

Direct Operated 2 Port Solenoid Valve For Steam

Series VCS

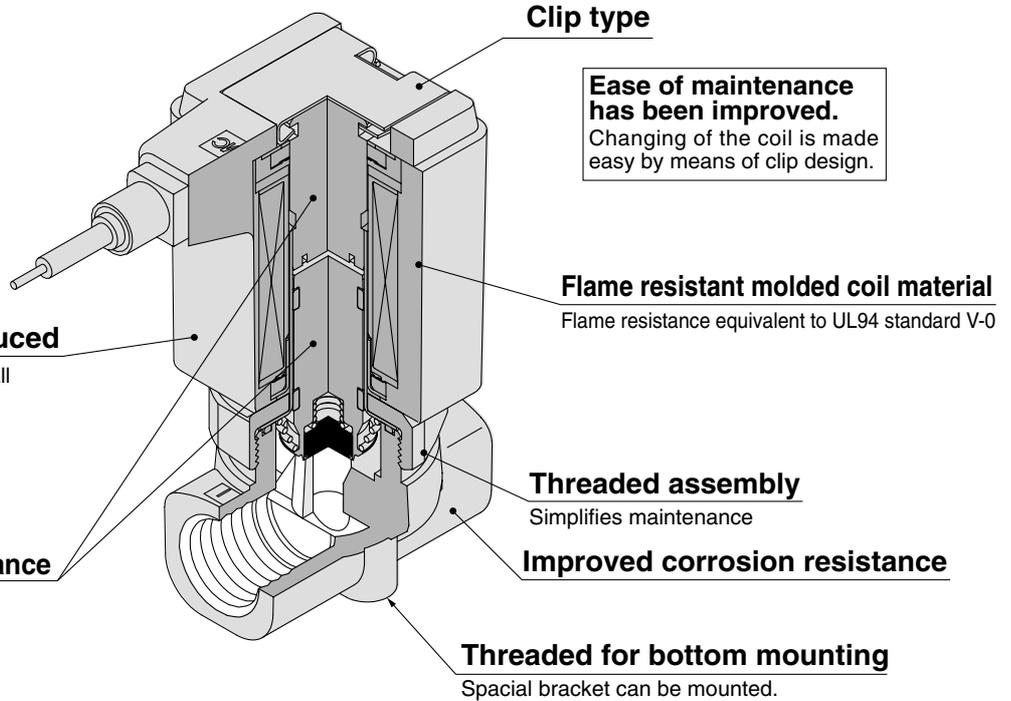
Improved durability (Nearly twice the life of the previous series)

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 $50.40 \times 10^{-6} \text{ m}^2$

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

Manifold length reduced by -18% (Class 3: 5 stations) (SMC comparison)



Coil size and weight reduced

New compact coil reduces the overall size and weight of the valve.

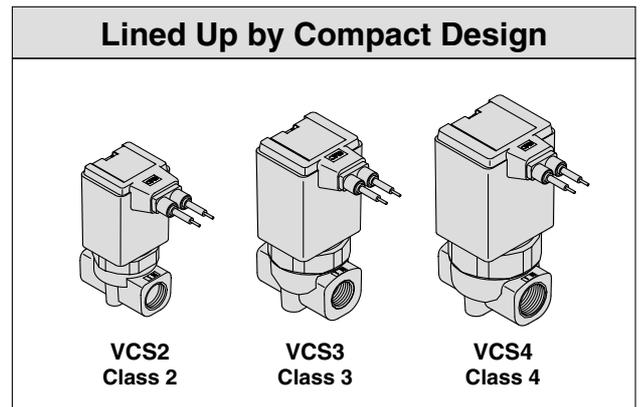
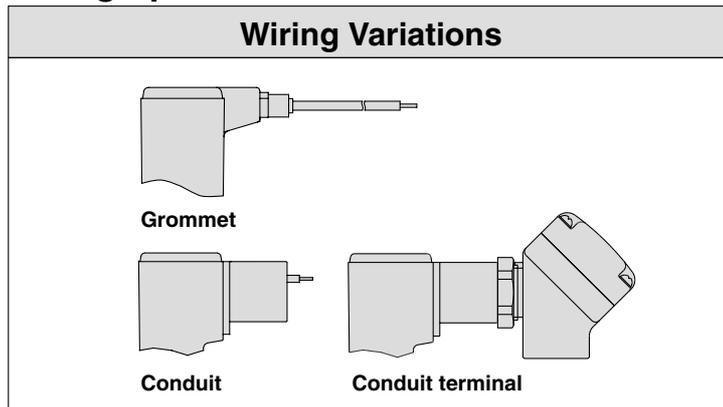
Volume: -15% } SMC comparison
Weight: -20% } (Class 3)

Improved corrosion resistance

Special material introduced.

Enclosure: Dusttight/Low jetproof (Equivalent to IP65)

Wiring Specifications (Class H coil)



- VC□
- VDW
- VQ
- VX2
- VX□
- VX3
- VXA
- VN□
- LVC
- LVA
- LVH
- LVD
- LVQ
- LQ
- LVN
- TI/TIL
- PA
- PAX
- PB

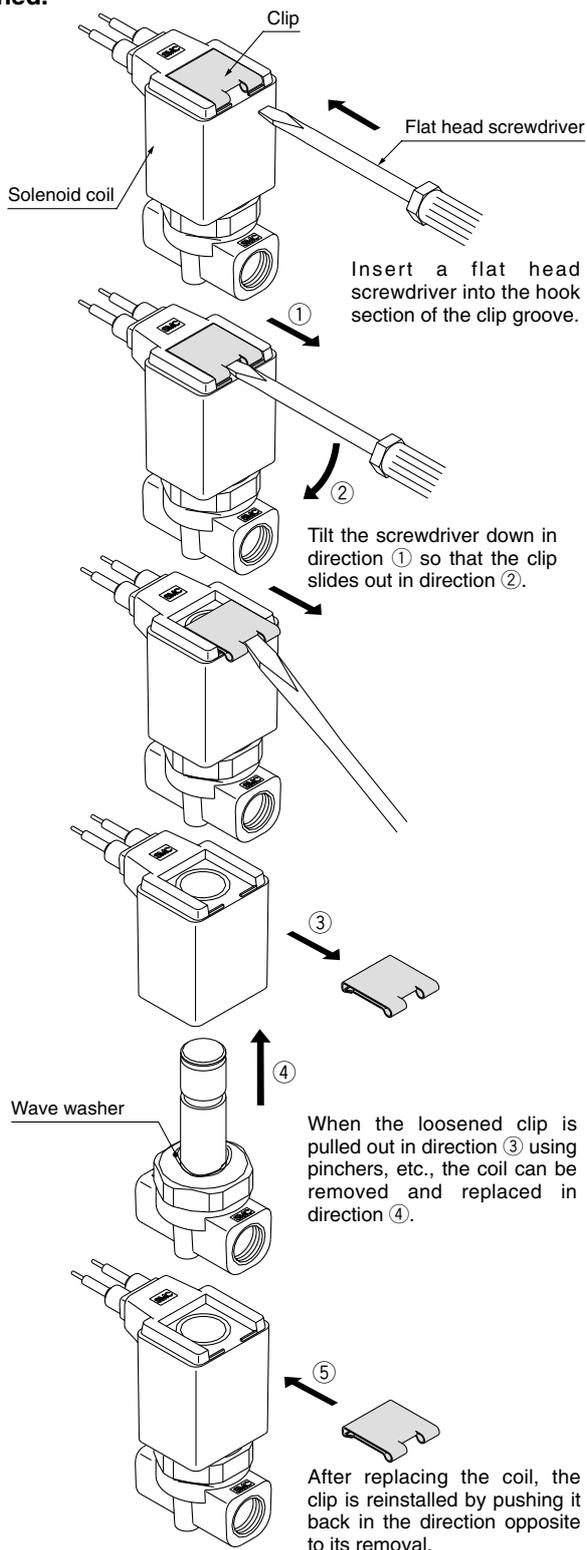
⚠ Precautions

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		Lead wire length	
Series							
20	Class 2					Nil	300 mm
30	Class 3					L1	600 mm
40	Class 4					L2	1000 mm
						L3	1500 mm
						L4	3000 mm
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		

- 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.

VC□

VDW

VQ

VX2

VX□

VX3

VXA

VN□

LVC

LVA

L VH

LVD

LVQ

LQ

LVN

T/
TIL

PA

PAX

PB

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 ●

Voltage ●

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

* Please consult with SMC regarding other voltages.

Option ●

Nil	None
F	Foot type bracket

Material and insulation type ●

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

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	—	○	○

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.

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)	—	●	●	●	●	●
4	1/2 (15A)	—	—	—	—	—	●
	1/4 (8A)	—	●	●	●	●	—
	3/8 (10A)	—	●	●	●	●	●
	1/2 (15A)	—	—	—	—	—	●
	3/4 (20A)	—	—	—	—	—	●

Note) ø10 is available with seal material FKM only.

Direct Operated 2 Port Solenoid Valve For Steam **Series VCS**

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.

VC□

VDW

VQ

VX2

VX□

VX3

VXA

VN□

LVC

LVA

LVH

LVD

LVQ

LQ

LVN

TI/
TIL

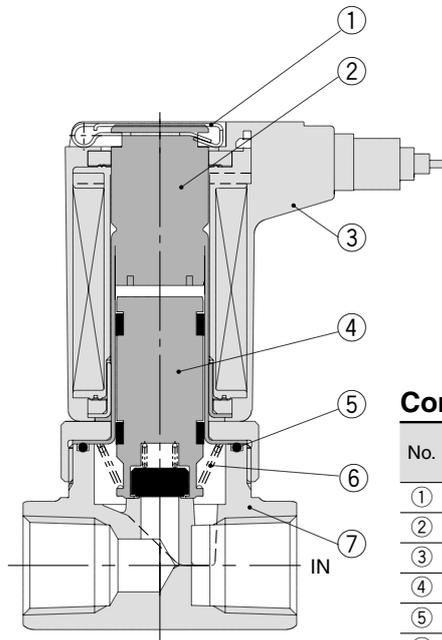
PA

PAX

PB

Series VCS

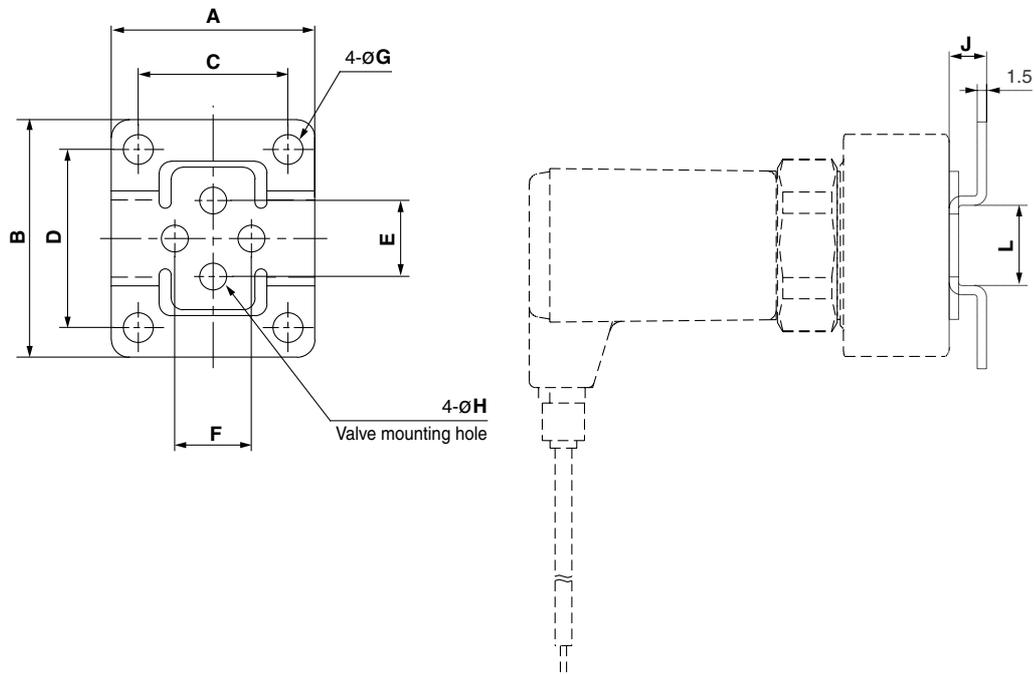
Construction



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

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.

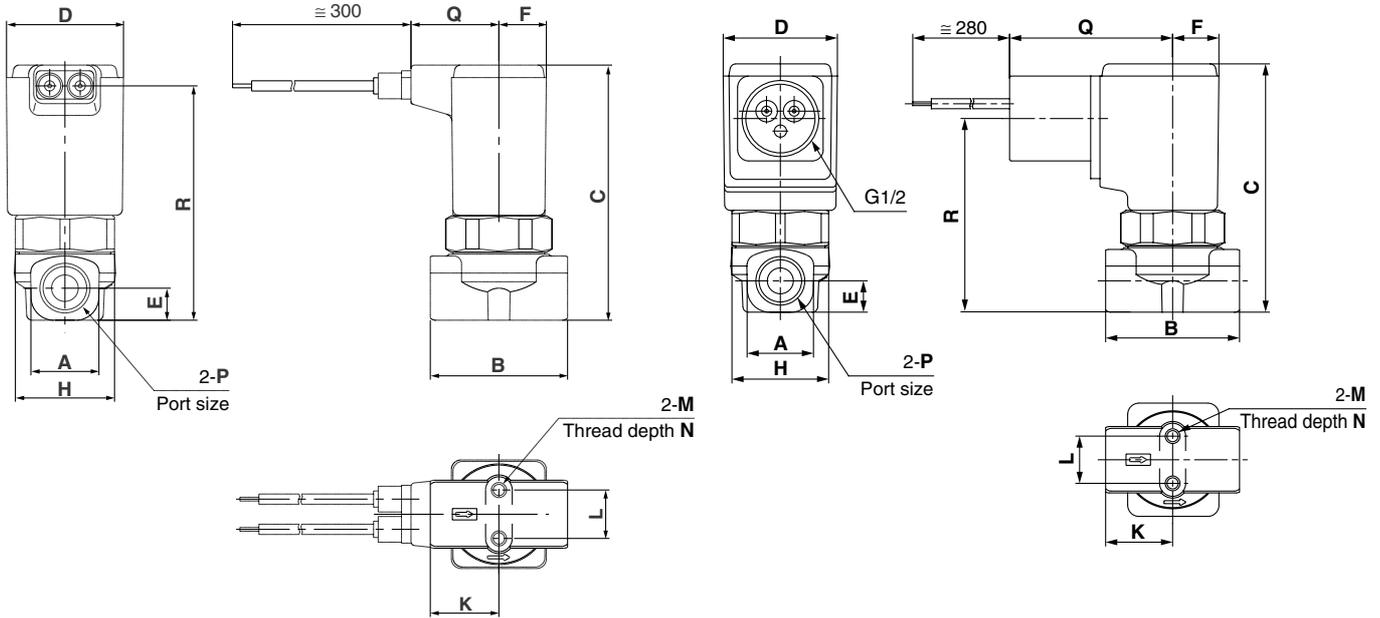
Note 1) The same bracket is used for VCS3□ and VCS4□ (port size 1/2).

Direct Operated 2 Port Solenoid Valve For Steam **Series VCS**

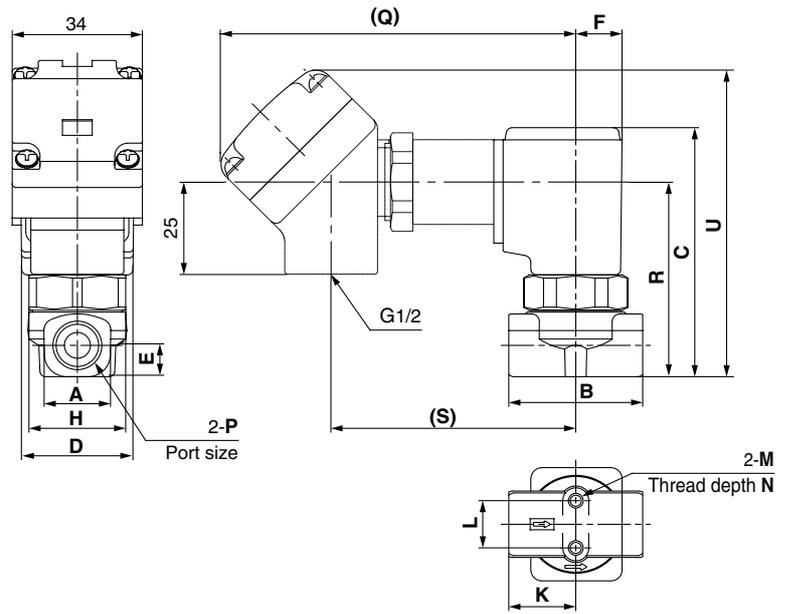
Dimensions

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

- VC□
- VDW
- VQ
- VX2
- VX□
- VX3
- VXA
- VN□
- LVC
- LVA
- LVH
- LVD
- LVQ
- LQ
- LVN
- TI/
TIL
- PA
- PAX
- PB

Series VCS

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.

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

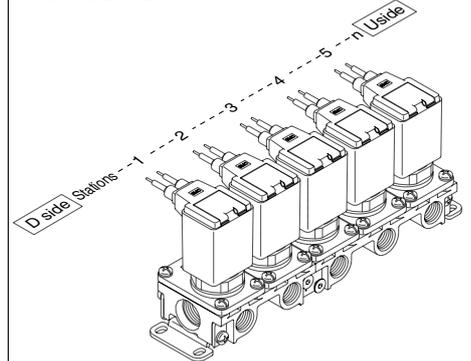
Enter the mounting valve and option part numbers under the manifold base part number.

<Ordering Example>

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 (mmφ)	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

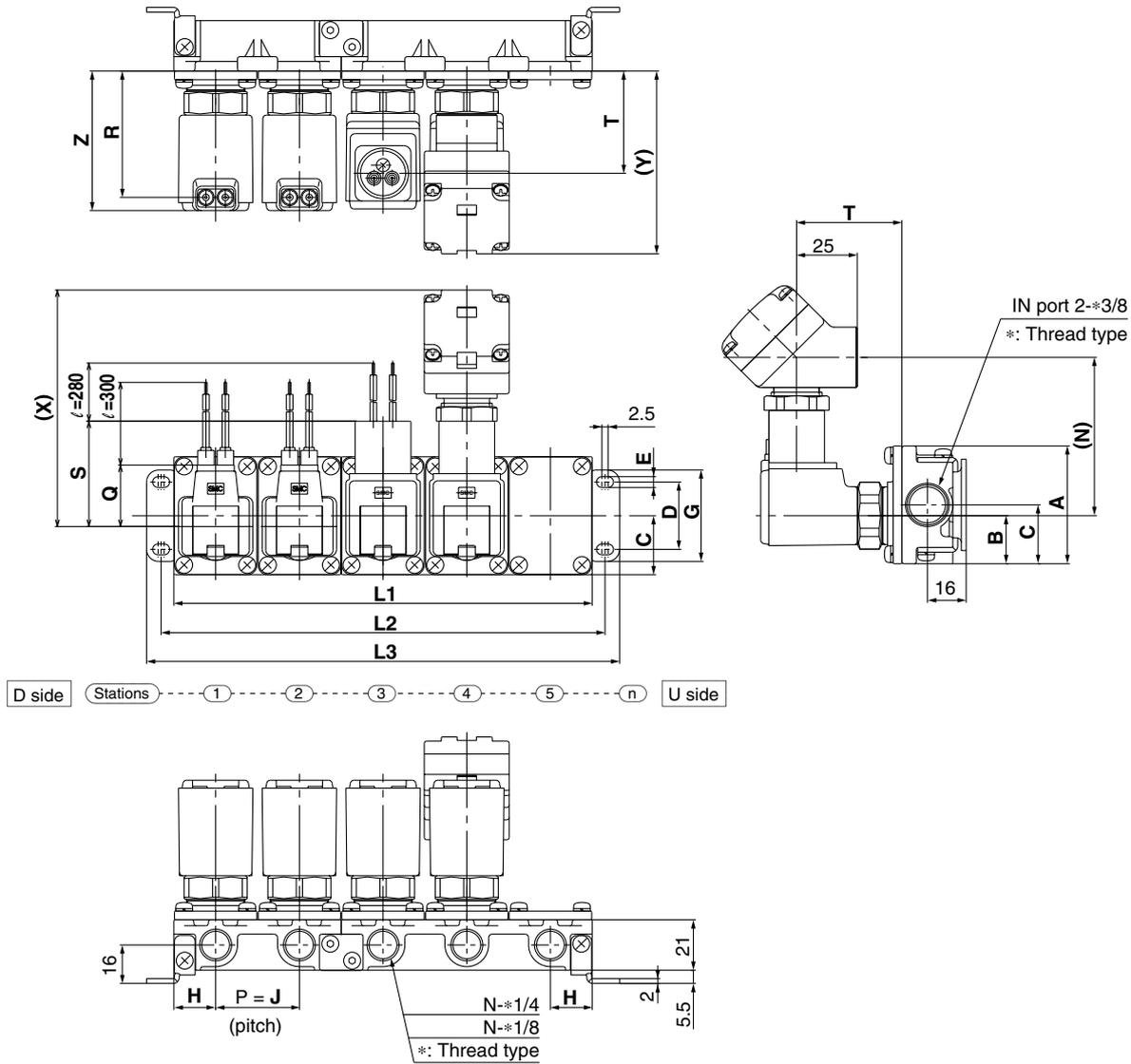
JIS symbol



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.

Direct Operated 2 Port Solenoid Valve For Steam Series VCS

Dimensions



- VC□
- VDW
- VQ
- VX2
- VX□
- VX3
- VXA
- VN□
- LVC
- LVA
- L VH
- LVD
- LVQ
- LQ
- LVN
- TI/
TIL
- PA
- PAX
- PB

L Dimension

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

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