

Series VC

# Series VCB

*Direct Operated 2 Port Solenoid Valve for Heated Water*



IP65 Enclosure  
Cv Factors From 0.16 to 2.1  
Multiple Wiring Options  
Long Life

Multipurpose Valve for Heated Water  
 Direct Operated 2 Port Solenoid  
 Valve for Heated Water

# Series VCB

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

Use of special magnetic material reduces the operating resistance of moving parts. Longevity, wear resistance and corrosion resistance improved.

**High flow rate: Cv factor 0.16 to 2.1**

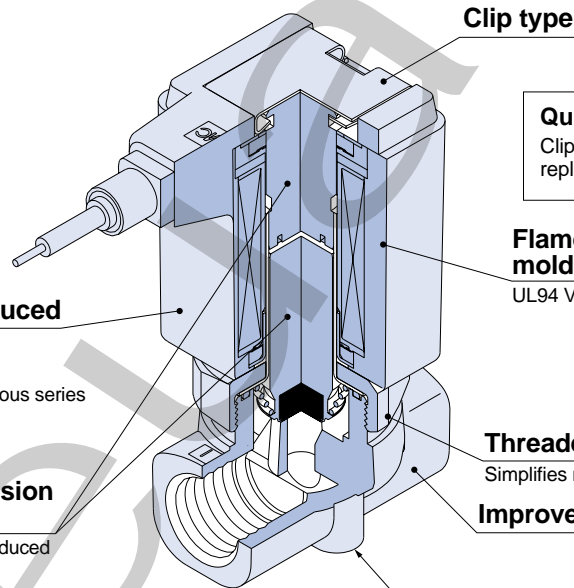
**Compact: Single valve volume reduced 15% (Class 3)**

**Coil size and weight reduced**

New compact coil reduces the size and weight of the valve  
 Volume: -15% } Compared to previous series  
 Weight: -20% } (Class 3)

**Improved corrosion resistance**

Special materials introduced



**Quick change coil**

Clip design makes coil replacement easy.

**Flame resistant molded coil material**

UL94 V-0 standard

**Threaded assembly**

Simplifies maintenance

**Improved corrosion resistance**

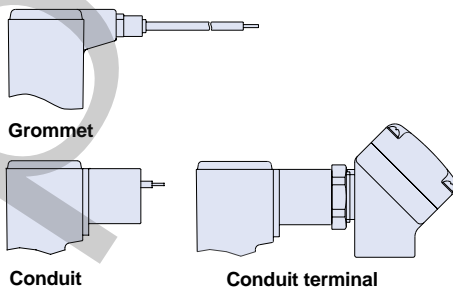
**Bottom mounting threads**

Mounting bracket also available

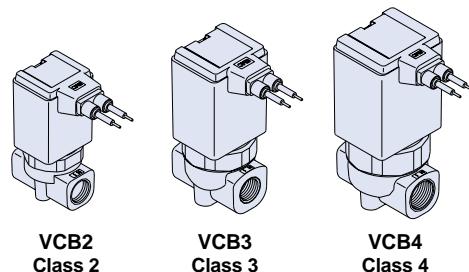
**Enclosure: Dust-proof & splash-proof (IP65 equivalent)**

**Wiring specifications (Class H coil)**

**Wiring variations**



**Three compact sizes available**



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## Series VC

### How to Order Valves

VC B 2 1 1 G 2 02

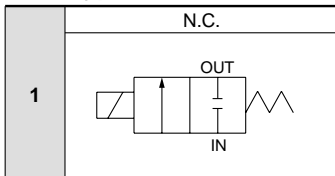
**For heated water**  
When no symbol is shown for material and insulation type

- Body material: CAC406
- Seal material: FKM
- Coil insulation: Class H

**Series**

2	Class 2
3	Class 3
4	Class 4

**Valve type**



**Voltage**

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

\* Consult P/A regarding other voltages.

**Electrical entry**

<b>G – Grommet</b>	<b>C – Conduit</b>
<b>T – With conduit terminal</b>	
<b>TL – With conduit terminal and light</b>	

**Option**

Nil	None
F	Foot type bracket

**Material and insulation type**

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

**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 table below 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)	—	●	●	●	●	●
4	1/2 (15A)	—	—	—	—	—	●
	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 [210°F or less])
	Withstand pressure MPa		5.0 (725psi)
	Body material		CAC406 (BC6), SUS
	Seal material		FKM, EPDM
	Ambient temperature		-20 to 100°C (-4 to 212°F)
	Fluid temperature		99°C or less (210°F or less)
	Enclosure		Dust proof, Splash proof (equivalent to IP65)
	Environment		Location without corrosive or explosive gases
	Valve leakage		0cm <sup>3</sup> /min (0in <sup>3</sup> /min) (with water pressure)
	Mounting orientation		Unrestricted
Vibration/Impact resistance m/s <sup>2</sup> <small>Note 1)</small>		30/150 or less	
Coil Specifications	Rated voltage		100VAC, 110VAC, 200VAC, 220VAC, 230VAC (50/60Hz)
	Allowable voltage fluctuation		±10% of rated voltage
	Coil insulation type		Class H
	Power consumption W 50/60Hz		VCB2: 4.9/4.1, VCB3: 7.7/6.6, VCB4: 10.5/9.3
	Apparent power VA 50/60Hz	Inrush	VCB2: 22/19, VCB3: 36/30, VCB4: 45/37
Holding		VCB2: 10/8, VCB3: 15/13, VCB4: 19/16	

Note 1) Vibration resistance ... Conditions when tested with one sweep of 10 to 300Hz in the axial direction and at a right angle to the armature, in both energized and deenergized states

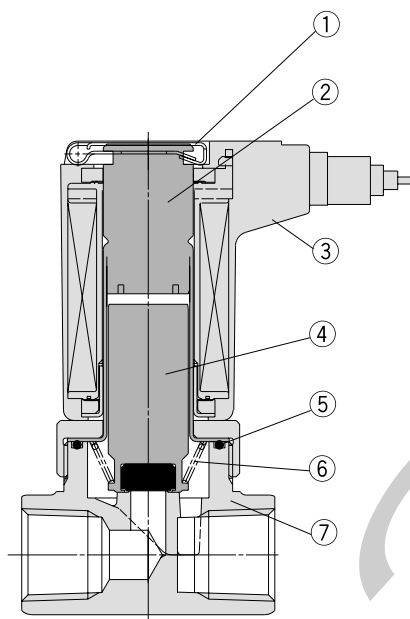
Impact resistance ..... Conditions when tested with a drop tester in the axial direction and at a right angle to the armature, one time each in energized and deenergized states

**Characteristic Specifications**

Model	Class	<small>Note 1)</small> Port size	<small>Note 1)</small> Orifice size mmø	Maximum operating pressure differential MPa (psi)	Effective area mm <sup>2</sup> (Cv factor)	Maximum operating pressure MPa (psi)	Weight kg (lb)
VCB2	2	1/8 (6A) 1/4 (8A)	2	2.0 (290)	2.8 (0.16)	3.0 (435)	1/8: 0.21 (0.46) 1/4: 0.24 (0.53)
			3	0.8 (116)	5.9 (0.33)		
			4	0.5 (72)	9.2 (0.51)		
			5	0.3 (43)	11.7 (0.65)		
VCB3	3	1/4 (8A) 3/8 (10A) 1/2 (15A)	3	2.0 (290)	6.3 (0.35)	3.0 (435)	1/4: 0.42 (0.93) 3/8: 0.40 (0.88) 1/2: 0.49 (1.08)
			4	0.8 (116)	9.7 (0.54)		
			5	0.5 (72)	14.4 (0.80)		
			7	0.2 (29)	24.8 (1.38)		
			10	0.1 (14)	37.8 (2.10)		
VCB4	4	1/4 (8A) 3/8 (10A) 1/2 (15A) 3/4 (20A)	3	3.0 (435)	6.3 (0.35)	3.0 (435)	1/4: 0.58 (1.28) 3/8: 0.55 (1.21) 1/2: 0.62 (1.37) 3/4: 0.78 (1.72)
			4	1.3 (188)	10.8 (0.60)		
			5	0.7 (101)	15.3 (0.85)		
			7	0.3 (43)	24.8 (1.38)		
			10	0.12 (17)	37.8 (2.10)		

Note 1) Refer to model selection on page 5 regarding port size and orifice size combinations.

**Construction**

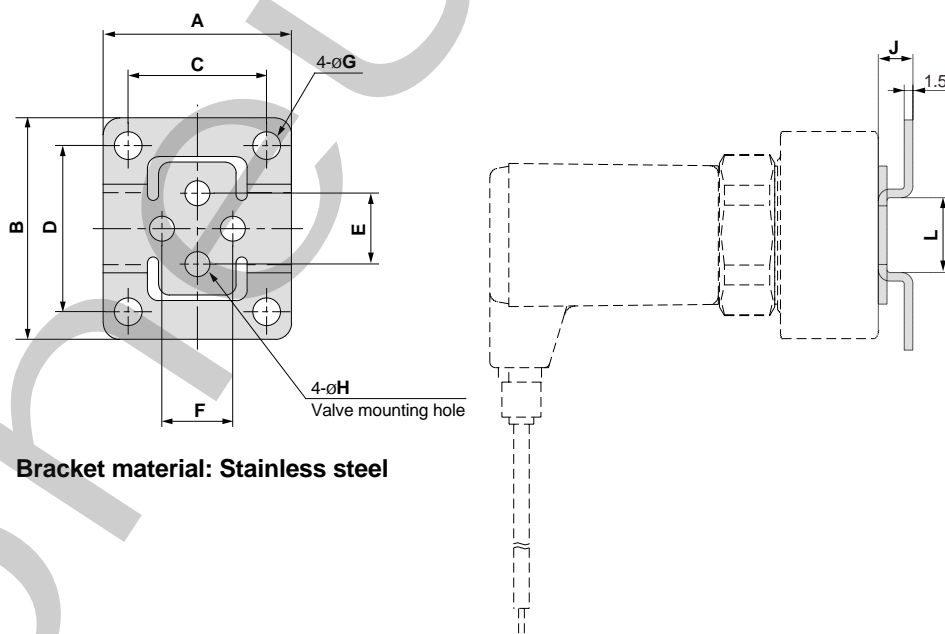


**Parts list**

No.	Description	Material
		Standard
1	Clip	Stainless steel
2	Core assembly	Stainless steel/Cu
3	Coil assembly	Class H
4	Armature assembly	Stainless steel/FKM (EPDM)
5	Seal	FKM (EPDM)
6	Return spring	Stainless steel
7	Body	CAC406 (stainless steel)

**Bracket Dimensions (mm)**

1in = 25.4mm



Bracket material: Stainless steel

**Bracket mounting dimensions**

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	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	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

\* Two mounting screws (for mounting bracket) are included with the above parts.

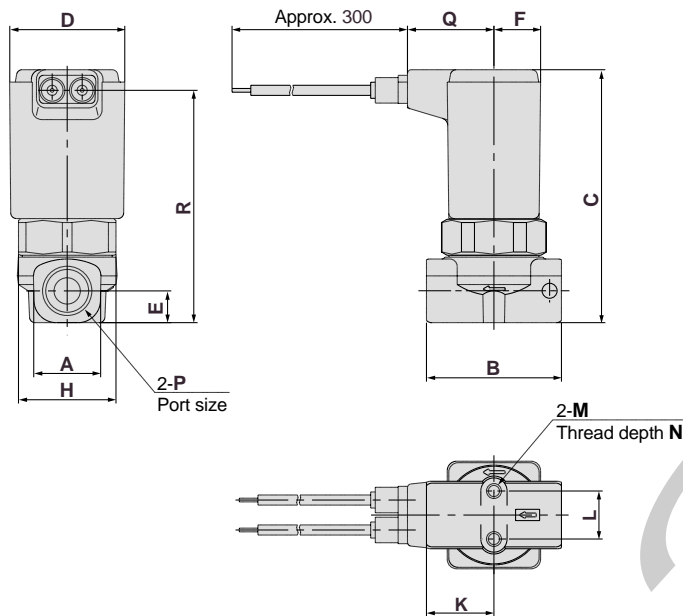
# Series VCB

## Direct Operated 2 Port for Heated Water

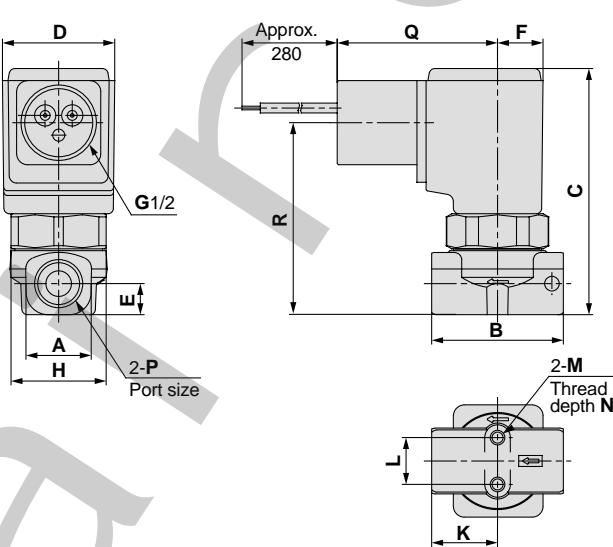
### Dimensions (mm)

1in = 25.4mm

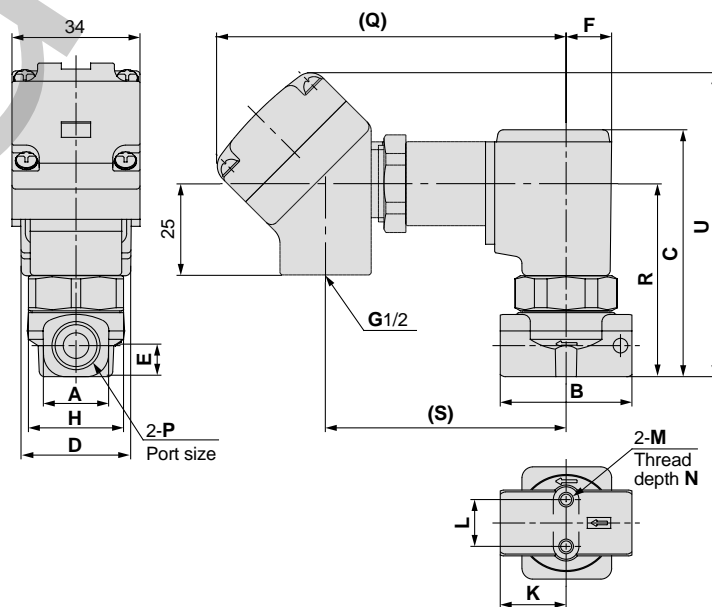
#### Grommet: G



#### 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

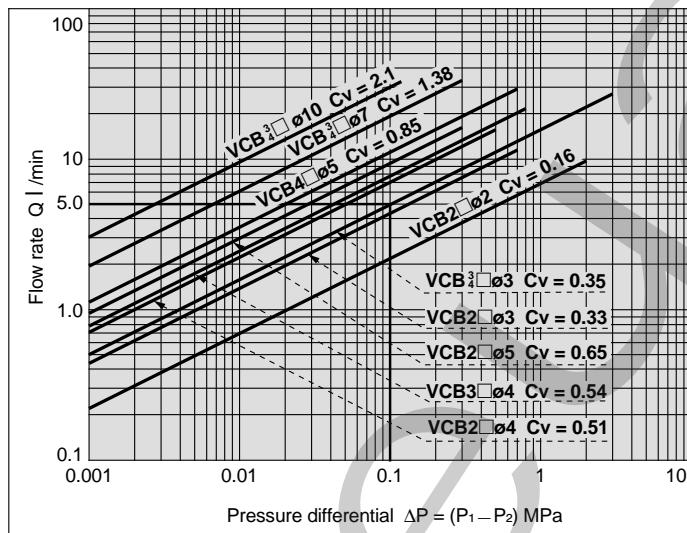
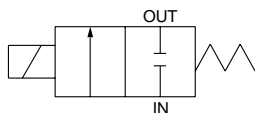
# Direct Operated 2 Port for Heated Water

# Series VCB

## Model Selection

### VCB (for heated water) 2 port solenoid valve

Model	Material		Class	Port size	Orifice size mmØ					
	Body	Seal			2	3	4	5	7	10
VCB (for heated water) 2 port solenoid valve	CAC406 (SUS)	FKM (EPDM)	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)	—	—	—	—	—	●



### Viewing the graph

To generate a water flow of 5 l/min at a differential pressure of 0.1MPa, an effective area with Cv factor 0.35 (VCB<sub>3</sub> ø3) or more is required.

### How to find the flow rate for water

- Formula based on Cv factor  
 $Q = 14.2 \cdot Cv \cdot \sqrt{10.2 \cdot \Delta P} \dots \text{l/min}$
- Formula based on effective area (Smm<sup>2</sup>)  
 $Q = 0.8 \cdot S \cdot \sqrt{10.2 \cdot \Delta P} \dots \text{l/min}$

Q: Flow rate (l/min)  
 ΔP: Pressure differential (P<sub>1</sub> - P<sub>2</sub>)  
 P<sub>1</sub>: Upstream pressure (MPa)  
 P<sub>2</sub>: Downstream pressure (MPa)  
 S: Effective area (mm<sup>2</sup>)  
 Cv: Cv factor

Note: 1 l/min = 0.353SCFM  
 1MPa = 145psi  
 1in = 25.4mm

**Explanation of Terminology****Pressure Terminology****1. Maximum operating pressure differential**

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

**2. Maximum operating pressure**

This indicates the upper 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. Proof 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).

**Electrical Terminology****1. Surge voltage**

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

**Other****1. Materials**

FKM: Fluoro rubber – Trade names: Viton®, Dai-el®, etc.

EPDM: Ethylene propylene rubber

CAC406: Bronze (BC6)

C37: Brass

SUS: Stainless steel