# Series VC Direct Operated 2 Port Solenoid Valve for Water

# Series VCW



VX

VN□ VQ

**VDW** 

VC

LV

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

# Series VCVV

## Improved durability (SMC comparison: Twice the life of previous series)

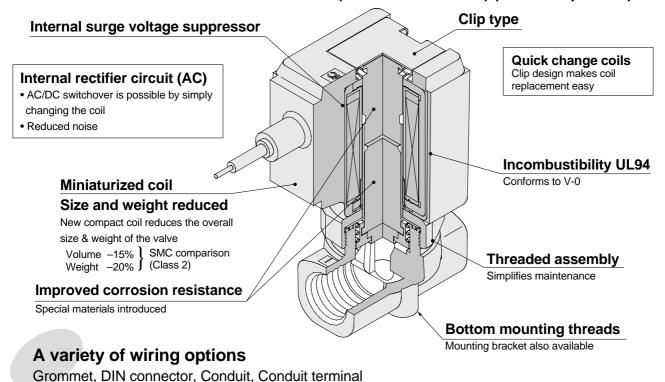
The internal wear of moving parts has been reduced through the use of a unique magnetic material. Service life, durability and corrosion resistance have been increased.

Large flow rate: Ndmin 157 to 2061

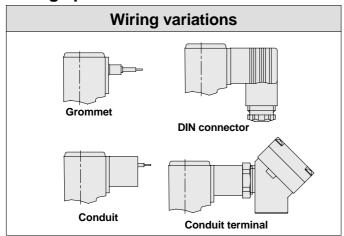
Smaller size: Single valve -15% reduction in volume (Class 2)

Manifold length - Reduced by 18%

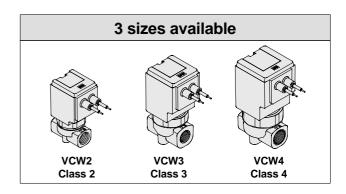
(Class 3: 7 stations) (SMC comparison)



#### Wiring specifications



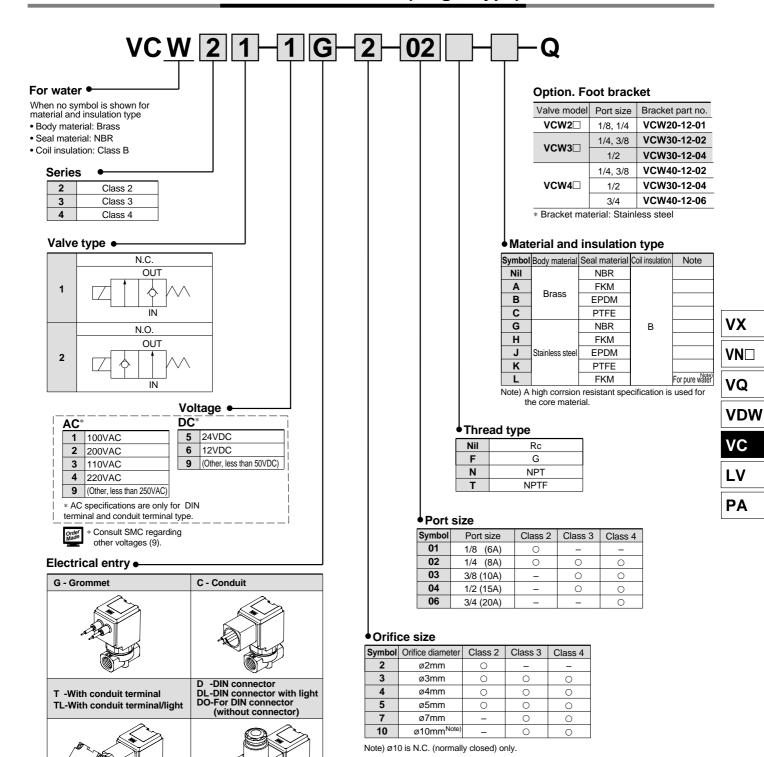
### **Enclosure: Splash-proof (equivalent to IP65)**



#### **Series VC**

# Direct Operated 2 Port Solenoid Valve for Water Series VCV

**How to Order Valves (Single Type)** 



Connector



\* Refer to model selection on page 4.5-11 for orifice and port size

<sup>\*</sup> All are equipped with surge voltage suppressor.





	Valve construction	1	Direct operated poppet
	Fluid Note 1)		Water, Pure water (except waste water or agricultural water)
	Withstand pressure I	MPa	5.0
	Body material		Brass, Stainless steel
	Seal material		NBR, FKM, EPDM, PTFE
Valve	Ambient temperat	ure °C	-20 to 60
specifications	Fluid temperature	°C	1 to 60 (with no freezing)
	Enclosure		Splash-proof (equivalent to IP65)
	Atmosphere		Location without corrosive or explosive gases
	Valve leakage cm <sup>3</sup>	/min	0 (with water pressure)
	Mounting position	l	Unrestricted
	Rated voltage		24V, 12VDC, 100V, 110V, 200V, 220VAC (50/60Hz)
	Allowable voltage	fluctuation	±10% of rated voltage
Coil specifications	Coil insulation typ	е	Class B
	Power consumption	DC	VCW2: 6W, VCW3: 8W, VCW4: 11.5W
	Power consumption	AC 50/60Hz	VCW2: 8.5VA, VCW3: 10VA, VCW4: 13VA

#### **Characteristic Specifications**

Model	Class	Note 1) Port size	Note 1) Orifice diameter	N.C. Max. operating pressure difference MPa	N.O. Max. operating pressure difference MPa	Effective area mm <sup>2</sup> (Ne/min)	Max. system pressure MPa	Note 2) Weight kg
			ø2	2.0	0.9	2.8 (157.04)		
VCW2	2	1/8 (6A)	ø3	0.8	0.45	5.9 (323.90)	2.0	1/8: 0.21
VCVVZ	_	1/4 (8A)	ø4	0.5	0.25	9.2 (500.57)	3.0	1/4: 0.24
			ø5	0.3	0.15	11.7 (637.9)		
			ø3	2.0	0.8	6.3 (343.53)		
		1/4 (8A)	ø4	0.8	0.42	9.7 (530.11)		4/4: 0.40
VCW3		3/8 (10A)	ø5	0.5	0.23	14.4 (785.2)	3.0	1/4: 0.42 3/8: 0.40
		1/2 (15A)	ø7	0.2	0.13	24.8 (1354)		1/2: 0.49
			ø10	0.1	_	37.8 (2061)		
			ø3	3.0	1.2	6.3 (343.53)		
		1/4 (8A)	ø4	1.3	0.73	10.8 (588.9)		1/4: 0.58
VCW4	CWA A	3/8 (10A) 1/2 (15A)	ø5	0.7	0.47	15.3 (834.2)	3.0	3/8: 0.55 1/2: 0.62
		3/4 (20A)	ø7	0.3	0.22	24.8 (1354)		3/4: 0.78
			ø10	0.12	_	37.8 (2061)		

Note 1) Refer to model selection on page 4.5-11 regarding port size and orifice size combinations.

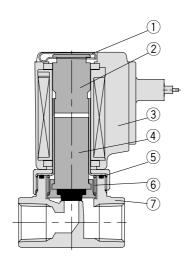
Note 2) The weight is the value for the grommet type.

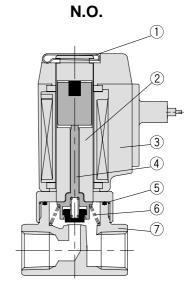


Note 1) When using pure water, select "L" for the type of material (stainless steel, FKM). Note 2) Since a rectifier circuit is used for AC, there is no difference in power consumption for starting or holding.

#### Construction

N.C.





#### Parts list

	Description	Mate	erial
No.	Description	Standard	Optional
1	Clip	Stainless steel	_
2	Tube assembly	Stainless steel	_
3	Coil assembly	Class B	_
4	Armature assembly	Class 2 Stainless steel, PPS, NBR Class <sup>3</sup> Stainless steel, NBR	Stainless steel, NBR/Stainless steel, FKMStainless steel, EPDM/Stainless steel, PTFE
5	O-ring	NBR	FKM, EPDM, PTFE
6	Return spring	Stainless steel	_
7	Body	Brass	Stainless steel

#### Parts list

NI-	Description	Mat	erial
No.	Description	Standard	Optional
1	Clip	Stainless steel	_
2	Tube assembly	Stainless steel, PTFE	_
3	Coil assembly	Class B	_
4	Push rod assembly	PPS, 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

VX

VN□

VQ

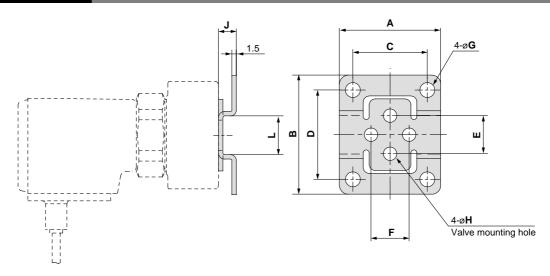
**VDW** 

VC

LV

PA

#### **Bracket Dimensions**



#### **Bracket mounting dimensions**

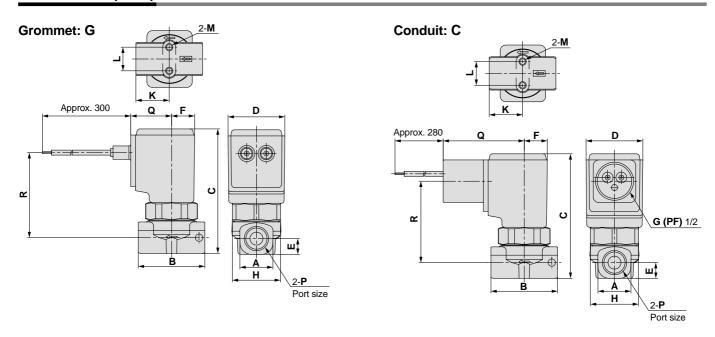
Valve model	Port size	Bracket part no.	Α	В	С	D	E	F	G	Н	J	L
VCW2□	1/8, 1/4	VCW20-12-01A	34	40	25	30	12.8	12.8	5	4.5	6	13
VCW2□	1/4, 3/8	VCW30-12-02A	42	52	30	40	19	19	6	5.5	7	19
VCW3□ -	1/2	VCW30-12-04A	48	56	36	44	23	23	6	5.5	7	23
	1/4, 3/8	VCW40-12-02A	42	52	30	40	23	23	6	5.5	7	19
VCW4□	1/2	VCW30-12-04A	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

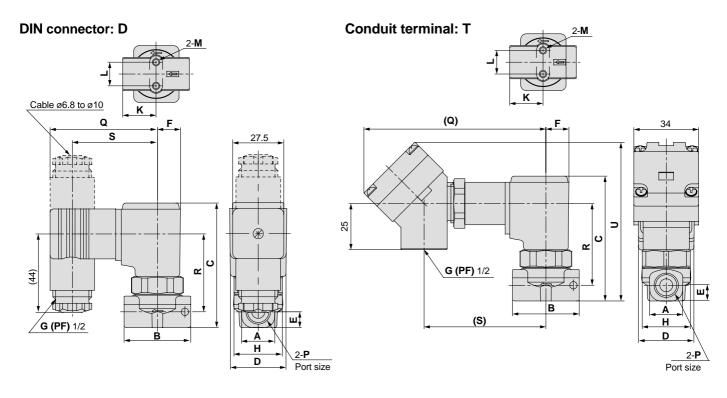
<sup>\*</sup> Bracket material: Stainless steel



#### Series VCW

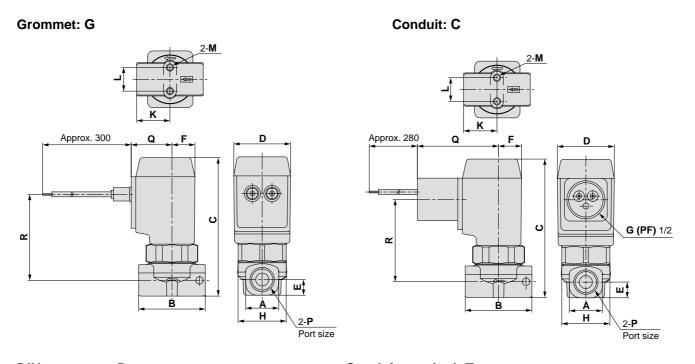
#### Dimensions (N.C.)

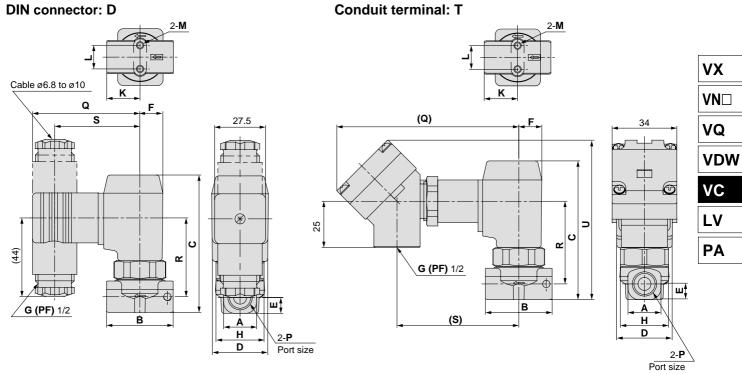




N.C.																					(mm)
	_															Electric	al entry	/			
Model	Port size	Α	В	С	D	E	F	Н	K	L	М	Gromi	met: G	Cond	uit: C	DIN	connec	tor: D	Cond	uit term	inal: T
	1 011 0120											Q	R	Q	R	Q	R	S	Q	R	S
VCW21	1/8	13.5	28	64	31	6.5	12.5	28	14	12.8	M4	22	45	44	43	58	40.5	46.5	99	43	66
VCVVZI	1/4	18	36	67	31	8.5	12.5	28	18	12.8	M4	22	46	44	44	58	41.5	46.5	99	44	66
VCW31	1/4, 3/8	22	40	80.5	36.5	11	15	32	20	19	M5	24	56.5	46	54.5	60	52	48.5	101	54.5	68
VCVV31	1/2	30	50	85.5	36.5	13.5	15	32	25	23	M5	24	59	46	57	60	54.5	48.5	101	57	68
	1/4, 3/8	22	45	89	41	11	17	36	22.5	23	M5	26	64.5	48	62.5	62	60	50.5	103	62.5	70
VCW41	1/2	30	50	93.5	41	13.5	17	36	25	23	M5	26	66.5	48	64.5	62	62	50.5	103	64.5	70
	3/4	35	60	101	41	17.5	17	36	30	28.2	M5	26	70	48	68	62	65.5	50.5	103	68	70

#### **Dimensions (N.O.)**

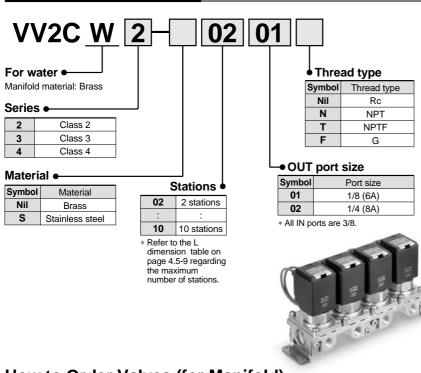




N.O.																					(mm)
	_															Electric	al entry	/			
Model	Port size	Α	В	С	D	E	F	Н	K	L	М	Grom	met: G	Cond	luit: C	DIN	connect	tor: D	Cond	uit termi	nal: T
	1 011 3120											Q	R	Q	R	Q	R	S	Q	R	S
VCW22	1/8	13.5	28	71.5	31	6.5	12.5	28	14	12.8	M4	22	45.5	44	43.5	58	41	46.5	99	43.5	66
VCW22	1/4	18	36	74.5	31	8.5	12.5	28	18	12.8	M4	22	46.5	44	44.5	58	42	46.5	99	44.5	66
VCW32	1/4, 3/8	22	40	88	36.5	11	15	32	20	19	M5	24	57	46	55	60	52.5	48.5	101	55	68
VCVV32	1/2	30	50	93	36.5	13.5	15	32	25	23	M5	24	59.5	46	57.5	60	55	48.5	101	57.5	68
	1/4, 3/8	22	45	96.5	41	11	17	36	22.5	23	M5	26	65	48	63	62	60.5	50.5	103	63	70
VCW42	1/2	30	50	101	41	13.5	17	36	25	23	M5	26	67	48	65	62	62.5	50.5	103	65	70
	3/4	35	60	108.5	41	17.5	17	36	30	28.2	M5	26	70.5	48	68.5	62	66	50.5	103	68.5	70

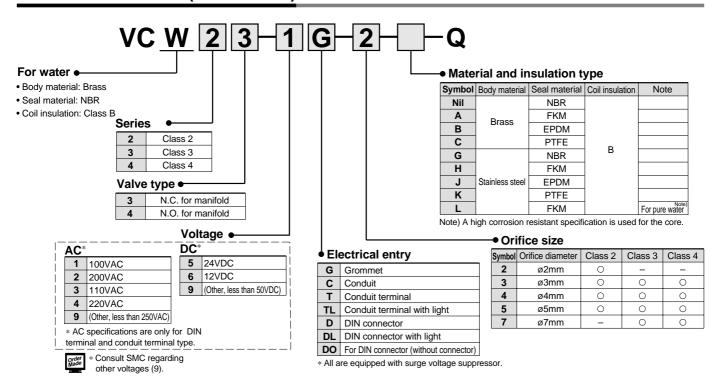
#### Series VCW

#### **How to Order Manifolds**

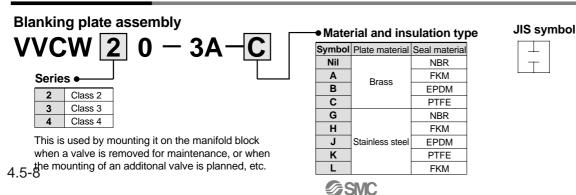


# Enter the valve and option models to be mounted under the manifold base part number. <a href="#"> <a href="#

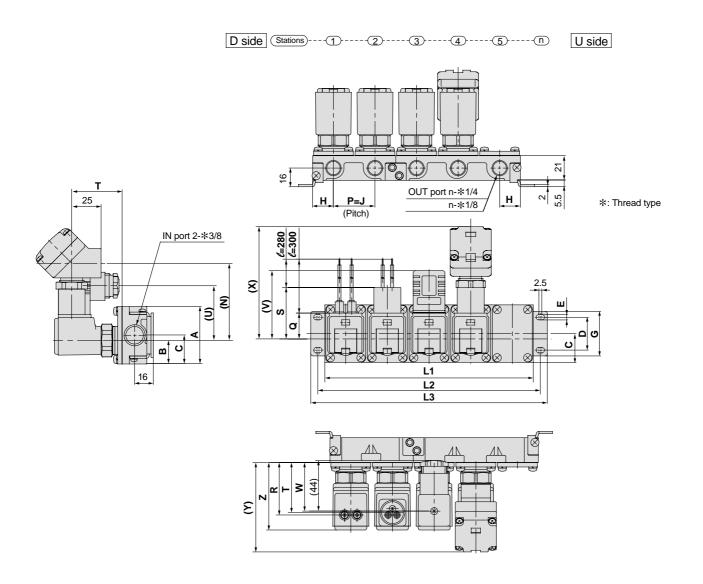
#### How to Order Valves (for Manifold)



#### **Manifold Options**



#### **Dimensions (N.C.)**



(mm) L dimensions

_ a	,,,,,,,									, ,
Model	Dimension				n (stat	ions)				
Model	Dimension -	2	3	4	5	6	7	8	9	10
	L1	69	103.5	138	172.5	207	241.5	276	310.5	345
VV2CW2	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
	L1	77	115.5	154	192.5	231	269.5	308	346.5	385
VV2CW3	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
	L1	83	124.5	166	207.5	249	290.5	332	373.5	415
VV2CW4	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 cor	nposition	2stns. x 1	3stns. x 1	2stns. x 2	2stns. + 3 stns.	3stns. x 2	2stns. x 2 + 3stns.	2stns. + 3stns. x 2	3stns. x 3	2stns. x 2 + 3stns. x 2

Note) Manifold bases are composed by connecting 2 station and 3 station bases.

Dimensio	ns																		(mm)
													Elec	ctrical e	ntry				
Model	Α	В	С	D	E	G	Н	J	Z	Gror	nmet	Cor	duit	DIN	l conne	ctor	Cor	duit terr	ninal
										Q	R	S	Т	U	٧	W	N	Х	Y
VV2CW2	49	20	24.5	28	4.5	38	17.3	34.5	58	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	68	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	76	26	62.5	47.5	60.5	50	62	58.5	70	103	94

**VX** 

 $VN\square$ VQ

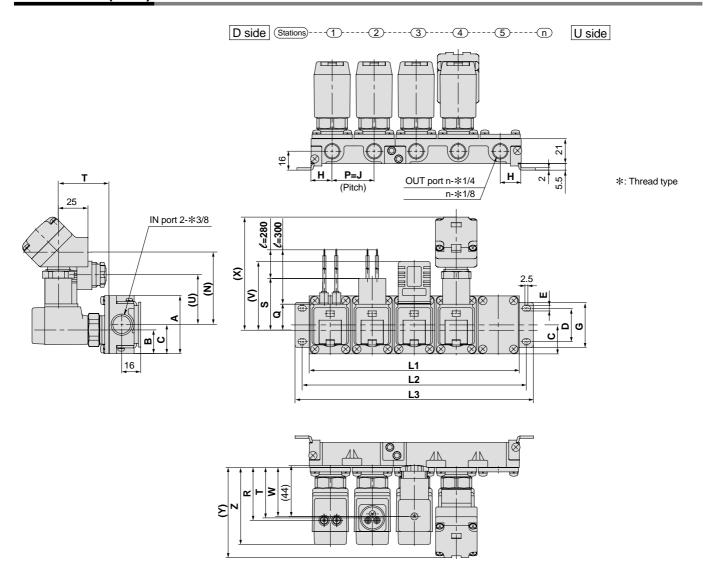
**VDW** 

VC

LV

#### Series VCW

#### **Dimensions (N.O.)**



L dimens	sions									(mm)
Madal	D: .				n (sta	tions)				
Model	Dimension	2	3	4	5	6	7	8	9	10
	L1	69	103.5	138	172.5	207	241.5	276	310.5	345
VV2CW2	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
	L1	77	115.5	154	192.5	231	269.5	308	346.5	385
VV2CW3	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
	L1	83	124.5	166	207.5	249	290.5	332	373.5	415
VV2CW4	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 co	mposition	2stns. x 1	3stns. x 1	2stns. x 2	2stns. + 3stns.	3stns. x 2	2stns. x 2 + 3stns.	2stns. + 3stns. x 2	3stns. x 3	2stns. x 2 + 3stns. x 2

Note) Manifold bases are composed by connecting 2 station and 3 station bases.

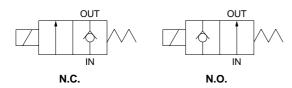
Dimensio	ns																		(mm)
													Elec	ctrical e	ntry				
Model	Α	В	С	D	E	G	Н	J	Z	Gron	nmet	Cor	duit	DIN	l conne	ctor	Con	duit teri	minal
										Q	R	S	Т	U	٧	w	N	Х	Υ
VV2CW2	49	20	24.5	28	4.5	38	17.3	34.5	65.5	22	45.5	44	43.5	46	58	41.5	66	99	77
VV2CW3	57	25.5	28.5	30	5.5	42	19.3	38.5	75.5	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	83.5	26	62.5	47.5	60.5	50	62	58.5	70	103	94

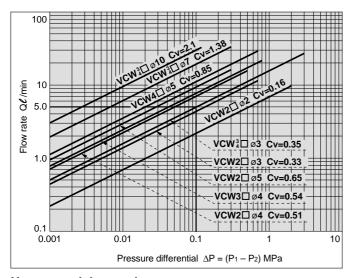
#### Series VCW **Model Selection**

#### VCW (for water) 2 port solenoid valve (N.C., N.O.)

Model	Materi	al	01	Dom oine		Orif	ice c	diame	eter	
Model	Body	Seal	Class	Port size	ø2	ø3	ø4	ø5	ø7	Note 1) Ø10
			2	1/8 ( 6A)	•	•	•	•	_	_
				1/4 ( 8A)	•	•	•	•	_	_
VCW		NBR		1/4 ( 8A)	_	•	•	•	•	_
(for water)	Brass	(FKM)	3	3/8 (10A)	_	•	•	•	•	•
2 port	(Stainless steel)	(ÈPDM)		1/2 (15A)	_	_	_	_	_	•
solenoid		(PTFE)		1/4 ( 8A)	_	•	•	•	•	_
valve			,	3/8 (10A)	_	•	•	•	•	•
			4	1/2 (15A)	_	_	_	_	_	•
				3/4 (20A)	_	_	_	_	_	•

Note 1) ø10 is N.C. (normally closed) only.





#### How to read the graph

When a water flow of 5 l/min is desired with a pressure differential of 0.1MPa, an effective area with a Cv factor of 0.35 (VCW<sup>3</sup>,□ø3) is required.

#### How to find the flow rate for water

• Formula based on Cv factor Q=14.2·Cv· $\sqrt{10.2 \cdot \Delta P} \dots \ell / min$ 

 Formula based on effective area (Smm²)  $Q=0.8 \cdot S \cdot \sqrt{10.2 \cdot \Delta P} \dots \ell min$ 

Q: Flow rate (l/min)

ΔP: Pressure differential (P1– P2)

P1: Upstream pressure (MPa)

P2: Downstream pressure (MPa)

S: Effective area (mm<sup>2</sup>)

Cv: Cv factor

#### **Explanation of Terminolgy**

#### **Pressure Terminology**

#### 1. Maximum operating pressure differential

This indicates the maximum pressure differential (upstream pressure and downstream pressure differential) 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 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 less 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. (value under the prescribed 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

NBR: Nitrile rubber

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

EPDM: Ethylene propylene rubber = EPR

PTFE: Tetrafluoroethylene resin - Trade names: Teflon®, Polyflon. etc.

#### 2. Symbols

In the JIS symbol ( The III) 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. ( I is used to indicate that blocking of reverse pressure is not possible.

VX

 $\mathsf{VN}\square$ 

VQ **VDW** 

VC

LV



## Series VCW 2 Port Solenoid Valve for Fluid Control

Be sure to read before handling.

#### Wiring

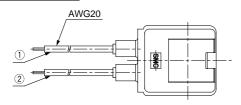
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- 1. As a rule, use electrical wire of 0.5 to 1.25mm<sup>2</sup> or larger for wiring.
  - Further, do not allow excessive force to be applied to the lines.
- 2. Use electrical circuits which do not generate chattering in their contacts.
- 3. Use voltage which is within  $\pm 10\%$  of the rated voltage. In cases with a DC power supply where importance is placed on responsiveness, stay within  $\pm 5\%$  of the rated value. The voltage drop is the value in the lead wire section connecting the coil.

#### **Electrical Connections**

#### **⚠** Caution

#### **Grommet/Conduit**

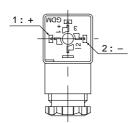


Rated voltage	Lead wire color	
	1)	2
DC	Black	Red

<sup>\*</sup> DC does not have polarity.

#### **DIN** connector

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

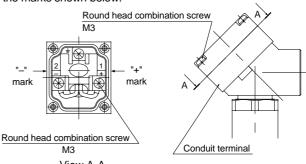


Terminal No.	1	2
DIN terminal	+	_

<sup>\*</sup> There is polarity only when equipped with light.

#### **Conduit terminal**

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



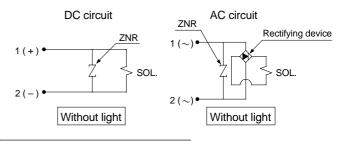
View A-A (Internal connection diagram)

\* There is polarity only when equipped with light.

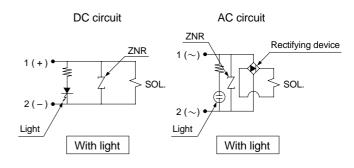
#### **Electrical Circuits**

#### 

#### Grommet, Conduit, Conduit terminal, DIN connector



#### Conduit terminal, DIN connector





## Series VCW 2 Port Solenoid Valve for Fluid Control

Be sure to read before handling.

#### **Operating Environment**

#### **Marning**

- 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 an explosive atmosphere.
- 3. Do not use in locations subject to vibration or impact.
- 4. Do not use in a location where radiated heat will be received from a heat source in the vicinity.
- 5. Employ suitable protective measures in locations where there is contact with water droplets, oil or welding spatter, etc.

#### **Maintenance**

#### **Marning**

 Maintenance should be performed in accordance with the procedures in the instruction manual.

If handled improperly, this can cause damage or malfunction in equipment and devices, etc.

#### 2. Demounting of the product

- Shut off the fluid supply and release the fluid pressure in the system.
- 2. Shut off the power supply.
- 3. Demount the product.

#### 3. Low frequency operation

Valves should be switched at least once every 30 days to prevent malfunction.

#### **⚠** 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 0.1MPa.
- 3. Replace strainers when the amount of pressure drop reaches 0.1MPa.
- 4. Flush drainage from filters regularly.

#### 2. Storage

In case of long term storage after use with water, first thoroughly remove all moisture to prevent rust and deterioration of rubber materials, etc.

VX

VN□ VQ

VDW

VC

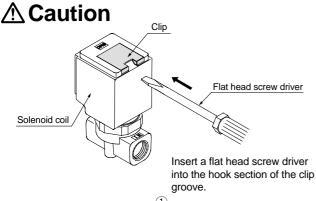
LV

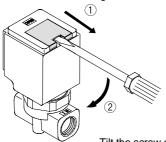


## Series VCW Specific Product Precautions

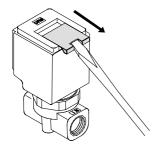
Be sure to read before handling.

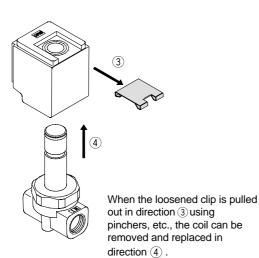
#### How to Replace the Solenoid Coil





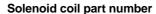
Tilt the screw driver down in direction ② so that the clip slides out in direction ①.

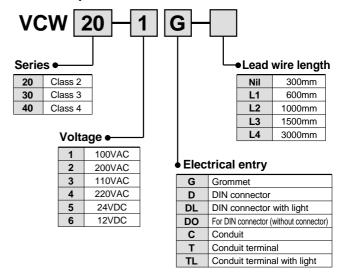




After replacing the coil, the clip is reinstalled by pushing it back in the direction opposite to its removal.

#### **Replacement Parts**





#### Clip part number



Note) Indicate the valve model, as a name plate is attached to the clip.