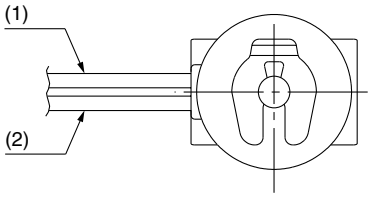
2/3 Port Process Valve Precautions 5

Be sure to read before handling.
For detailed precautions on every series, refer to main text.

Electrical Connections

⚠ Caution

Series VDW

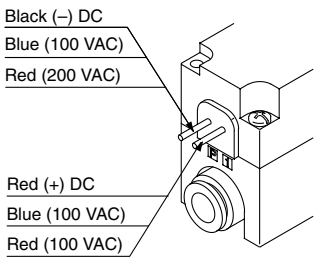


Rated voltage	Lead wire color	
	(1)	(2)
DC	Black	Red
100 VAC	Blue	Blue
200 VAC	Red	Red
Other AC	Gray	Gray

∗ There is no polarity.

Series VQ20/30

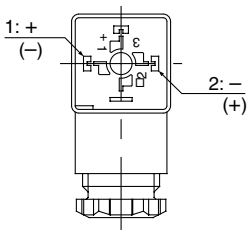
Grommet



∗ For energy-saving circuit, there is the polarity.

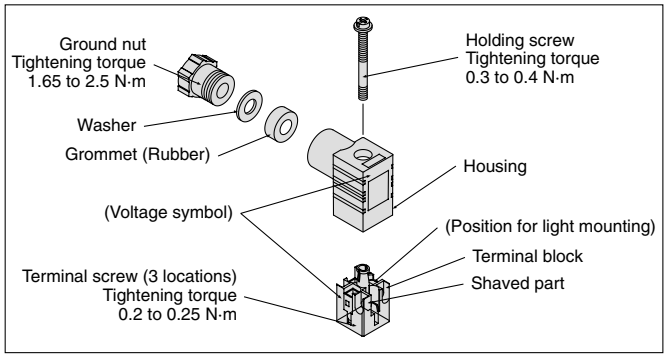
DIN terminal

Since internal connections are as shown below for the DIN terminal, make connections to the power supply accordingly.



Terminal no.	1	2
DIN terminal	+	–

∗ For energy-saving circuit, there is the polarity.
Heavy-duty cord can be used up to the cable O.D. ø3.5 to 7.



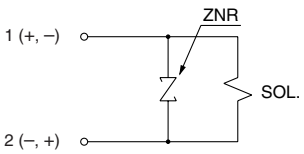
Electrical Circuit

⚠ Caution

Series VC (Class B coil)

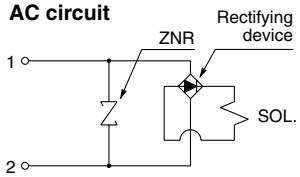
Grommet, Conduit, Conduit terminal, DIN connector

DC circuit



Without indicator light

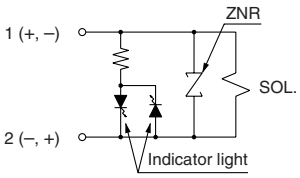
AC circuit



Without indicator light

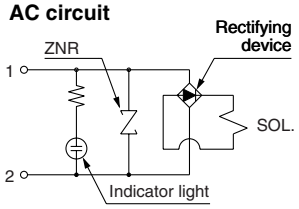
Conduit terminal, DIN terminal

DC circuit



With indicator light

AC circuit

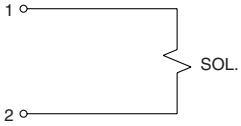


With indicator light

Series VC (Class H coil)

Grommet, Conduit, Conduit terminal

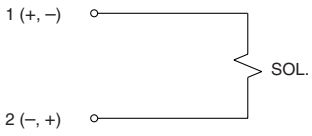
AC circuit



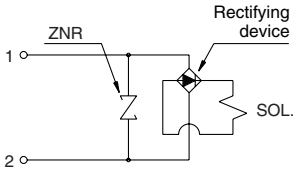
Without indicator light

Series VDW

DC circuit



AC circuit



2/3 Port Process Valve Precautions 6

Be sure to read before handling.
For detailed precautions on every series, refer to main text.

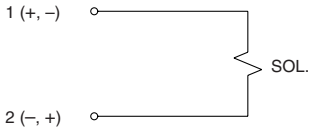
Electrical Circuit

⚠ Caution

Series VX

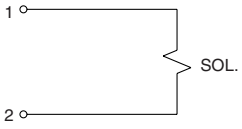
Grommet, Conduit, Conduit terminal, DIN connector

DC circuit



Without indicator light

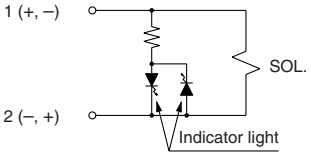
AC circuit



Without indicator light

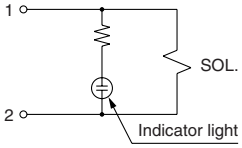
Conduit terminal, DIN terminal

DC circuit



With indicator light

AC circuit

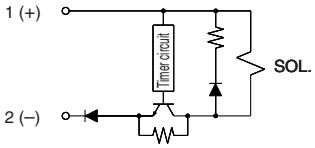


With indicator light

Series VQ20/30

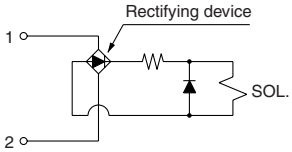
Grommet, DIN terminal

DC voltage
(With energy-saving circuit)



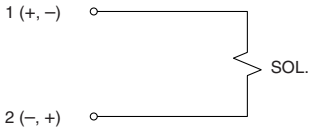
Without indicator light

AC circuit



Without indicator light

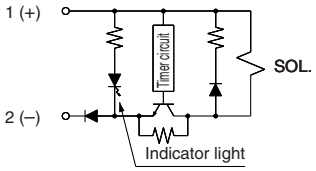
DC circuit



With indicator light

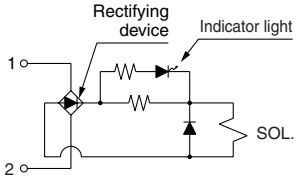
Grommet

DC voltage
(With energy-saving circuit)



With indicator light

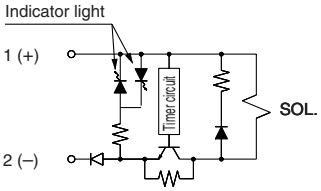
AC circuit



With indicator light

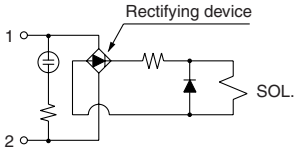
DIN terminal

DC voltage
(With energy-saving circuit)



With indicator light

AC circuit



With indicator light

2/3 Port Process Valve Precautions 7

Be sure to read before handling.
For detailed precautions on every series, refer to main text.

Operating Environment

⚠ Warning

1. **Do not use valves in atmospheres of corrosive gases, chemicals, salt water, water or steam, or where there is direct contact with same.**
2. **Do not use in explosive atmospheres.**
3. **Do not use in locations where vibration or impact occurs.**
4. **Do not use in locations subject to emissive heat.**
5. **Employ suitable protective measures in locations where there is contact with water droplets, oil or welding spatter, etc.**

Lubrication

⚠ Caution

1. **The valve has been lubricated for life at manufacture, and does not require lubrication in service.**
   If a lubricant is used in the system, use turbine oil Class 1, ISO VG32 (no additive). But do not lubricate the valve with EPR seal.
   Refer to the below brand name table of lubricants compliant to Class 1 turbine oil (without additive), ISO VG32.

Class 1 Turbine Oil (with no additive), ISO VG32

Classification of viscosity (cst) (40°C)	Viscosity according to ISO Grade	32
Idemitsu Kosan Co.,Ltd.		Turbine oil P-32
Nippon Mitsubishi Oil Corp.		Turbine oil 32
Cosmo Oil Co.,Ltd.		Cosmo turbine 32
Japan Energy Corp.		Kyodo turbine 32
Kygnus Oil Co.		Turbine oil 32
Kyushu Oil Co.		Stork turbine 32
NIPPON OIL CORPORATION		Mitsubishi turbine 32
Showa Shell Sekiyu K.K.		Turbine 32
Tonen General Sekiyu K.K.		General R turbine 32
Fuji Kosan Co.,Ltd.		Fucoal turbine 32

Please contact SMC regarding Class 2 turbine oil (with additives), ISO VG32.

Maintenance and Inspection

⚠ Warning

1. **Removing the product**
   The valve will reach high temperatures from high temperature fluids such as steam. Confirm that the valve has cooled sufficiently before performing work. If touched inadvertently, there is a danger of being burned.
   1) Shut off the fluid supply and release the fluid pressure in the system.
   2) In the case of air pilot or air-operated type, shut off the supply air source and discharge the compressed air inside a pilot piping.
   3) Shut off the power supply.
   4) Remove the product.
2. **Remove any remaining chemicals and carefully replace them with pure water or air, etc., before beginning work activities. (Series LV)**
3. **Low frequency operation**
   In order to prevent malfunction, conduct a switching operation of a valve every 30 days. Also, in order to use it under the optimum state, conduct a regular inspection once a half year.
4. **Manual override**
   When the manual override is operated, connected equipment will be actuated.
   Operate after safety is confirmed.
5. **Do not disassemble the product. Products which have been disassembled cannot be guaranteed.**
   If disassembly is necessary, please contact SMC.

Maintenance and Inspection

⚠ Caution

1. **Filters and strainers**
   1) Be careful regarding clogging of filters and strainers.
   2) Replace filters after one year of use, or earlier if the amount of pressure drop reaches 0.1 MPa.
   3) Clean the strainer when pressure drop exceeds 0.1 MPa.
2. **Lubrication**
   If operated with lubrication, be sure to continue the lubrication.
3. **How to store for a long period of time**
   Remove water completely from valves before storing for a long period of time to avoid the dust generation and damage to the rubber material.
4. **Flush drainage from filters regularly.**

Precautions on Handling

⚠ Warning

1. **Valves will reach high temperatures from high temperature fluids. Use caution, as there is a danger of being burned if a valve is touched directly.**

⚠ Caution

Series LV

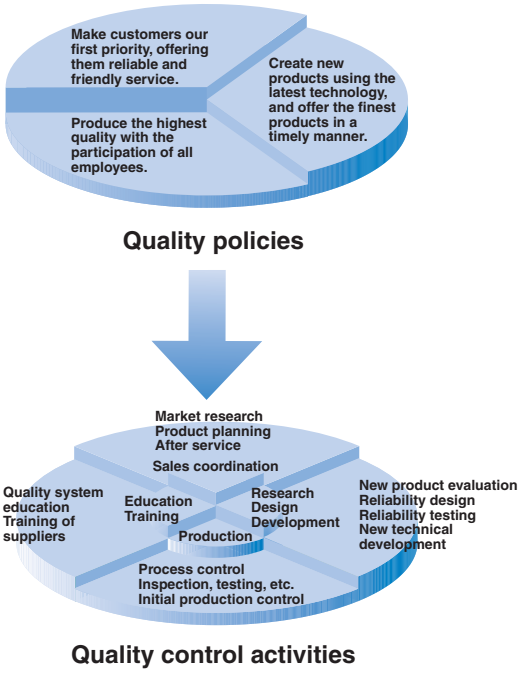
1. **When the diaphragm is made of PTFE**
   Please note that when the product is shipped from the factory, gases such as N2 and air may leak from the valve at a rate of 1 cm^3/min (when pressurized).
2. **When operated at a very low flow rate, the series LV□ with flow rate adjustment may vibrate, etc. depending on the operating conditions. Therefore, operate it after careful examination of the flow rate, pressure and piping conditions.**
3. **In the series LV□, water hammering may occur depending on the fluid pressure conditions. In most cases, improvement is possible by adjusting the pilot pressure with a speed controller, etc., but the flow rate, pressure and piping conditions should be reviewed.**
4. **To adjust the flow rate for the series LV□ with flow rate adjustment, open gradually starting from the fully closed condition.**
   Opening is accomplished by turning the adjustment knob counterclockwise. It is in the fully closed condition when the product is shipped from the factory.
5. **After a long period of nonuse, perform a test run before beginning regular operation.**
6. **Since the LVC is packaged in a clean room use sufficient care in handling when opened.**

Quality Assurance Information (ISO 9001, ISO 14001)

Reliable quality of products in the global market

To enable our customers throughout the world to use our products with even greater confidence, SMC has obtained certification for international standards “ISO 9001” and “ISO 14001”, and created a complete structure for quality assurance and environmental controls. SMC products pursue to meet its customers’ expectations while also considering company’s contribution in society.

SMC’s quality control system



Quality management system

ISO 9001

This is an international standard for quality control and quality assurance. SMC has obtained a large number of certifications in Japan and overseas, providing assurance to our customers throughout the world.

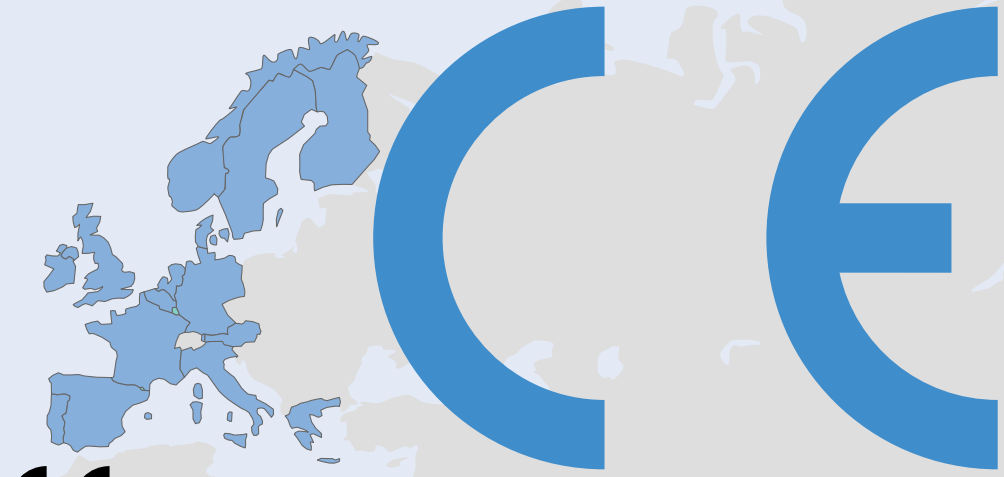
Environmental management system

ISO 14001

This is an international standard related to environmental management systems and environmental inspections. While promoting environmentally friendly automation technology, SMC is also making diligent efforts to preserve the environment.

SMC Product Conforming to Inter

SMC products complying with EN/ISO, CSA/UL standards are supporting



CE Mark

The CE mark indicates that machines and components meet essential requirements of all the EC Directives applied.
It has been obligatory to apply CE marks indicating conformity with EC Directives when machines and components are exported to the member Nations of the EU.
Once “A manufacturer himself” declares a product to be safe by means of CE marking (declaration of conformity by manufacturer), free distribution inside the member Nations of the EU is permissible.

■ CE Mark

SMC provides CE marking to products to which EMC and Low Voltage Directives have been applied, in accordance with CETOP (European hydraulics and pneumatics committee) guide lines.

■ As of February 1998, the following 18 countries will be obliged to conform to CE mark legislation

Iceland, Ireland, United Kingdom, Italy, Austria, Netherlands, Greece, Liechtenstein, Sweden, Spain, Denmark, Germany, Norway, Finland, France, Belgium, Portugal, Luxembourg

■ EC Directives and Pneumatic Components

• Machinery Directive

The Machinery Directive contains essential health and safety requirements for machinery, as applied to industrial machines e.g. machine tools, injection molding machines and automatic machines. Pneumatic equipment is not specified in Machinery Directive. However, the use of SMC products that are certified as conforming to EN Standards, allows customers to simplify preparation work of the Technical Construction File required for a Declaration of Conformity.

• Electromagnetic Compatibility (EMC) Directive

The EMC Directive specifies electromagnetic compatibility. Equipment which may generate electromagnetic interference or whose function may be compromised by electromagnetic interference is required to be immune to electromagnetic affects (EMS/immunity) without emitting excessive electromagnetic affects (EMI/emission).

• Low Voltage Directive

This directive is applied to products, which operate above 50 VAC to 1000 VAC and 75 VDC to 1500 VDC operating voltage, and require electrical safety measures to be introduced.

• Simple Pressure Vessels Directive

This directive is applied to welded vessels whose maximum operating pressure (PS) and volume of vessel (V) exceed 50 bar/L. Such vessels require EC type examination and then CE marking.

national Standards

you to comply with EC directives and CSA/UL standards.

Mark of compliance for CSA/UL

Mark of compliance for CSA

NRTL /C

■ CSA Standards & UL Standards

UL and CSA standards have been applied in North America (U.S.A. and Canada) symbolizing safety of electric products, and are defined to mainly prevent danger from electric shock or fire, resulting from trouble with electric products. Both UL and CSA standards are acknowledged in North America as the first class certifying body. They have a long experience and ability for issuing product safety certificate. Products approved by CSA or UL standards are accepted in most states and governments beyond question.
Since CSA is a test certifying body as the National Recognized Testing Laboratory (NRTL) within the jurisdiction of Occupational Safety and Health Administration (OSHA), SMC was tested for compliance with CSA Standards and UL Standards at the same time and was approved for compliance with the two Standards. The above CSA NRTL/C logo is described on a product label in order to indicate that the product is approved by CSA and UL Standards.

■ TSSA (MCCR) Registration Products

TSSA is the regulation in Ontario State, Canada. The products that the operating pressure is more than 5 psi (0.03 MPa) and the piping size is bigger than 1 inch. fall into the scope of TSSA regulation.

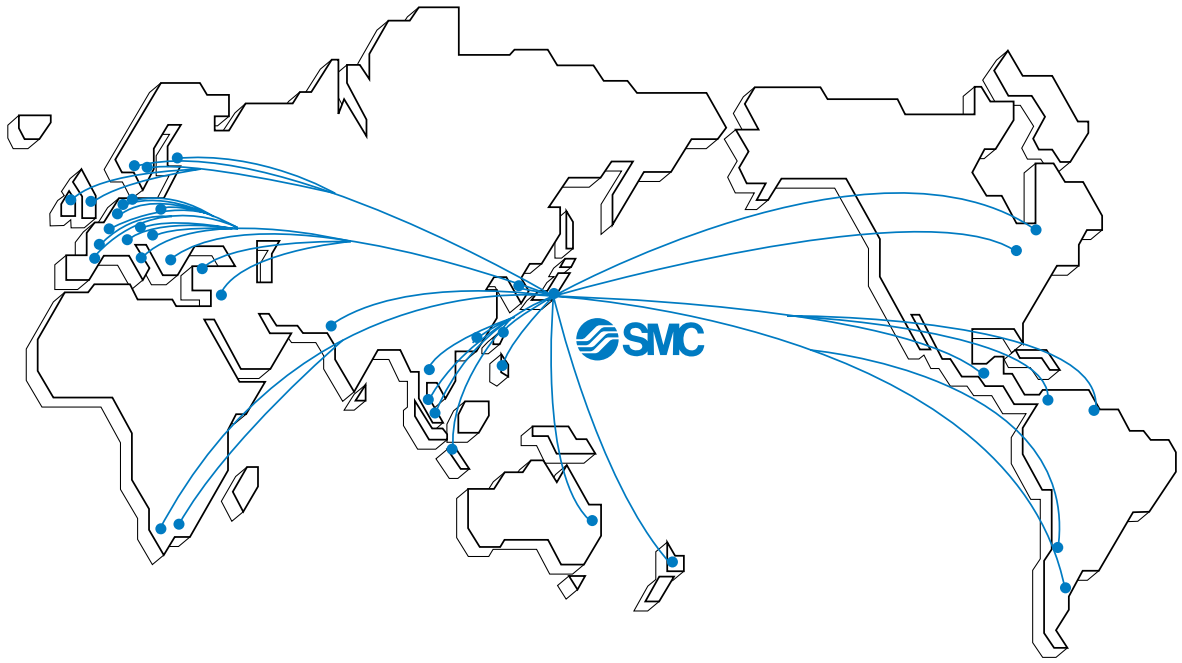
Products conforming to CE Standard

CE **With CE symbol for simple visual recognition**

In this catalog each accredited product series is indicated with a CE mark symbol. However, in some cases, every available models may not meet CE compliance. Please visit our web site for the latest selection of available models with CE mark.

http://www.smcworld.com

SMC's Global Service Network



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TEL: 905-812-0400 FAX: 905-812-8686

MEXICO **SMC Corporation (Mexico), S.A. DE C.V.**
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Santa Cruz de la Sierra-Casilla de Correo 2281, Bolivia
TEL: 591-3-3428383 FAX: 591-3-3449900

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Apartado 40152, Avenida Nueva Granada, Edificio Wanlac,
Local 5, Caracas 1040-A, Venezuela
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AV. Canevaro 752, Lince, Lima, Peru
TEL: 1-471-6002 FAX: 1-471-0935

URUGUAY (Distributor) **BAKO S.A.**
Galicia 1650 esq. Gaboto C.P. 11200, Montevideo, Uruguay
TEL: 2-401-6603 FAX: 2-409-4306

BRAZIL **SMC Pneumaticos Do Brasil Ltda.**
Rua. Dra. Maria Fidelis, nr. 130, Jardim Piraporinha-Diadema-S.P.
CEP: 09950-350, Brasil
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