Direct Operated 2 Port Solenoid Valve For Oil

Series VCL

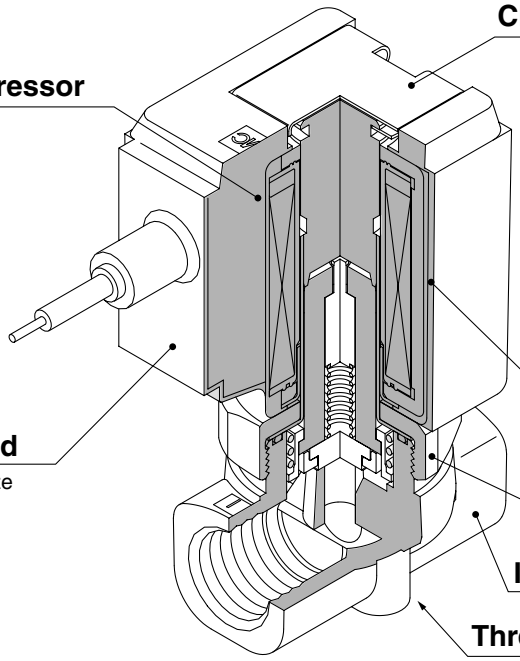
Kerosene, Fuel oil Class 1 (fuel oil A), Silicone oil, Machine oil, Compressor oil, Gas oil, Hydraulic fluid, Turbine oil

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)

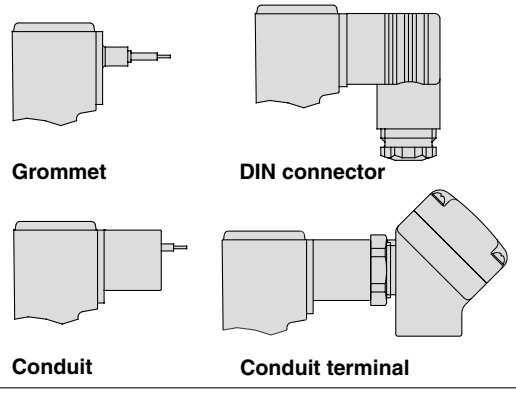


A variety of wiring options (Class B coil)

Grommet, DIN terminal, Conduit, Conduit terminal

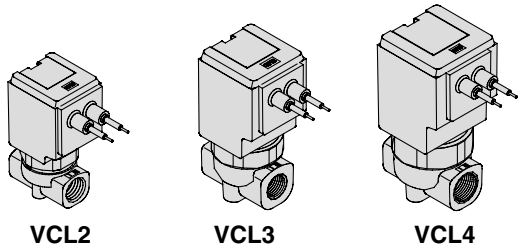
Wiring Specifications (Class B coil)

Wiring Variations



Enclosure: Dusttight/Low jetproof (Equivalent to IP65)

Lined Up by Compact Design



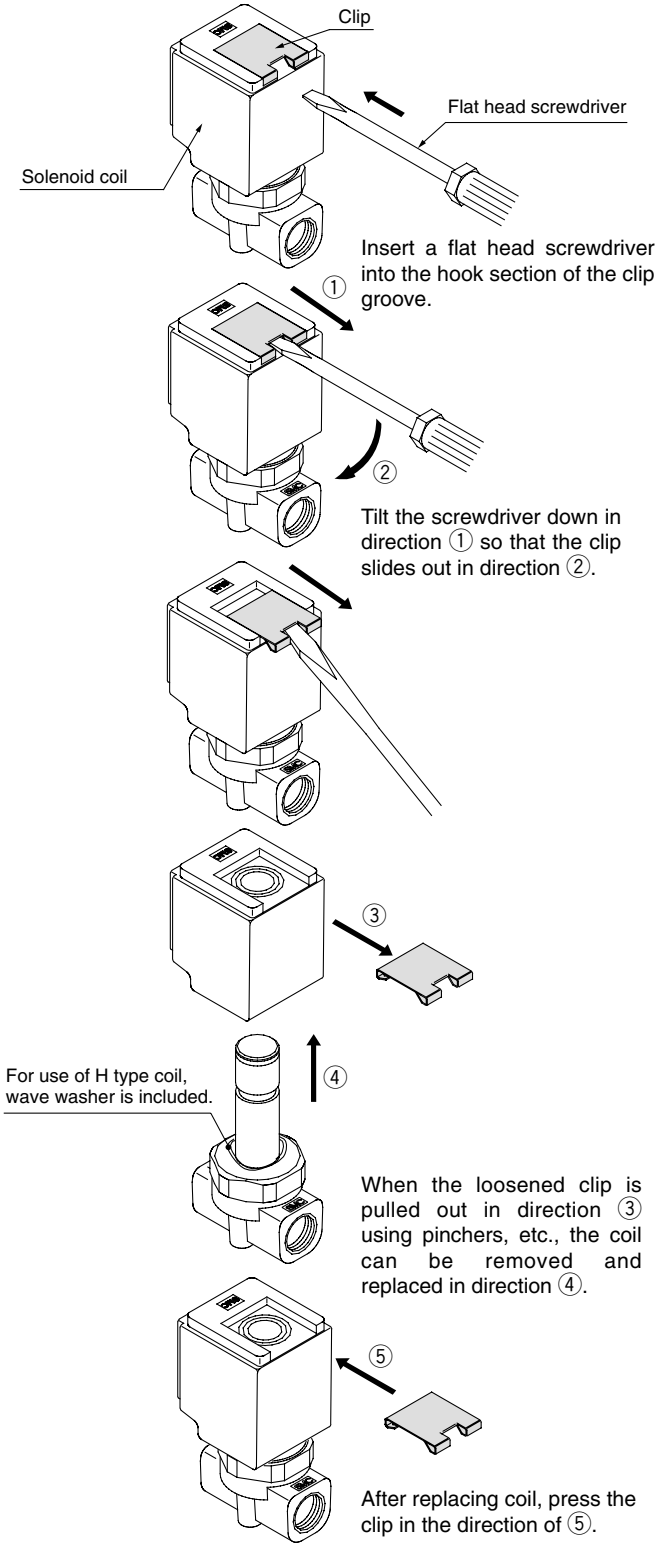
⚠ Precautions

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 □ – □ – □

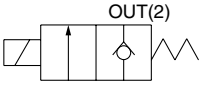
For oil

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

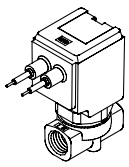
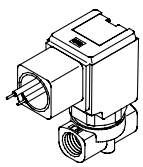
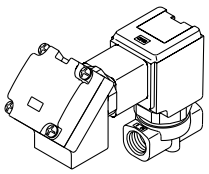
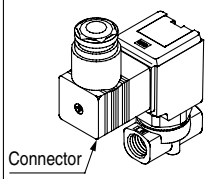
1	N.C. OUT(2)  IN(1)

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

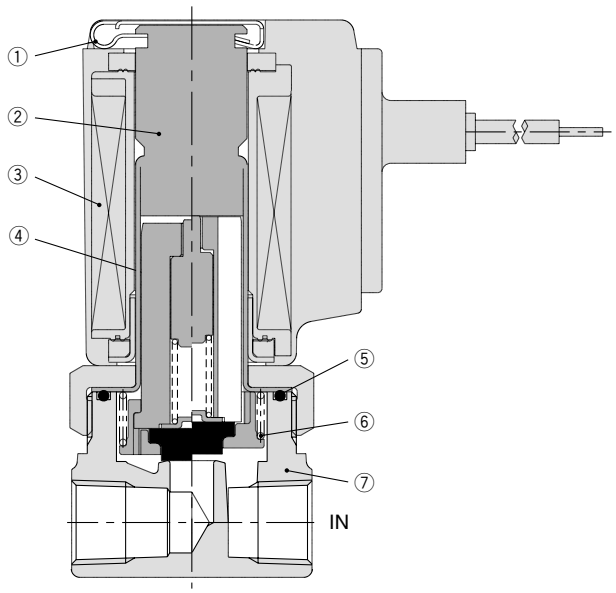
Note 1) When the ambient temperature or fluid temperature is 60°C or more, use high temperature specifications (class H coil).
Note 2) Since a rectifier circuit is used for class B coils with AC, there is no difference in apparent power between inrush and holding.
Note 3) Vibration resistance ···· Conditions 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.

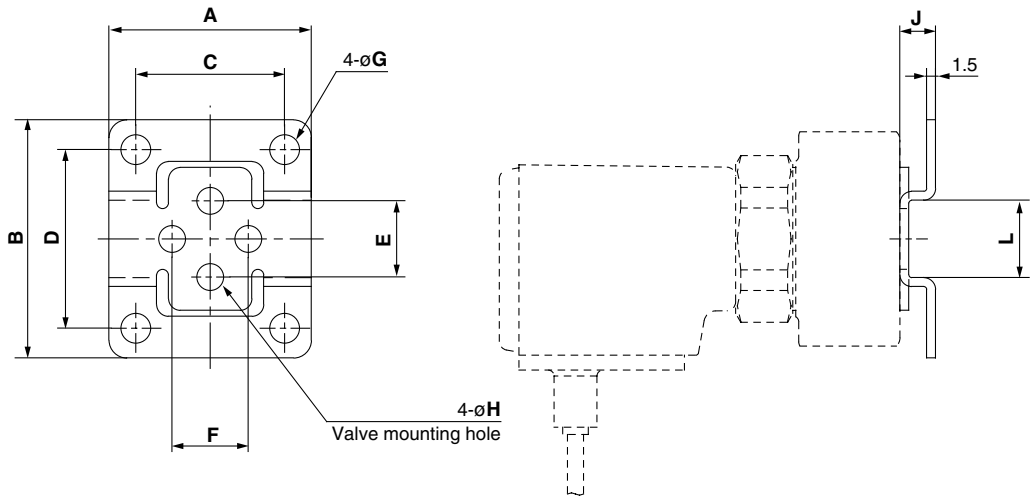
Construction



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

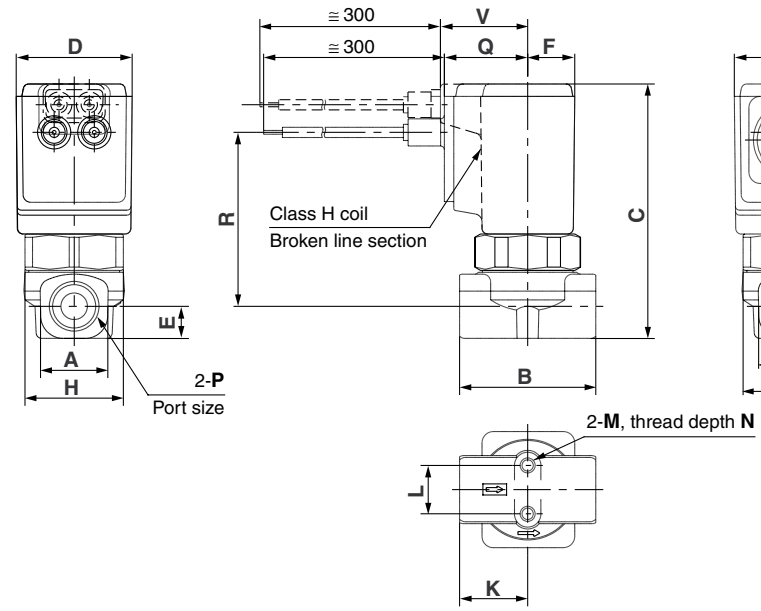
(mm)

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

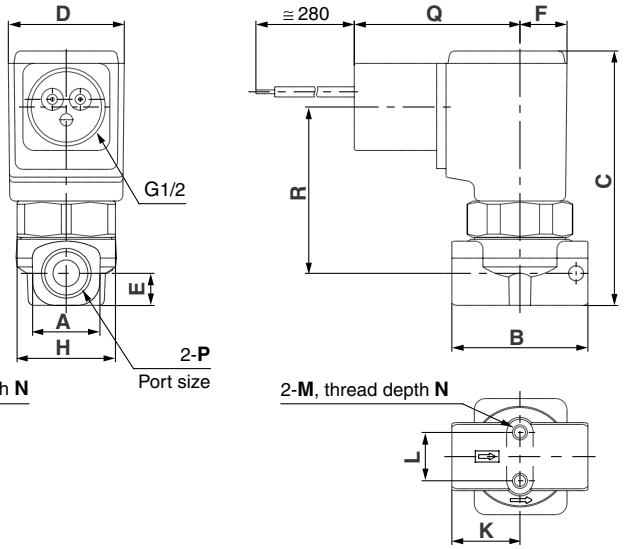
∗ 2 Mounting screws (for mounting bracket) are included in bracket part no.
Note 1) The same bracket is used for VCL3□ and VCL4□ (port size 1/2).

Dimensions (N.C.)

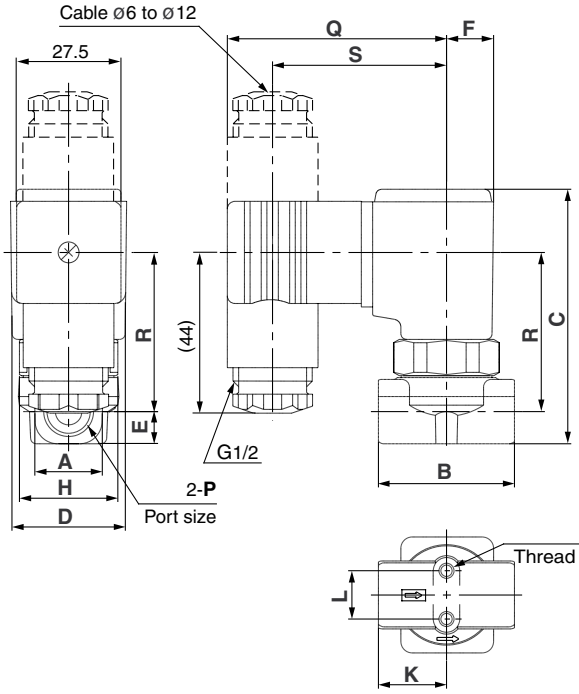
Grommet: G



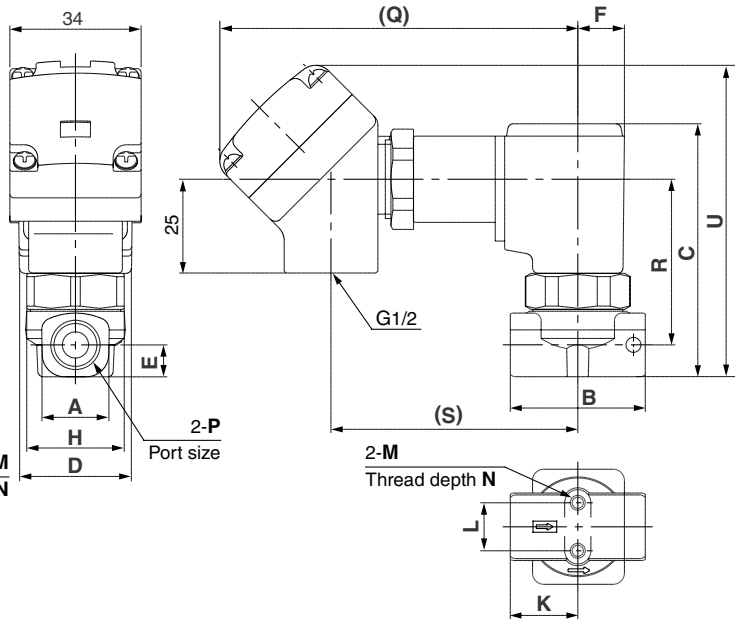
Conduit: C



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

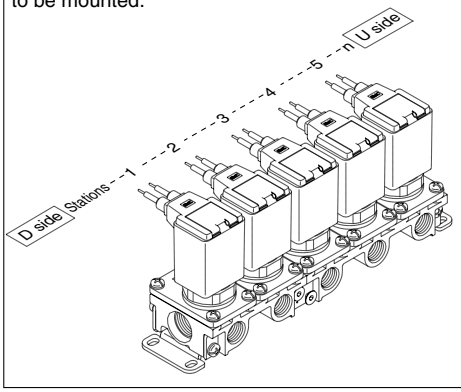
Enter the mounting valve and option part numbers under the manifold base part number.

<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

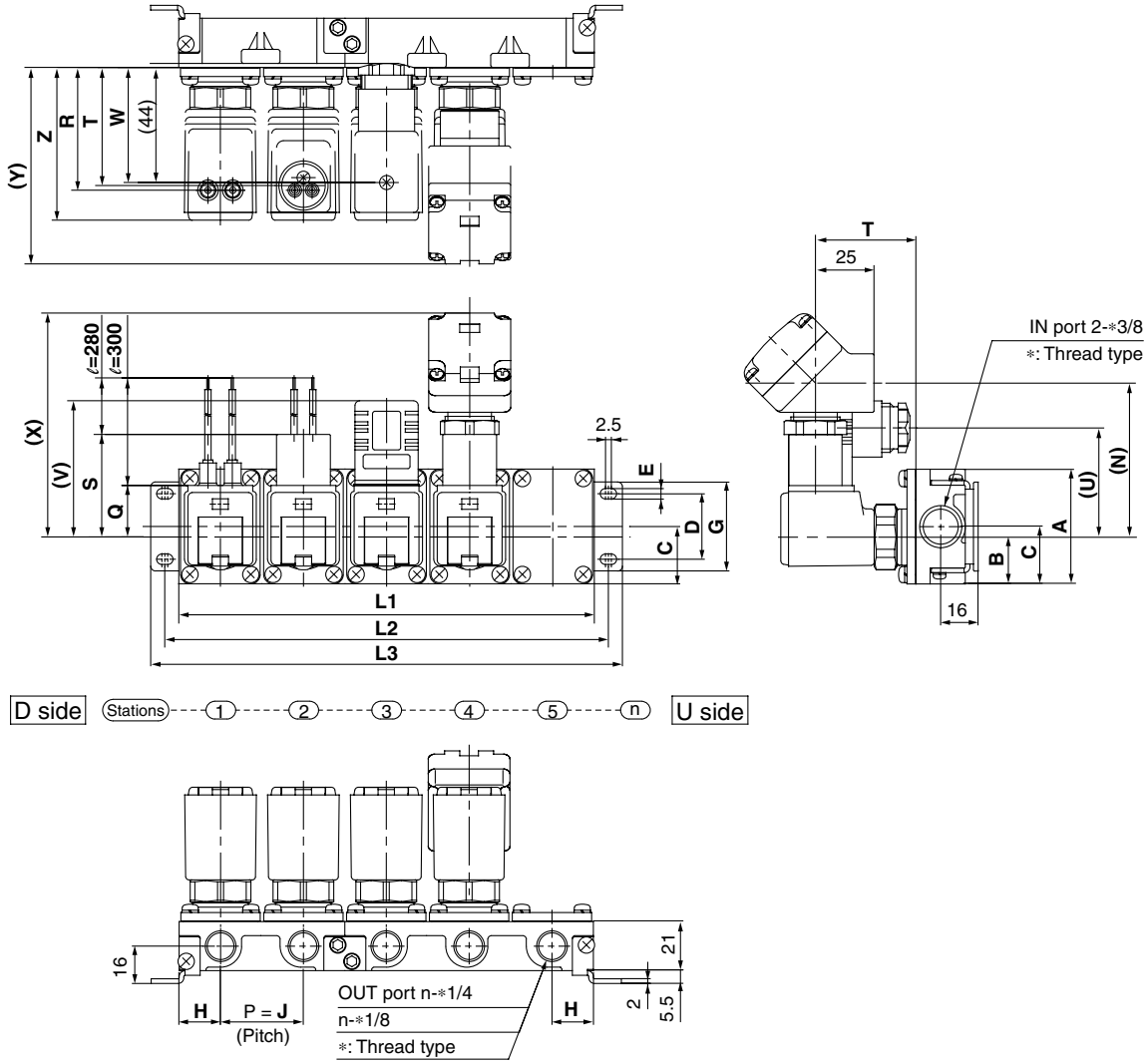
Material

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