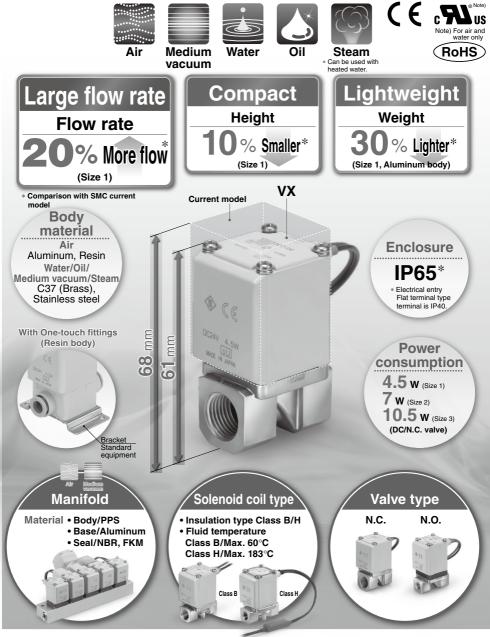
Direct Operated 2 Port Solenoid Valve

VX21/22/23 Series



VX2 VXK

VXD

VXZ VXS

VXB

VXE

VXP

VXR

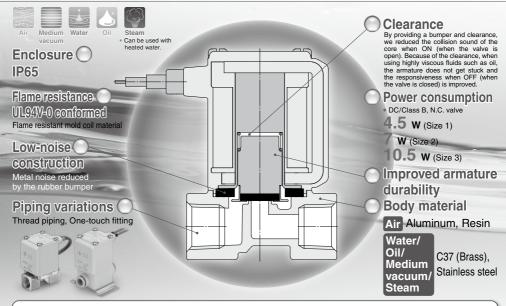
VXH

VXF

VX3

VXA

Direct Operated 2 Port Solenoid Valve



Full-wave rectifier type (AC specification: Insulation type Class B/H)

- Improved durability
 Service life is extended by the special construction.
 (compared with current shading coil)
- Reduced buzz noise
 Rectified to DC by the full-wave rectifier, resulting in a buzz noise reduction.
- Reduced apparent power * Class B, N.C. valve 10 VA→7 VA (Size 1) 20 VA→9.5 VA (Size 2) 32 VA→12 VA (Size 3)
- Improved OFF response
 Specially constructed to improve the OFF response
 when operated with a higher viscosity fluid such as oil.
- Low-noise construction
 Specially constructed to reduce the metal noise during operation.

Variations

<Fluid>

Model		Applicable fluid *1 * Can be used with heated water.				
Wiodei	Air	Medium vacuum	Water	Oil	Steam	
For Air VX2 Page 33	•	_	_	_	_	
For Medium vacuum VX2 4 Page 38	•*2	•	_	_	_	
For Water VX2 2 Page 42	*2	_	•	_	_	
VX2 Page 44	•*2	_	• *2	•	_	
For Steam heated water. VX2□5 Page 46	*2	_	• *2	*2	•	



^{*1} For details, refer to pages 73 and 74. *2 Refer to the individual specifications for each fluid.

<Body Size>

Model	Body		Orifice diameter					Port size	
Model	size	2 mmø	3 mmø	4 mmø	5 mmø	7 mmø	8 mmø	10 mmø Note)	Fort size
VX2 ₄ ¹	Size 1	•	•	_	•	_	_	_	1/8, 1/4 One-touch fitting: ø6, ø8
VX2 ₅	Size 2	_	_	•	_	•	_	_	1/4, 3/8 One-touch fitting: ø8, ø10
VX2 ₆ ³	Size 3	_	_	_	•	_	•	•	1/4, 3/8, 1/2 One-touch fitting: ø10, ø12

Note) N.C. only

INDEX

Direct Operated 2 Port Solenoid Valve VX21/22/23 Series



Single	e Unit/Manifold: Specifications30)
Comr	non Specifications31	
Selec	tion Steps32	2
	For Air Model/Valve Specifications, Fluid and Ambient Temperature, Valve Leakage Rate 33, 34 How to Order (Single Unit)	5
	How to Order (Solenoid Valve for Manifold, Manifold Base), Blanking Plate Assembly Part No., How to Order Manifold Assembly (Example) 37	,
	For Medium Vacuum (0.1 Pa·abs or more)	
	Model/Valve Specifications, Fluid and Ambient Temperature, Valve Leakage Rate 38 How to Order (Single Unit))
	Blanking Plate Assembly Part No., How to Order Manifold Assembly (Example) 41	
	For Water Model/Valve Specifications, Fluid and Ambient Temperature, Valve Leakage Rate 42 How to Order (Single Unit)43	
	For Oil Model/Valve Specifications, Fluid and Ambient Temperature, Valve Leakage Rate 44 How to Order (Single Unit)45	
	For Steam * Can be used with heated water. Model/Valve Specifications, Fluid and Ambient Temperature, Valve Leakage Rate 46 How to Order (Single Unit)47	
JL-cc	al Options	
	gle Unit54	ļ
Ма	nifold55	5
Dimer	nsions (Single Unit) Body material: Aluminum56	6
	Body material: Resin58	3
	Body material: C37, Stainless steel60)
	(Manifold) Base material: Aluminum63	3
Repla	cement Parts64	ŀ
Gloss	ary of Terms65	,
Solen	oid Valve Flow Rate Characteristics66	j
low	Rate Characteristics71	
Speci	fic Product Precautions73	
Ø	SMC 29)

VXK VXD

VXZ

VXB

WD

VXR

VXH

VXF VX3

VXA

For Air, Medium Vacuum, Water, Oil and Steam

Variations

Single Unit (For Air, Medium Vacuum, Water, Oil and Steam)

■ Valve type

Normally Closed (N.C.) Normally Open (N.O.)

Solenoid coil type

Insulation type: Class B, Class H

Rated voltage

100 V/200 V/110 V/230 VAC (220 V/240 V/48 V/24 VAC) 24 VDC (12 VDC)

Voltage in () indicates special voltage.

■ Material

Body — Aluminum, Resin, C37 (Brass), Stainless steel Seal — NBR, FKM*

* Refer to individual pages for details of each fluid.

■ Electrical entry

- Grommet
- Conduit
- DIN terminal
- Conduit terminal
- Flat terminal



Normally Closed (N.C.) Normally Open (N.O.)

Size		Size 1	Size 2	Size 3
	2 mmø	•		_
	3 mmø	•	_	_
	4 mmø	_	•	_
Orifice diameter	5 mmø	•	_	•
	7 mmø	_	•	_
	8 mmø	_	_	•
	10 mmø	_	_	•*
Port size		1/8, 1/4	1/4, 3/8	1/4, 3/8, 1/2
Port size		ø6, ø8	ø8, ø10	ø10, ø12

^{*} N.C. only

Manifold (For Air, Medium Vacuum)

Valve type

Normally Closed (N.C.) Normally Open (N.O.)

■ Manifold type

Common SUP type Individual SUP type

Solenoid coil type

Insulation type: Class B

■ Rated voltage

100 V/200 V/110 V/230 VAC (220 V/240 V/48 V/24 VAC) 24 VDC (12 VDC)

Voltage in () indicates special voltage.

Material

Body — Resin Base — Aluminum Seal — NBR, FKM

■ Electrical entry

- Grommet
- Conduit
- DIN terminal
- Conduit terminal
- Flat terminal



Manifold

Size		Size 1	Size 2	Size 3	
		2 mmø	•		_
		3 mmø	•	_	_
Orifice diameter		4 mmø	_	•	_
		5 mmø	•	_	•
		7 mmø	_	•	•
Ф	Common SUP type	IN	3/8		
O Common SUP type (Air)		OUT	1/8, 1/4		
Individual SUP type (Medium vacuum)		IN	1/8, 1/4		
		OUT	3/8		

Common Specifications

Standard Specifications

	Valve construction		Direct operated poppet
	Withstand pressure		2.0 MPa (Resin body type 1.5 MPa)
Valve	Body material		Aluminum, Resin, C37 (Brass), Stainless steel
specifications	ons Seal material Note 3) Enclosure Environment		NBR, FKM
			Dust-tight, Water-jet-proof type (IP65) Note 1,4)
			Location without the presence of corrosive gases, explosive gases, or constant fluid adhesion Note 4)
	Rated voltage	AC	100 VAC, 200 VAC, 110 VAC, 230 VAC, (220 VAC, 240 VAC, 48 VAC, 24 VAC) Note 2)
	nateu voitage	DC	24 VDC, (12 VDC) Note 2)
Coil	Allowable voltage flu	ctuation	±10% of rated voltage
specifications	Allowable leakage	AC	5% or less of rated voltage
	voltage	DC	2% or less of rated voltage
	Coil insulation type		Class B, Class H

Note 1) Electrical entry flat terminal type terminal is IP40.

Note 2) Voltage in () indicates special voltage. (Refer to page 49.)

Note 3) For seal material/EPDM, refer to X332. (Refer to page 51.)

Note 4) For enclosure, refer to "Glossary of Terms" on page 65. When using the product in a place which requires water resistance, please contact SMC.

⚠ Be sure to read "Specific Product Precautions" before handling.

Solenoid Coil Specifications

Normally Closed (N.C.) DC Specification

Class B

Size	Power consumption (W) Note 1)	Temperature rise (°C) Note 2)
Size 1	4.5	50
Size 2	7	55
Size 3	10.5	65

Class H

Size	Power consumption (W) Note 1)	Temperature rise (°C) Note 2)
Size 1	9	100
Size 2	12	100
Size 3	15	100

Note 1) Power consumption: The value at ambient temperature of 20°C and when the rated voltage is applied. (Variation: ±10%)

Note 2) The value at ambient temperature of 20°C and when the rated voltage is applied. The value depends on the ambient environment. This is for reference.

AC Specification (Built-in Full-wave Rectifier Type) Class B

Size	Apparent power (VA) Note 1) 2)	Temperature rise (°C) Note 3)
Size 1	7	60
Size 2	9.5	70
Size 3	12	70

Class H

Size	Apparent power (VA) Note 1) 2)	Temperature rise (°C) Note 3)
Size 1	9	100
Size 2	12	100
Size 3	15	100

Note 1) Apparent power: The value at ambient temperature of 20°C and when the rated voltage is applied. (Variation: ±10%)

Note 2) There is no difference in the frequency and the inrush and energized apparent power, since a rectifying circuit is used in the AC.

Note 3) The value at ambient temperature of 20°C and when the rated voltage is applied. The value depends on the ambient environment. This is for reference.

Normally Open (N.O.)

DC Specification

Class B

Size	Power consumption (W) Note 1)	Temperature rise (°C) Note 2
Size 1	7.5	60
Size 2	8.5	70
Size 3	12.5	70

Class H

Size	Power consumption (W) Note 1)	Temperature rise (°C) Note 2)
Size 1	9	100
Size 2	12	100
Size 3	15	100

Note 1) Power consumption: The value at ambient temperature of 20°C and when the rated voltage is applied. (Variation: ±10%)

Note 2) The value at ambient temperature of 20°C and when the rated voltage is applied. The value depends on the ambient environment. This is for reference.

AC Specification (Built-in Full-wave Rectifier Type) Class B

Size	Apparent power (VA) Note 1) 2)	Temperature rise (°C) Note 3)	
Size 1	9	60	
Size 2	10	70	
Size 3	14	70	

Class H

Size	Apparent power (VA) Note 1) 2)	Temperature rise (°C) Note 3)
Size 1	9	100
Size 2	12	100
Size 3	15	100

Note 1) Apparent power: The value at ambient temperature of 20°C and when the rated voltage is applied. (Variation: ±10%)

Note 2) There is no difference in the frequency and the inrush and energized apparent power, since a rectifying circuit is used in the AC.

Note 3) The value at ambient temperature of 20°C and when the rated voltage is applied. The value depends on the ambient environment. This is for reference. VX2 VXK VXD VXZ VXS

VXE

VXP

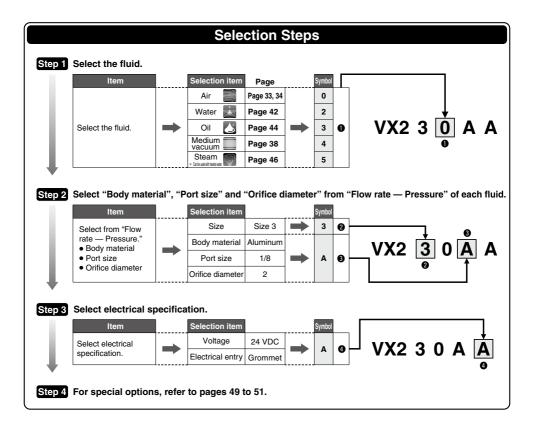
VXR

VXH

VXF

VX3 VXA

VX21/22/23 Series Selection Steps





Model/Valve Specifications

N.C.
Symbol

When the valve is closed, flow is blocked from port 1 to port 2. However, if the pressure in port 2 is higher than port 1, the valve will not be able to block the fluid and it will flow from port 2 to port 1.

Aluminum Body Type

0:	Port size	Orifice diameter	Model	Flow rate characteristics Note 2)			Maximum operating Max. system	Max. system pressure	Weight Note 3)
Size		(mmø) Note 1)		C [dm ³ /(s·bar)]	b	Cv	pressure differential (MPa) Note 4)	(MPa) Note 4)	(g)
		2		0.63	0.63	0.23	1.0	1.0	220
1	1/8, 1/4	3	VX210	1.05	0.68	0.41	0.6		220
		5		2.20	0.39	0.62	0.2		220
2	1/4, 3/8	4	VX220	1.90	0.52	0.62	1.0		340
		7		3.99	0.44	1.08	0.15		340
	1/4, 3/8	5		1.96	0.55	0.75	1.0		450
3		8	VX230	5.67	0.33	1.58	0.3		450
3		10	V X 250	5.74	0.64	2.21	0.1] [450
	1/2	10		8.42	0.39	2.21	0.1		470

Resin Body Type (Built-in One-touch Fittings)

0:	.	Orifice diameter		Flow rate of	haracteristics	Note 2)	Maximum operating	Max. system pressure	Weight Note 3)
Size	Port size	(mmø) Note 1)	Model	C [dm ³ /(s-bar)]	b	Cv	pressure differential (MPa) Note 4)	(MPa) Note 4)	(g)
		2		0.82	0.44	0.23	1.0		220
	ø6	3		1.25	0.34	0.35	0.6		220
1		5	10/040	1.45	0.43	0.40	0.2		220
•		2	VX210	0.82	0.44	0.23	1.0		220
	ø8	3		1.81	0.40	0.41	0.6	1.0	220
		5		2.11	0.32	0.56	0.2		220
	ø8	4	VX220	1.69	0.40	0.47	1.0		340
2		7		3.14	0.34	0.84	0.15		340
	ø10	4		1.68	0.49	0.50	1.0		340
		7		3.54	0.36	0.90	0.15		340
		5		2.50	0.44	0.70	1.0		460
	ø10	8		2.77	0.82	1.22	0.3		460
3		10	10/000	5.69	0.46	1.54	0.1		460
٠		5	VX230	2.50	0.44	0.70	1.0		460
	ø12	8		2.56	0.88	1.38	0.3		460
		10		5.69	0.64	1.76	0.1]	460

Note 1) The orifice size is just as a reference guide. Check the flow rate characteristics (conversion Cv).

Note 2) The flow rate characteristics of this product have variations.

When the highly precise flow control is required according to the system to be used, select an orifice diameter 1.3 times larger than that shown above and install a restrictor on the downstream side of the solenoid valve to make the adjustment.

Note 3) Weight of grommet type. Add 10 g for conduit type, 30 g for DIN terminal type, 60 g for conduit terminal type respectively.

Note 4) Refer to "Glossary of Terms" on page 65 for details on the maximum operating pressure differential and the maximum system pressure.

Fluid and Ambient Temperature

Fluid temperature (°C)	Ambient temperature (°C)
-10 Note) to 60	-20 to 60

Note) Dew point temperature: -10°C or less

Valve Leakage Rate

Internal Leakage

Seal material Note 2)	Leakage rate (Air) Note 1)		
NBR (FKM)	1 cm ³ /min or less (Aluminum body type)		
NDR (FRIVI)	15 cm ³ /min or less (Resin body type)		

External Leakage

External Loakage							
Seal material Note 2)	Leakage rate (Air) Note 1)						
NBR (FKM)	1 cm ³ /min or less (Aluminum body type)						
INDIT (FRIVI)	15 cm ³ /min or less (Resin body type)						

Note 1) Leakage is the value at ambient temperature 20°C.

Note 2) For seal material/FKM, refer to "Other Options" on page 49 for the selection.

Note 3) The amount of leakage is the value at a differential pressure of 0.01 MPa or more, and a temperature of 20°C. If the differential pressure is less than 0.01 MPa, please contact SMC.



VX2

VXK VXD

VXZ VXS VXB

VXE

VXP

VXF VX3

VXA



Model/Valve Specifications







When the valve is closed, flow is blocked from port 1 to port 2. However, if the pressure in port 2 is higher than port 1, the valve will not be able to block the fluid and it will flow from port 2 to port 1.

Aluminum Body Type

0:	Port size	Orifice diameter (mmø) Note 1)	Model	Flow rate characteristics Note 2)			Maximum operating	Max. system pressure	Weight Note 3)
Size				C [dm ³ /(s·bar)]	b	Cv	pressure differential (MPa) Note 4)	(MPa) Note 4)	(g)
		2		0.63	0.63	0.23	0.9		240
1	1/8, 1/4	3	VX240	1.05	0.68	0.41	0.45		240
		5		2.20	0.39	0.62	0.2		240
2	1/4, 3/8	4	VX250	1.90	0.52	0.62	0.8	1.0	370
_		7	V A 2 3 0	3.99	0.44	1.08	0.15		370
3	1/4, 3/8	5	VX260	1.96	0.55	0.75	0.8		490
ŭ		8	VA200	5.67	0.33	1.58	0.3		490

Resin Body Type (Built-in One-touch Fittings)

Troom Body Typo (Built in One toden Titango)									
Size	Port size	Orifice diameter	Mandal	Flow rate characteristics Note 2)			Maximum operating	Max. system pressure	Weight Note 3)
Size		(mmø) Note 1)	Model	C [dm ³ /(s·bar)]	b	Cv	pressure differential (MPa) Note 4)	(MPa) Note 4)	(g)
		2		0.82	0.44	0.23	0.9		240
	ø6	3		1.25	0.34	0.35	0.45		240
		5	VX240	1.45	0.43	0.40	0.2		240
•		2	V A 240	0.82	0.44	0.23	0.9	1.0	240
	ø8	3		1.81	0.40	0.41	0.45		240
		5		2.11	0.32	0.56	0.2		240
	ø8	4		1.69	0.40	0.47	0.8		370
2		7	VX250	3.14	0.34	0.84	0.15		370
2		4		1.68	0.49	0.50	0.8		370
	ø10	7		3.54	0.36	0.90	0.15		370
	~10	5		2.50	0.44	0.70	0.8		500
3	ø10	8	VX260	2.77	0.82	1.22	0.3		500
3	~10	5	V A 2 0 0	2.50	0.42	0.70	0.8		500
	ø12	8		2.56	0.88	1.38	0.3		500

Note 1) The orifice size is just as a reference guide. Check the flow rate characteristics (conversion Cv).

Note 2) The flow rate characteristics of this product have variations.

When the highly precise flow control is required according to the system to be used, select an orifice diameter 1.3 times larger than that shown above and install a restrictor on the downstream side of the solenoid valve to make the adjustment.

Note 3) Weight of grommet type. Add 10 g for conduit type, 30 g for DIN terminal type, 60 g for conduit terminal type respectively.

Note 4) Refer to "Glossary of Terms" on page 65 for details on the maximum operating pressure differential and the maximum system pressure.

Fluid and Ambient Temperature

Fluid temperature (°C)	Ambient temperature (°C)
-10 Note) to 60	-20 to 60

Note) Dew point temperature: -10°C or less

Valve Leakage Rate

Internal Leakage

Seal material Note 2)	Leakage rate (Air) Note 1)
NBR (FKM)	1 cm ³ /min or less (Aluminum body type)
NDN (FRW)	15 cm ³ /min or less (Resin body type)

External Leakage

Seal material Note 2)	Leakage rate (Air) Note 1)
NBR (FKM)	1 cm ³ /min or less (Aluminum body type)
INDR (FRW)	15 cm ³ /min or less (Resin body type)

Note 1) Leakage is the value at ambient temperature 20°C. Note 2) For seal material/FKM, refer to "Other Options" on page 49 for the

selection

Note 3) The amount of leakage is the value at a differential pressure of 0.01 MPa or more, and a temperature of 20°C. If the differential pressure is less than 0.01 MPa, please contact SMC.







♦ Voltage/Electrical entry

on page 52 for (UL-compliant.



VX2

VXK

VXD VXZ VXS VXB VXE VXP VXR VXH VXF VX3 VXA

VX2 1 0 A A Fluid 0 Air

Common Specifications

Seal material	NBR
Coil insulation type	Class B
Thread type	Rc*

* One-touch fittings are attached to the resin body type.

Coil size/Valve type Body material/Port size/Orifice diameter

•••	o, . a	~ 1, p~		,	atorian. or		minor anamoto.
Size	Symbol	Valve type		Symbol	Body material	Port size	Orifice diameter
	1	N.C.		Α			2
Size 1	'	IN.C.		В		1/8	3
Size i	4	N.O.		С	Aluminum		5
	4	N.O.		D	Aluminum		2
			\	E		1/4	3
			\	F			5
			Ì	Н			2
			1	J		ø6	3
			`\	K	Resin		5
			_ \	L	(With bracket)		2
			\	M		ø8	3
			,	N			5

0: 0	2 N.C. A B			1/4	7		
Size 2	5	N.O.	1	D	Aluminum	3/8	4
	3	IN.O.		E		3/6	7
			1	Н		ø8	4
			Λ.	J	Resin		7
				L	(With bracket)	ø10	4
			',	М		טוש	7

Size 3		l				1/-	
Size 3	6	N.O.		С			10 (N.C. only)
	0	IN.O.		D	Aluminum		5
			<i>}</i>	E		3/8	8
			1	F			10 (N.C. only)
			1	G		1/2	10 (N.C. only)
			\	Н			5
			\	J		ø10	8
			/	K	Resin		10 (N.C. only)
				L	(With bracket)		5
				M		ø12	8
			ì	N			10 (N.C. only)

1//

Symbol	Voltage	Electrical entry			
A	24 VDC	Grommet			
В	100 VAC	Grommet			
С	110 VAC	(With surge voltage			
D	200 VAC	\suppressor/			
E	230 VAC				
F	24 VDC				
G	24 VDC	DIN terminal			
Н	100 VAC	With surge voltage			
J	110 VAC	\ suppressor/			
K	200 VAC				
L	230 VAC				
М	24 VDC	Conduit terminal			
N	100 VAC	(With surge voltage			
Р	110 VAC	\suppressor/			

S	24 VDC	Conduit
Т	100 VAC	/ With surge \ voltage
U	110 VAC	\suppressor/
٧	200 VAC	
W	230 VAC	
		Flat terminal
Υ	24 VDC	

200 VAC

230 VAC

Q

R

z



For special options, refer to pages 49 to 51

i oi speciai options, reie	i to pages 43 to 51.			
	24 VAC			
	48 VAC			
Special voltage	220 VAC			
	240 VAC			
	12 VDC			
DIN terminal with light				
Conduit terminal with light				
Without DIN connector				

Low concentration ozone resistant
(Seal material: FKM)
Seal material: EPDM
Oil-free
G thread
NPT thread
With bracket (Aluminum body only)
Mounting holes on the bottom side of the body
(Aluminum body only)
Special electrical entry direction

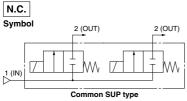
Other voltages

Dimensions → Pages 56 to 59 (Single unit)

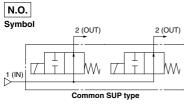




Model/Valve Specifications







When the valve is closed, flow is blocked from port 1 to port 2. However, if the pressure in port 2 is higher than port 1, the valve will not be able to block the fluid and it will flow from port 2 to port 1.

Normally Closed (N.C.)

0.	Orifice diameter (mmø) Note 1) Model		Flov	v rate characteristics	Maximum operating	Max. system pressure	
Size			C [dm ³ /(s-bar)]	b	Cv	pressure differential (MPa) Note 3)	Max. system pressure (MPa) Note 3)
	2		0.63	0.63	0.23	1.0	
1	3	VX2A0	1.05	0.68	0.41	0.6	
	5		2.20	0.39	0.62	0.2	
•	4	VX2B0	1.90	0.52	0.62	1.0	1.0
2	7	VAZDU	3.99	0.44	1.08	0.15	
_	5	VX2C0	1.96	0.55	0.75	1.0	
3	7	VAZCU	3.99	0.44	1.08	0.3	

Normally Open (N.O.)

0:	ore Orifice diameter (mmø) Note 1) Model		Flow	rate characteristics	Maximum operating		
Size			C [dm ³ /(s·bar)]	b	Cv	pressure differential (MPa) Note 3)	(MPa) Note 3)
	2		0.63	0.63	0.23	0.9	
1	3	VX2D0	1.05	0.68	0.41	0.45	
	5		2.20	0.39	0.62	0.2	
	4	VX2E0	1.90	0.52	0.62	0.8	1.0
2	7		3.99	0.44	1.08	0.15	1.0
	5	VX2F0	1.96	0.55	0.75	0.8	
3	7		3.99	0.44	1.08	0.3	

Note 1) The orifice size is just as a reference guide. Check the flow rate characteristics (conversion Cv).

Note 2) The flow rate characteristics of this product have variations.

When the highly precise flow control is required according to the system to be used, select an orifice diameter 1.3 times larger than that shown above and install a restrictor on the downstream side of the solenoid valve to make the adjustment.

Note 3) Refer to "Glossary of Terms" on page 65 for details on the maximum operating pressure differential and the maximum system pressure.

Fluid and Ambient Temperature

Fluid temperature (°C)	Ambient temperature (°C)		
-10 Note) to 60	-20 to 60		

Note) Dew point temperature: -10°C or less

Valve Leakage Rate

Internal Leakage Seal material Note 2) Leakage rate Note 1) NBR (FKM) 1 cm3/min or less

External Leakage

Seal material Note 2)	Leakage rate Note 1)
NBR (FKM)	1 cm ³ /min or less

Note 1) Leakage is the value at ambient temperature 20°C.

Note 2) For seal material/FKM, refer to "Other Options" on page 49 for the selection.

Note 3) The amount of leakage is the value at a differential pressure of 0.01 MPa or more, and a temperature of 20°C. If the differential pressure is less than 0.01 MPa, please contact SMC.



How to Order (Solenoid Valve for Manifold)



Common Specifications Seal material

Coil insulation type Class B

NBR

VX2

VXK

VXD

VXZ

VXS

VXB

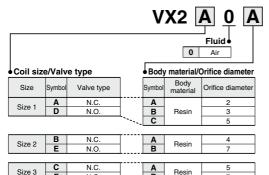
VXE

VXP

VXR

VXH

VXF VX3 VXA



For special options, refer to pages 49 to 51.

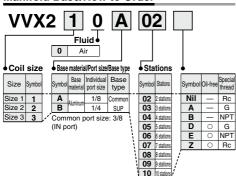
	24 VAC				
	48 VAC				
Special voltage	220 VAC				
	240 VAC				
	12 VDC				
DIN terminal with light					
Conduit terminal with light					
Without DIN connector					
Seal material: EPDM					
Low concentration ozone re	sistant (Seal material: FKM)				
Oil-free					
Special electrical entry direction					

N.O.

Mounting orientation exists when mounting valves onto manifold base. Refer to page 76 for details

Symbol	Voltage	Electrical entry					
A	24 VDC	Grommet					
В	100 VAC	Grommet					
С	110 VAC	/With surge \					
D	200 VAC	(voltage suppressor)					
Е	230 VAC						
F	24 VDC						
G	24 VDC	DIN terminal					
Н	100 VAC	/With surge \					
J	110 VAC	(voltage suppressor)					
K	200 VAC						
L	230 VAC						
M	24 VDC	Conduit terminal					
N	100 VAC	/With surge voltage					
Р	110 VAC	suppressor					
Q	200 VAC						
R	230 VAC						
S	24 VDC	Conduit					
Т	100 VAC	/With surge voltage					
U	110 VAC	suppressor/					
٧	200 VAC						
W	230 VAC						
Υ	24 VDC	Flat terminal					
	Other voltages						

Manifold Base/How to Order



Blanking Plate Assembly Part No.

N

NBR

FKM

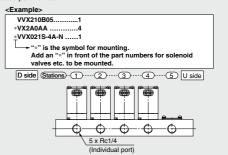


When mounting a blanking plate assembly, if the solenoid valve for Seal material the manifold is ozone resistant, (Seal material: FKM), please se-

ICCL I IXIVI.	
Dimensions -	→ Page 63

How to Order Manifold Assembly (Example)

Enter the valve and blanking plate to be mounted under the manifold base part number.



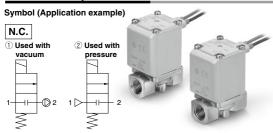
Enter the product's part number in order, counting the 1st station from the D side (left in the manifold arrangement, when viewing the individual port in front).



For Medium Vacuum (0.1 Pa-abs or more) Single Unit

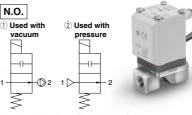
This valve can also be used with air.
 (Refer to the valve specifications for air.)

Model/Valve Specifications



When the valve is closed, flow is blocked from port 1 to port 2. However, if the pressure in port 2 is higher than port 1, the valve will not be able to block the fluid and it will flow from port 2 to port 1.

Symbol (Application example)



When the valve is closed, flow is blocked from port 1 to port 2. However, if the pressure in port 2 is higher than port 1, the valve will not be able to block the fluid and it will flow from port 2 to port 1.

Normally Closed (N.C.)

0:		Orifice diameter		Flow rate characteristics Note 2)			Maximum operating	Max. system pressure	Note 3) Weight
Size P	Port size	(mmø) Note 1) Model	Model	C [dm ³ /(s·bar)]	b	Cv	pressure differential (MPa) Note 4)	(MPa)	(g)
		2		0.63	0.63	0.23	1.0		300
1	1/8, 1/4	3	VX214	1.05	0.68	0.41	0.6		300
		5		2.20	0.39	0.62	0.2	1.0	300
2	2 1/4, 3/8	4	VX224	1.90	0.52	0.62	1.0		460
		7		3.99	0.44	1.08	0.15		460
		5		1.96	0.55	0.75	1.0		580
3	1/4, 3/8	8	VX234	5.67	0.33	1.58	0.3		580
3		10	V A 2 3 4	5.74	0.64	2.21	0.1		580
	1/2	10		8.42	0.39	2.21	0.1	1	630

Normally Open (N.O.)

	remany epon (mon)										
	Size Port size Orifice diameter (mmø) Note 1) Model			Flow rate characteristics Note 2)			Maximum operating	Max. system pressure	Note 3) Weight		
S			Model	C [dm ³ /(s-bar)]	b	Cv	pressure differential (MPa) Note 4)	(MPa)	(g)		
	1 1/8, 1/4	2		0.63	0.63	0.23	0.9		320		
		3	VX244	1.05	0.68	0.41	0.45		320		
			5		2.20	0.39	0.62	0.2		320	
	2	1/4, 3/8	4	VX254	1.90	0.52	0.62	0.8	1.0	490	
		1/4, 5/0	7	V A 2 3 4	3.99	0.44	1.08	0.15		490	
	3 1/4, 3/8	5	VX264	1.96	0.55	0.75	0.8		620		
		³	1/4, 3/8	1/4, 3/8	8	V A 204	5.67	0.33	1.58	0.3	

Note 1) The orifice size is just as a reference guide. Check the flow rate characteristics (conversion Cv).

Note 2) The flow rate characteristics of this product have variations.

When the highly precise flow control is required according to the system to be used, select an orifice diameter 1.3 times larger than that shown above and install a restrictor on the downstream side of the solenoid valve to make the adjustment.

Note 3) Weight of grommet type. Add 10 g for conduit type, 30 g for DIN terminal type, 60 g for conduit terminal type respectively.

Note 4) Refer to "Glossary of Terms" on page 65 for details on the maximum operating pressure differential.

Fluid and Ambient Temperature

Fluid temperature (°C)	Ambient temperature (°C)
1 to 60 Note)	-20 to 60

Note) With no freezing

Valve Leakage Rate

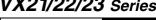
Internal Leakage

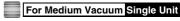
Seai materiai	Leakage rate (1010)
FKM	10 ⁻⁶ Pa⋅m³/sec or less

External Leakage

Seal material	Leakage rate Note)		
FKM	10 ⁻⁶ Pa⋅m³/sec or less		

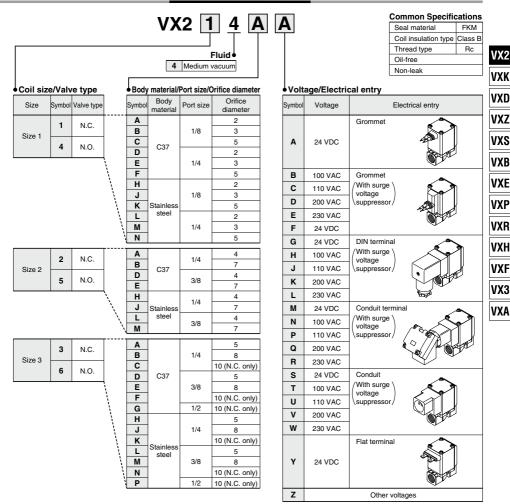
Note) Leakage (10^{-6} Pa-m³/sec) is the value at differential pressure 0.1 MPa and ambient temperature 20° C.





How to Order (Single Unit)





For special options, refer to pages 49 to 51

For special options, refer to pages 49 to 51					
	24 VAC				
Special voltage	48 VAC				
	220 VAC				
	240 VAC				
	12 VDC				
DIN terminal with light					
Conduit terminal with light					

Without DIN connector
Seal material: EPDM
G thread
NPT thread
With bracket
Mounting holes on the bottom side of the body
Special electrical entry direction

Dimensions→ Pages 60, 61 (Single unit)

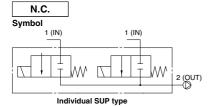




For Medium Vacuum (0.1 Pa-abs or more) Manifold

* For other fluids, please contact SMC.

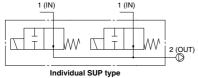
Model/Valve Specifications





N.O.

Symbol



When the valve is closed, flow is blocked from port 1 to port 2. However, if the pressure in port 2 is higher than port 1, the valve will not be able to block the fluid and it will flow from port 2 to port 1.

Normally Closed (N.C.)

14011116	any Cioseu (iv.c.	,					
Sine Orifice diameter Model			Flow	rate characteristics 1	Maximum operating pressure differential	Max. system pressure	
Size (mmø) Note 1)	Model	C [dm ³ /(s·bar)]	b	Cv	pressure differential (MPa) Note 3)	(MPa) Note 3)	
	2	VX2A4 VX2B4 VX2C4	0.63	0.63	0.23	1.0	
1	3		1.05	0.68	0.41	0.6	
	5		2.20	0.39	0.62	0.2	
2	4		1.90	0.52	0.62	1.0	1.0
_	7		3.99	0.44	1.08	0.15	
3	5		1.96	0.55	0.75	1.0	
3	7	VA2C4	3.99	0.44	1.08	0.3	

Normally Open (N.O.)

Size	Orifice diameter Model		Flow rate characteristics Note 2)			Maximum operating pressure differential	Max. system pressure
(mmø) Note 1)	Model	C [dm ³ /(s·bar)]	b	Cv	pressure differential (MPa) Note 3)	(MPa) Note 3)	
	2		0.63	0.63	0.23	0.9	
1	3	VX2D4	1.05	0.68	0.41	0.45	
	5		2.20	0.39	0.62	0.2	
2	4	VX2E4	1.90	0.52	0.62	0.8	1.0
	7		3.99	0.44	1.08	0.15	
3	5	VX2F4	1.96	0.55	0.75	0.8	
3	7	V 1/2 F 4	3.99	0.44	1.08	0.3	

Note 1) The orifice size is just as a reference guide. Check the flow rate characteristics (conversion Cv).

Note 2) The flow rate characteristics of this product have variations.

When the highly precise flow control is required according to the system to be used, select an orifice diameter 1.3 times larger than that shown above and install a restrictor on the downstream side of the solenoid valve to make the adjustment.

Note 3) Refer to "Glossary of Terms" on page 65 for details on the maximum operating pressure differential and the maximum system pressure.

Fluid and Ambient Temperature

Fluid temperature (°C)	Ambient temperature (°C)
1 to 60 Note)	-20 to 60

Note) With no freezing

Valve Leakage Rate

Internal Leakage							
Seal material	Leakage rate Note)						
FKM	10 ⁻⁶ Pa⋅m³/sec or less						
External Leakage							

External Leakage						
Seal material	Leakage rate Note)					
FKM	10 ⁻⁶ Pa⋅m³/sec or less					

Note) Leakage (10⁻⁶ Pa·m³/sec) is the value at 0.1 Pa·abs and ambient

 Voltage/Electrical entry Voltage

24 VDC

100 VAC

110 VAC

200 VAC

230 VAC

24 VDC

24 VDC

100 VAC

110 VAC

200 VAC

230 VAC

24 VDC

100 VAC

110 VAC

200 VAC

230 VAC

24 VDC

100 VAC

110 VAC

200 VAC

230 VAC

24 VDC

Symbol

Α

В

C

D

Е

F

G

Н

J

K

L

M

N

P

Q

R

s

Т

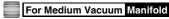
U

ν

W

Υ

Z



Oil-free Non-leak

Grommet

Grommet With surge

voltage

suppressor

DIN terminal

With surge

suppressor

With surge voltage

suppressor

Conduit With surge

voltage

suppressor

Flat terminal

Other voltages

Conduit terminal

voltage

Electrical entry

How to Order (Solenoid Valve for Manifold)



Common Specifications Seal material Coil insulation type Class B

VX2

VXK

VXD

VXZ

VXS

VXB

VXE

VXP

VXR

VXH

VXF

VX3

VXA

41



	Fluid ●	
	4 Medium vacuum	
Coil size/Valve type	Body material/Orifice dia	9
	D 1 0:0	١

COII SIZE	e type		• Bou	/ Illaterial/t	Jillice dialiletei	
Size	Symbol	Valve type		Symbol	Body material	Orifice diameter
Size 1	Α	N.C.		Α		2
Size i	D	N.O.		В	Resin	3
			*****	С		5

	<u> </u>	N.O.	LL	В		7
Size 3	С	N.C.		Α	Resin	5
Size 3	F	N.O.		В	nesiii	7

N.C

For special options refer to pages 49 to 51.

Size 2

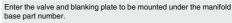
	24 VAC			
	48 VAC			
Special voltage	220 VAC			
	240 VAC			
	12 VDC			
DIN terminal with li	ght			
Conduit terminal wi	th light			
Without DIN connector				
Seal material: EPDM				
Special electrical entry direction				

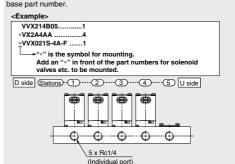
. Caution

76 for details.

Mounting orientation exists when mounting valves onto manifold base. Refer to page

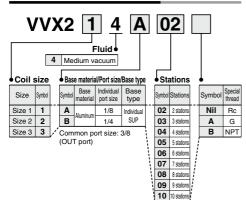
How to Order Manifold Assembly (Example)





Enter the product's part number in order, counting the 1st station from the D side (left in the manifold arrangement, when viewing the individual port in front).

Manifold Base/How to Order



Blanking Plate Assembly Part No.

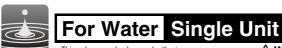
For size 1 VVX021S - 4A-F

For size 2 VVX022S - 4A-F

For size 3 VVX023S - 4A-F

Dimensions → Page 63

ØSMC



* This valve can also be used with air. (Refer to the valve specifications for air.)

Mhen water is used as the fluid

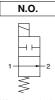
Use clear water equivalent to tap water. (When using underground water, if the water is to be treated, be sure to check the disinfectant or corrosion treatment's compatibility with the product before use.) Corrosive fluids or seawater cannot be used.

Model/Valve Specifications



When the valve is closed, flow is blocked from port 1 to port 2. However, if the pressure in port 2 is higher than port 1, the valve will not be able to block the fluid and it will flow from port 2 to port 1.

Symbol





When the valve is closed, flow is blocked from port 1 to port 2. However, if the pressure in port 2 is higher than port 1, the valve will not be able to block the fluid and it will flow from port 2 to port 1.

Normally Closed (N.C.)

	.,							
0:		Orifice diameter		Flow rate characteristics Note 2)		Maximum operating Max. system pressure		Weight Note 3)
Size	Port size	(mmø) Note 1)	Model	Kv	Conversion Cv	pressure differential (MPa) Note 4)	(MPa) Note 4)	(g)
		2		0.20	0.23	1		300
1	1/8, 1/4	3	VX212	0.36	0.42	0.6		300
		5		0.54	0.63	0.2		300
2	1/4, 3/8	4	VX222	0.54	0.63	1		460
	2 1/4, 3/6	7		0.93	1.08	0.15	1.0	460
	5	5		0.64	0.75	1		580
3	1/4, 3/8	8	VX232	1.36	1.58	0.3		580
٥		10	V A Z 3 Z	1.89	2.21	0.1		580
	1/2	10		1.89	2.21	0.1		630

Normally Open (N.O.)

0:	,	Orifice diameter		Flow rate chara	Flow rate characteristics Note 2)		Maximum operating Max. system pressure	
Size	Port size	(mmø) Note 1)	Model	Kv	Conversion Cv	pressure differential (MPa) Note 4)	(MPa) Note 4)	Weight (g)
		2		0.20	0.23	0.9		320
1	1/8, 1/4	3	VX242	0.36	0.42	0.45		320
		5		0.54	0.63	0.2		320
2	1/4. 3/8	4	VX252	0.54	0.63	0.8	1.0	490
	1/4, 3/8	7		0.93	1.08	0.15		490
3	1/4, 3/8	5	WYOCO	0.64	0.75	0.8		620
3	1/4, 3/6	8	VX262	1.36	1.58	0.3		620

Note 1) The orifice size is just as a reference guide. Check the flow rate characteristics (conversion Cv).

Note 2) The flow rate characteristics of this product have variations.

When the highly precise flow control is required according to the system to be used, select an orifice diameter 1.3 times larger than that shown above and install a restrictor on the downstream side of the solenoid valve to make the adjustment.

Note 3) Weight of grommet type. Add 10 g for conduit type, 30 g for DIN terminal type, 60 g for conduit terminal type respectively.

Note 4) Refer to "Glossary of Terms" on page 65 for details on the maximum operating pressure differential and the maximum system pressure.

Fluid and Ambient Temperature

	ature (°C)
1 to 60 Note) —20 to 6	0

Note) With no freezing

Valve Leakage Rate

External Leakage

Seal material Note 2)	Leakage rate (Water) Note 1)
NBR (FKM)	0.1 cm ³ /min or less

Note 1) Leakage is the value at ambient temperature 20°C.

Note 2) For seal material/FKM, refer to "Other Options" on page 49 for the selection.



How to Order (Single Unit)



on page 53 for RoHS

Thread type



VX2

VXK

VXD VXZ

VXS VXB VXE VXP VXR

VXH VXF VX3 VXA

VX2 Fluid 2 Water

Common Specific	cations
Seal material	NBR
Coil insulation type	Class B

N.O.

Size 1

Coil size/Valve type				 Body material/Port size/Orifice diamet 			
Size	Symbol Valve type	Symbol	Body material	Port size	Orifice diameter		
	-	N.C		Α			2

	Cymbo.	material	. 011 0120	diameter
	Α			2
	В		1/8	3
	С	C37		5
	D	D C37		2
	E		1/4	3
	F			5
	Н		1/8	2
	J			3
	K	Stainless steel		5
	L			2
Ì	M		1/4	3
ì	N			5

	2	N.C.		A	C37	1/4	4
Size 2		IN.C.		В			7
Size 2	5	N.O.		D		3/8	4
		N.O.		E			7
			\	Н		1/4	4
			1	J	Stainless	1/4	7
			_ \	L	steel	3/8	4
			` `	М	l	5/6	7

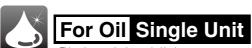
	Size 3				В		1/4	8
	Size 3	6	N.O.	С				10 (N.C. only)
l		۰	14.0.		D	C37		5
				\	E		3/8	8
				Ì	F			10 (N.C. only)
				\	G		1/2	10 (N.C. only)
				ì	Н			5
		<i>i i</i>		J		1/4	8	
			į		K	a		10 (N.C. only)
				``	L	Stainless steel		5
				1	М]	3/8	8
				\ 	N			10 (N.C. only)

Symbol	Voltage	Electrical entry
A	24 VDC	Grommet
В	100 VAC	Grommet
С	110 VAC	(With surge voltage
D	200 VAC	suppressor /
E	230 VAC	
F	24 VDC	
G	24 VDC	DIN terminal
Н	100 VAC	With surge voltage
J	110 VAC	suppressor
K	200 VAC	
L	230 VAC	
М	24 VDC	Conduit terminal
N	100 VAC	With surge voltage
Р	110 VAC	suppressor
Q	200 VAC	
R	230 VAC	
s	24 VDC	Conduit
Т	100 VAC	With surge voltage
U	110 VAC	suppressor
٧	200 VAC	
W	230 VAC	
Y	24 VDC	Flat terminal
Z	-	Other voltages

10 (N.C. only)

For special options, refer to pages 49 to 51.					
	24 VAC				
	48 VAC				
Special voltage	220 VAC				
	240 VAC				
	12 VDC				
DIN terminal with light					
Conduit terminal with light					
Without DIN connector					

Dimensions → Pages 60, 61 (Single unit)



* This valve can also be used with air or water. (Refer to the valve specifications for air or water.)

The kinematic viscosity must not exceed 50 mm²/s. The special construction of the armature adopted in the built-in ull-wave rectifier type gives an improvement in OFF response by providing clearance on the absorbed surface when it is switched ON.

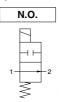
Model/Valve Specifications

Symbol



When the valve is closed, flow is blocked from port 1 to port 2. However, if the pressure in port 2 is higher than port 1, the valve will not be able to block the fluid and it will flow from port 2 to port 1.

Symbol





When the valve is closed, flow is blocked from port 1 to port 2. However, if the pressure in port 2 is higher than port 1, the valve will not be able to block the fluid and it will flow from port 2 to port 1.

Normally Closed (N.C.)

Hormany Globba (Hilb)								
Size	Don't sine	Orifice diameter	Mandal	Flow rate characteristics Note 2)		Maximum operating	Max. system pressure	Weight Note 3)
Size	Port size	(mmø) Note 1)	Model	Kv	Conversion Cv	pressure differential (MPa) Note 4)	(MPa) Note 4)	(g)
		2		0.20	0.23	1		300
1	1/8, 1/4	3	VX213	0.36	0.42	0.6		300
		5		0.54	0.63	0.2		300
2	1/4, 3/8	4	VX223	0.54	0.63	1		460
		7		0.93	1.08	0.15	1.0	460
		5		0.64	0.75	1		580
3	1/4, 3/8	8	VX233	1.36	1.58	0.3		580
3		10	VA233	1.89	2.21	0.1		580
	1/2	10		1.89	2.21	0.1		630

Normally Open (N.O.)

Normany Open (N.O.)									
	Size	Don't since	Orifice diameter	Mandal	Flow rate chara	acteristics Note 2)	Maximum operating	Max. system pressure (MPa) Note 4)	Weight Note 3)
	Size Port size	Port size	(mmø) Note 1)	Model	Kv	Conversion Cv	pressure differential (MPa) Note 4)		(g)
			2		0.20	0.23	0.9	1.0	320
	1	1/8, 1/4	3	VX243 VX253	0.36	0.42	0.45		320
			5		0.54	0.63	0.2		320
	2	1/4, 3/8	4		0.54	0.63	0.8		490
l	2	1/4, 3/6	7	V A 2 3 3	0.93	1.08	0.15		490
ĺ	3	1/4, 3/8	5	VX263	0.64	0.75	0.8		620
	3	1/4, 3/6	8	V A 2 0 3	1.36	1.58	0.3	7 [620

Note 1) The orifice size is just as a reference guide. Check the flow rate characteristics (conversion Cv).

Note 2) The flow rate characteristics of this product have variations.

When the highly precise flow control is required according to the system to be used, select an orifice diameter 1.3 times larger than that shown above and install a restrictor on the downstream side of the solenoid valve to make the adjustment.

Note 3) Weight of grommet type. Add 10 g for conduit type, 30 g for DIN terminal type, 60 g for conduit terminal type respectively.

Note 4) Refer to "Glossary of Terms" on page 65 for details on the maximum operating pressure differential and the maximum system pressure.

Fluid and Ambient Temperature

Fluid temperature (°C)	Ambient temperature (°C)	
-5 Note) to 60	-20 to 60	
0 10 00	20 10 00	

Note) Kinematic viscosity: 50 mm²/s or less

Valve Leakage Rate

Internal Leakage

Seal material	Leakage rate (Oil) Note)
FKM	0.1 cm ³ /min or less

External Leakage

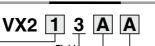
Seal material	Leakage rate (Oil) Note)
FKM	0.1 cm ³ /min or less

Note) Leakage is the value at ambient temperature 20 $^{\circ}\text{C}.$



How to Order





Orifice

diameter 2

Body material/Port size/Orifice diameter

Port size

Body

material

Common Specifications				
Seal material	FKM			
Coil insulation type	Class B			

Fluid •

Symbol

Т

U

z

VX2 VXK

VXD

VXZ

VXS
VXB
VXP
VXR
VXH
VXF
VX3

Voltage/Electrical	entry

Voltage

24 VDC

	Thread type	Rc
l entry		
	Electrical entry	
Grommet	_	

Size 1				В		1/8	3
SIZE I	4	N.O.		C	C37		5
	4	IN.O.		D	037		2
			1	E		1/4	3
			1	F			5
			1	Н			2
			Ì	J		1/8	3
			`\	K	Stainless		5
			_ /	L	steel		2
			<i>\</i>	M		1/4	3
			Ì	N			5
	2	N.C.		Α		1/4	4
Size 2		14.0.		В	C37	1/4	7

Coil size/Valve type

Symbol Valve type

N.C.

В	100 VAC	Grommet	
С	110 VAC	With surge voltage	
D	200 VAC	suppressor	
E	230 VAC		
F	24 VDC		4
G	24 VDC	DIN terminal	6
Н	100 VAC	With surge voltage	
J	110 VAC	suppressor	

0.20 2	5	N.O.		D		3/8	4
	,	IN.O.		E		3/6	7
			\	Н		1/4	4
			1	J	Stainless steel	1/4	7
			_ \	L	steel	3/8	4
				М		3/0	7
				Α			5

_	200 VAC	
L	230 VAC	
М	24 VDC	Conduit terminal
N	100 VAC	With surge voltage
Р	110 VAC	suppressor
Q	200 VAC	
R	230 VAC	
S	24 VDC	Conduit

With surge

suppressor

voltage

Size 3						., .	U
Size 3	6	N.O.		С			10 (N.C. only)
		14.0.		D	C37		5
			}	E		3/8	8
			į	F			10 (N.C. only)
			Ì	G		1/2	10 (N.C. only)
			1	Н			5
			\	J		1/4	8
			1	K	04-1-1		10 (N.C. only)
			\	L	Stainless steel		5
			Ì	М		3/8	8
			,	N			10 (N.C. only)

Р

w	230 VAC	
Y	24 VDC	Flat terminal

100 VAC

110 VAC

200 VAC

	~
terminal	
Other voltages	

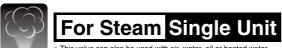
For special options, refer to pages 49 to 51

10 (N.C. only)

rui speciai options, reiei to pages 43 to 31.				
	24 VAC			
	48 VAC			
Special voltage	220 VAC			
	240 VAC			
	12 VDC			
DIN terminal with light				
Conduit terminal with light				

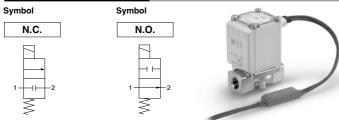
٧	Without DIN connector
C	Dil-free
G	G thread
Ν	NPT thread
٧	With bracket
Λ	Mounting holes on the bottom side of the body
S	Special electrical entry direction

Dimensions → Pages 60, 61 (Single unit)



* This valve can also be used with air, water, oil or heated water. (Refer to the valve specifications for air, water or oil.)

Model/Valve Specifications



When the valve is closed, flow is blocked from port 1 to port 2. However, if the pressure in port 2 is higher than port 1,

the valve will not be able to block the fluid and it will flow from port 2 to port 1.

Normally Closed (N.C.)

Hommu	iy Giosca (
Size Port size		Orifice diameter	Model	Flow rate characteristics Note 2)		Maximum operating	Max. system pressure	Weight Note 3)
Size Port size	(mmø) Note 1)	Model	Kv	Conversion Cv	pressure differential (MPa) Note 4)	(MPa) Note 4)	(g)	
	2			0.20	0.23	1		300
1	1 1/8, 1/4	3	VX215	0.36	0.42	0.6		300
	5		0.54	0.63	0.2	ı [300	
2	1/4.0/0	4	VX225	0.54	0.63	1	1.0	460
2 1/4, 3/8	1/4, 3/6	7		0.93	1.08	0.15		460
		5		0.64	0.75	1		580
3	1/4, 3/8	8	VX235	1.36	1.58	0.3		580
		10	V A 2 3 5	1.89	2.21	0.1		580
	1/2	10		1.89	2.21	0.1		630

Normally Open (N.O.)

Size Port size		Orifice diameter	Mandal	Flow rate characteristics Note 2)		Maximum operating	Max. system pressure	Note 3) Weight
SIZE P	Port size	(mmø) Note 1)	Model	Kv	Conversion Cv	(MPa) Note 4)	(MPa) Note 4)	(g)
		2		0.20	0.23	0.9		320
1	1/8, 1/4	3	VX245	0.36	0.42	0.45		320
		5		0.54	0.63	0.2		320
2	1/4, 3/8	4	VX255	0.54	0.63	0.8	1.0	490
2	1/4, 3/6	7	V A 2 3 3	0.93	1.08	0.15		490
3 1/4, 3/8	1/4. 3/8	5	VX265	0.64	0.75	0.8		620
3	1/4, 3/6	8	V A 200	1.36	1.58	0.3	1	620

Note 1) The orifice size is just as a reference guide. Check the flow rate characteristics (conversion Cv). Note 2) The flow rate characteristics of this product have variations.

When the highly precise flow control is required according to the system to be used, select an orifice diameter 1.3 times larger than that shown above and install a restrictor on the downstream side of the solenoid valve to make the adjustment.

Note 3) Weight of grommet type. Add 10 g for conduit type, 60 g for conduit terminal type respectively.

Note 4) Refer to "Glossary of Terms" on page 65 for details on the maximum operating pressure differential and the maximum system pressure.

Fluid and Ambient Temperature

Fluid temperature (°C)	Ambient temperature (°C)	
Steam: 183 or less	-20 to 60	
Heated water: 99 or less	-20 10 60	

Valve Leakage Rate

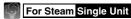
Internal Leakage

Flu	uid	Seal material	Leakage rate
Ste	am	FKM for high temperature	1.0 cm ³ /min or less
Heated	d water	rkivi for night temperature	0.1 cm ³ /min or less

External Leakage

F	luid	Seal material	Leakage rate	
St	eam	FKM for high temperature	1.0 cm ³ /min or less	
Heated water		rkivi ior nign temperature	0.1 cm ³ /min or less	





How to Order (Single Unit)



VX2

VXK

VXD

VXZ

VXS

VXB

VXE

VXP

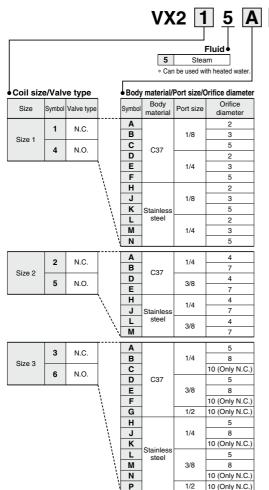
VXR

VXH

VXF

VX3

VXA



Common Specific

Seal material	FKM for high temperature
Coil insulation type	Class H
Thread type	Rc

Symbol	Voltage	Electrical entry		
A	24 VDC	Grommet		
В	100 VAC	Grommet		
С	110 VAC	/With surge voltage		
D	200 VAC	\suppressor/		
E	230 VAC			
G	24 VDC	DIN terminal		
Н	100 VAC	(With surge voltage suppressor Note)		
J	110 VAC			
K	200 VAC			
L	230 VAC			
N	100 VAC	Conduit terminal /With surge \		
Р	110 VAC	voltage		
Q	200 VAC	\suppressor/		
R	230 VAC			
Т	100 VAC	Conduit		
U	110 VAC	/With surge voltage		
٧	200 VAC	\suppressor/		
w	230 VAC			
Z	Other voltages			

Note) For the class H type DIN terminal, use it in combination with the connector provided.

For special options, refer to pages 49 to 51.						
	24 VAC					
Special voltage	48 VAC					
Special voltage	220 VAC					
	240 VAC					
DIN terminal with light						
Conduit terminal with light						
Seal material: EPDM (99°C or less)						
Oil-free						
G thread						
NPT thread						
With bracket						
Mounting holes on the bottom side of the body						
Special electrical entry direction						

Dimensions → Page 62 (Single unit)



Special Options

Electrical Options (Special voltage, With light, Without DIN connector)



Enter standard product •

1N

1Q

1R | •

Conduit

(With surge voltage suppressor)

ecification	Symbol	Class H*	Voltage	Electrical entry
	1A	•	48 VAC	
	1B	•	220 VAC	Grommet
	1C	•	240 VAC	(With surge voltage suppressor)
	10	•	24 VAC	
	1D		12 VDC	Grommet
	1E		12 VDC	Grommet
	'=		12 VDC	(With surge voltage suppressor)
	1F	•	48 VAC	
m	1G	•	220 VAC	DIN terminal
age	1H	•	240 VAC	(With surge voltage suppressor)
9	1V	•	24 VAC	(with surge voltage suppressor)
~	1J	_	12 VDC	
Ö.	1K	•	48 VAC	
Special voltage	1L	•	220 VAC	Conduit terminal
0)	1M	•	240 VAC	(With surge voltage suppressor)
	1W	•	24 VAC	(vviiii surge voitage suppressor)

12 VDC 48 VAC

220 VAC

240 VAC

24 VAC

12 VDC

			12 100	riai terminai
	2A	•	24 VDC	
	2B	•	100 VAC	
	2C	•	110 VAC	
	2D	•	200 VAC	
	2E	•	230 VAC	DIN terminal
	2F	•	48 VAC	(With surge voltage suppressor)
ŧ	2G	•	220 VAC	
	2H	•	240 VAC	
	2V	•	24 VAC	
With light	2J	_	12 VDC	
£	2K	_	24 VDC	
>	2L	•	100 VAC	
	2M	•	110 VAC	
	2N	•	200 VAC	
	2P	•	230 VAC	Conduit terminal
	2Q	•	48 VAC	(With surge voltage suppressor)
	2R	•	220 VAC	
	2S	•	240 VAC	
	2W	•	24 VAC]
	2T	_	12 VDC	

	3A	_	24 VDC	
tor	3B	_	100 VAC	
ě	3C	_	110 VAC	
n c	3D	_	200 VAC	
ō	3E	_	230 VAC	DIN terminal
	3F	_	48 VAC	(With surge voltage suppressor)
Ħ	3G	_	220 VAC	
8	3H	_	240 VAC	
Without DIN connector	3V	_	24 VAC	
_	3J	_	12 VDC	

* Options marked with ● are available for Class "H" coil. Applicable for all when the coil insulation class is Class "B".

* Enter symbols in the order below when ordering a combination of electrical option, other option, etc.

Example) VX2 1 2 A Z 1 Z

Electrical option • Other option

Other Options

Low concentration ozone resistant and applicable to deionized water
Oil-free
Port thread

VX2 1 0 A A Z
Enter standard product number.

Other option

VX2

VXK

VXD

VXZ

VXS

VXB VXE VXP

VXF

VX3

VXA

Low concentration ozone resistant and applicable to deionized water/Oil-free/Port thread

Symbol	to deionized water*1, *3 (Seal material: FKM)	Oil-free	Port thread		
Nil	_	_	Rc, One-touch fitting*2		
Α			G		
В	_	_	NPT		
С	0	_	Rc, One-touch fitting*2		
D		0	G		
E	_		NPT		
F	_	_	G		
G	0		NPT		
Н			Rc, One-touch fitting*2		
K	0	0	G		
L			NPT		
Z	_	0	Rc, One-touch fitting*2		
A Analisable to air (AMODO) and mater (AMODO)					

- *1 Applicable to air (VX2□0) and water (VX2□2).
- *2 When the body is resin, One-touch fittings are equipped.
- *3 When using deionized water or any other fluid that may corrode C37 (brass), select a stainless steel body.

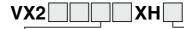
Made to Order

<Special lead wire length>

Produced upon receipt of order. Please contact SMC for lead times.



<High pressure>



					Corr	espo	ndenc	e table
	Size s			1	Body	Port	Orifice	Max. operating
	OI.	ze .	Symi	100	material	size	dia.	pressure differential
	Т		Q		C37	1/8		
	١,	N.C.	R		U37	1/4	2	2 MPa
1	ď	IV.C.	S		Cinialana aisal	1/8	-	2 IVIPa
			Т		Stainless steel	1/4		
	Ī	N.O.	_		_	Not available		able
	Т	N.C.	Q	_	C37	1/4	3	2 MPa
2			R		037	3/8	3	2 IVIPa
-	L		_		Stainless steel	N	lot availa	able
		N.O.	_		_	Not available		able
	T		Q		C37	1/4	3	3 MPa
3		N.C.	R		037	3/8	3	3 IVIPA
3			=		Stainless steel	- 1	lot availa	able
	Ī	N.O.	=		_	Not available		able

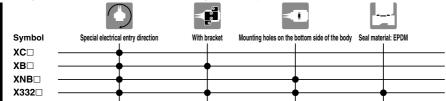
 The aluminum and PBT bodies are not available.

	0	ption •
	Specifi	cations
Symbol	Electrical	Bracket
	entry direction	Diacket
Nil	In side	
1411	(Standard)	
Α	90°	None
В	180°	
С	270°	
D	In side	
"	(Standard)	With
E	90°	bracket
F	180°	bracket
G	270°	
н	In side	Mounting
п	(Standard)	holes on
J	90°	the bottom
K	180°	side of
L	270°	the body

49 ®

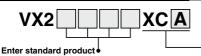
Installation Options (Mounting Option/Special Electrical Entry Direction)

The following shows combinations that can be selected using installation options.

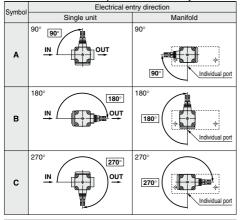


Special Electrical Entry Direction

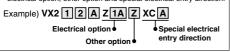
number.



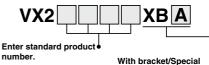
Special electrical entry direction



* Enter symbols in the order below when ordering a combination of electrical option, other option and special electrical entry direction.



With Bracket/
Special Electrical Entry Direction



electrical entry direction Symbol Electrical entry direction Symbol Electrical entry direction Standard Nil 2709 900 90 270° OUT IN С IN 180° 180° R IN

	h	-
₩	ľ	≥ ⊃
	J	<u>'</u>
х		

				(mm)
Size	Port size	U	W	Х
1	1/8, 1/4	46	36	11
2	1/4, 3/8	56	46	13
3	1/4, 3/8	56	46	13
3	1/2	_	_	_

- *1 Bracket is attached as standard with the resin body, so there are no XB settings. *2 When the orifice is Ø8, Ø10, and the body port size is 1/4 or 3/8, use a foot
- type bracket. (The L-bracket of the old VX series is not compatible.) If the body port size is 1/2, there are no XB settings. (Refer to the following.) *3 On the bottom side of the standard body, there is no female thread for mounting
- *3 On the bottom side of the standard body, there is no female thread for mountin a bracket. Please be careful because the bracket cannot be retrofit.

Bracket Interchangeable with an Old Type

	Bracket interchangeable with an Ola Type					
Size	Port size	Orifice diameter (mmø)	Bracket interchangeable with an old type			
		2	(Interchangeable)			
1	1/8, 1/4	3	(Interchangeable)			
		5	(Interchangeable)			
2	2 1/4, 3/8	4	(Interchangeable)			
2 1	1/4, 3/6	7	(Interchangeable)			
		5	(Interchangeable)			
3	1/4, 3/8	8	× (Not interchangeable)*2			
3		10	× (Not interchangeable)*2			
	1/2	10	— (Not available)*2			

Enter symbols in the order below when ordering a combination of electrical option, other option and with bracket.

Other option

Example) VX2 1 2 A Z 1A Z XB A

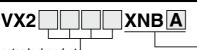
Electrical option • With

With bracket/Special electrical entry direction

ØSMC

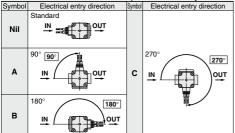
Installation Options (Mounting Option/Special Electrical Entry Direction)

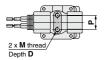
Mounting Holes on the Bottom Side of the Body/ Special Electrical Entry Direction



Enter standard product number.

> Mounting holes on the bottom side of the body/ Special electrical entry direction

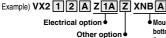




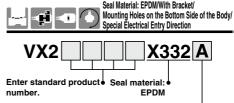
				(mm)
Size	Port size	M	D	Р
1	1/8, 1/4	M4	6	12.8
2	1/4, 3/8	M5	8	19
3	1/4, 3/8	M5	8	19
3	1/2	M5	8	23

Note) Resin body is not available.

* Enter symbols in the order below when ordering a combination of electrical option, other option and mounting holes on the bottom side of the body.



Mounting holes on the bottom side of the body/ Special electrical entry direction



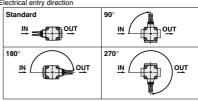
Fluid symbol

0	Air		
2	Water		
4	Medium vacuum		
-5	Heated water (99°C or less)		

With bracket/Mounting holes on the bottom side of the body/ Special electrical entry direction

	- poola				
Cumbal	Specifications				
Symbol	Electrical entry direction	Bracket			
Nil	IN side (Standard)				
Α	90°	None			
В	180°	None			
С	270°				
D	IN side (Standard)				
E 90°		With bracket*1, 2			
F 180°					
G	270°				
Н	IN side (Standard)				
J	90°	Mounting holes on the			
K	180°	bottom side of the body*1			
L	270°				

- *1 Resin body is not available.
- *2 The model with bracket is not available for port size 1/2. *3 "Other Options", which can be combined, are A, B, D, E, Z
- *4 Electrical entry direction



* Enter symbols in the order below when ordering a combination of electrical option, other option, seal material: EPDM, with bracket, mounting holes on the bottom side of the body and special electrical entry direction.

Example) VX2 1 2 A Z 1A Z X332 A Electrical option Seal material: EPDM/ With bracket/Mounting holes Other option on the bottom side of the body/

ØSMC

Special electrical entry direction

VX2

VXK

VXD

VXZ

VXS

VXB

VXE

VXP

VXR

VXH

VXF

VX3 VXA

VX21/22/23 Series **UL-compliant**

* Refer to the table shown below for UL-compliant.

VX210	Valve	tyne:	N C

****	TALLO TUITO LYPOLITION					
Size, Valve type, Fluid	Body material, Port size	Voltage, Electrical entry, Electrical options	Other options	With Note) bracket		
VX210	Α	Α	Nil	Nil		
	В	В	Α	XC*		
	С	С	В	XB*		
	D	D	С	XNB*		
	E	E	D	X332*		
	F	F	E			
	H Note)	M	F			
	J Note)	N	G			
	K Note)	P	Н			
	L Note)	Q	K			
	M Note)	R	L			
	N Note)	S	Z			

Т	Note) Body material/
U	Port size: Since
٧	the bracket is
W	attached to H, J,
Υ	K, L, M and N, "XB" cannot be
Z1A	selected.
Z1B	
Z1C	
Z1U	
Z1D	
Z1E	
Z1K	
Z1L	
Z1M	
Z1W	
Z1N	
Z1P	
Z1Q	
Z1R	
Z1Y	

Z1S

Z1T

Z2K

Z2L

Z2M

Z2N

Z2P

Z2Q

Z2R

Z2S

Z2W

Z2T

Z3A

Z3B

Z3C

Z3D

Z3E

Z3F

Z3G

Z3H

Z3V

Z3J

VX220) Valv	e type: N.	C.	
Size, Valve type, Fluid Body material, Port size		Voltage, Electrical entry, Electrical options	Other options	With Note bracket
VX220	Α	Α	Nil	Nil
	В	В	Α	XC*
	D	С	В	XB*
	E	D	С	XNB
	H Note)	E	D	X332
	J Note)	F	E	
	L Note)	М	F	
	M Note)	N	G	
		P	Н	
		Q	K	
		R	L	

S	Z
Т	Note) Body material/
U	Port size: Since
V	the bracket is
W	attached to H, J,
Y	L and M, "XB" cannot be
Z1A	selected.
Z1B	
Z1C	
Z1U	
Z1D	
Z1E	
Z1K	
Z1L	

Z1M Z1W Z1N Z1P

Z1Q

VX230 Valve type: N.C.

VALUE	, vaiv	c type: it.o.				
Size, Valve type, Fluid	Body material, Port size	Voltage, Electrical entry, Electrical options	Other options	With Note) bracket		
VX230	Α	Α	Nil	Nil		
	В	В	Α	XC*		
	С	C	В	XB*		
	D	D	С	XNB*		
	E	E	D	X332*		
	F	F	E			
	G Note 1)	М	F			
	H Note 2)	N	G			
	J Note 2)	Р	Н			
	K Note 2)	Q	K			
	L Note 2)	R	L			
	M Note 2)	S	Z			
	Note 2)	T	Note 1) B	odv		
		- 11	1			

	l Note 1) Body
U	material/Port
٧	size: Since "with
W	bracket" setting
Υ	is not provided on G. "XB"
Z1A	cannot be
Z1B	selected.
Z1C	Note 2) Body material/Port
Z1U	size: Since the
Z1D	bracket is
Z1E	attached to H, J,
Z1K	K, L, M and N, "XB" cannot be
Z1L	selected.
Z1M	
Z1W	
Z1N	
Z1P	

Z1R
Z1Y
Z1S
Z1T
Z2K
Z2L
Z2M
Z2N
Z2P
Z2Q
Z2R
Z2S
Z2W
Z2T
Z3A
Z3B
Z3C
Z3D
Z3E
Z3F
Z3G

Z1T Z2K Z2L Z2M Z2N Z2P Z2Q Z2R Z2S Z2W Z2T Z3A Z3B Z3C Z3D Z3E Z3F Z3G Z3H

Z3V

Z3J

Z1Q Z1R Z1Y

Z1S

Z3J Refer to pages 49 to 51 for electrical options, other options, and bracket/electrical entry direction.

Z3H

Z3V



UL-compliant VX21/22/23 Series

VX2

VXK

VXD

VXZ VXS VXB VXE

VXP

VXR

VXH

VXF VX3 VXA

							For Water							
X212	Valv	e type: N.	c.		VX222	2 Valv	e type: N.	c.		VX232	Valv	e type: N.	c.	
Size, ve type, Fluid	Body material, Port	Voltage, Electrical entry, Electrical options	Other options	With bracket	Size, Valve type, Fluid	Body material, Port	Voltage, Electrical entry, Electrical options	Other	With bracket	Size, Valve type, Fluid	Body material, Port	Voltage, Electrical entry, Electrical options	Other options	W
X212	size	A	Nil	Nil	VX222	size	A	Nil	Nil	VX232	size	Α	Nil	_
~	В	В	A	XC*	.,,,	В	В	A	XC*	171202	В	В	Α	x
	c	c	В	XB*		D	C	В	XB*		С	C	В	X
	D	D	С	XNB*		E	D	С	XNB*		D	D	С	1X
	E	E	D	X332*		Н	E	D	X332*		E	E	D	X3
	F	F	Е			J	F	E			F	F	E	
	Н	М	F	1		L	М	F			G Note)	М	F	1
	J	N	G			М	N	G			Н	N	G	
	K	Р	Н				P	Н			J	P	Н	
	L	Q	K				Q	K			K	Q	K	
	M	R	L				R	L			L	R	L	
	N	S	Z]			S	Z			M	S	Z	
		T					T				N	T	Note) Boo	
		V					V				P Note)	U V	Port siz "with b	
		W					W					W	setting	
		Y					Y					Y	provide	ed or
		Z1A					Z1A					Z1A	and P, cannot	
		Z1B					Z1B					Z1B	selecte	
		Z1C	1				Z1C					Z1C		
		Z1U					Z1U					Z1U		
		Z1D	İ				Z1D					Z1D		
		Z1E					Z1E					Z1E		
		Z1K	1				Z1K	1				Z1K		
		Z1L					Z1L					Z1L		
		Z1M					Z1M					Z1M		
		Z1W					Z1W					Z1W		
		Z1N					Z1N					Z1N		
		Z1P	ļ				Z1P					Z1P		
		Z1Q					Z1Q					Z1Q		
		Z1R					Z1R					Z1R		
		Z1Y	ļ				Z1Y					Z1Y		
		Z1S Z1T					Z1S Z1T					Z1S Z1T		
		Z2K	-				Z2K					Z2K		
		Z2L					Z2L					Z2L		
		Z2M					Z2M					Z2M		
		Z2N					Z2N					Z2N		
		Z2P					Z2P					Z2P		
		Z2Q					Z2Q					Z2Q		
		Z2R	İ				Z2R					Z2R		
		Z2S	1				Z2S					Z2S		
		Z2W	1				Z2W					Z2W		
		Z2T					Z2T					Z2T		
		Z3A					Z3A					Z3A		
		Z3B					Z3B					Z3B		
		Z3C					Z3C					Z3C		
		Z3D					Z3D					Z3D		
		Z3E					Z3E					Z3E		
		Z3F					Z3F					Z3F		
		Z3G					Z3G					Z3G		
		Z3H Z3V					Z3H Z3V					Z3H Z3V		

Z3J Refer to pages 49 to 51 for electrical options, other options, and bracket/electrical entry direction.

Z3J

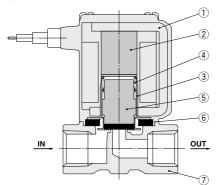


Z3J

Construction/Single Unit

Normally Closed (N.C.)

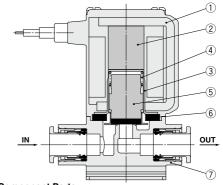
Body material: Aluminum, C37, Stainless steel



Component Parts

No.	Description	Material
1	Solenoid coil	Cu + Fe + Resin
2	Core	Fe
3	Tube	Stainless steel
4	Spring	Stainless steel
5	Armature assembly	NBR, FKM, Stainless steel, PPS
6	Seal	NBR, FKM
7	Body	Aluminum, C37, Stainless steel

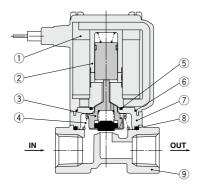
Body material: Resin



Component Parts

No.	Description	Material
1	Solenoid coil	Cu + Fe + Resin
2	Core	Fe
3	Tube	Stainless steel
4	Spring	Stainless steel
5	Armature assembly	NBR, FKM, Stainless steel, PPS
6	Seal	NBR, FKM
7	Body	Resin (PBT)

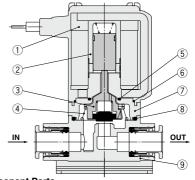
Normally Open (N.O.) Body material: Aluminum, C37, Stainless steel



Component Parts

No.	Description	Material
1	Solenoid coil	Cu + Fe + Resin
2	Sleeve assembly	Stainless steel, Resin (PPS)
3	Push rod assembly	Resin (PPS), Stainless steel, NBR, FKM
4	Spring	Stainless steel
5	O-ring A	NBR, FKM
6	O-ring B	NBR, FKM
7	Adapter	Resin (PPS)
8	O-ring C	NBR, FKM
9	Body	Aluminum, C37, Stainless steel

Body material: Resin

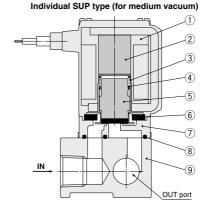


Component Parts

No	o. Description	Material
1	Solenoid coil	Cu + Fe + Resin
2	Sleeve assembly	Stainless steel, Resin (PPS)
3	Push rod assembly	Resin (PPS), Stainless steel, NBR, FKM
4	Spring	Stainless steel
5	O-ring A	NBR, FKM
6	O-ring B	NBR, FKM
7	Adapter	Resin (PPS)
8	O-ring C	NBR, FKM
9	Body	Resin (PBT)

Construction/Manifold

Normally Closed (N.C.) Base material: Aluminum 1 2 3 3 4 4



VX2 VXK VXD

VXZ

VXS

VXB

VXE VXP

VXR VXH VXF VX3

Component Parts

OUT

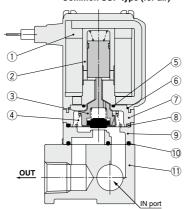
No.	Description	Material					
1	Solenoid coil	Cu + Fe + Resin					
2	Core	Fe					
3	Tube	Stainless steel					
4	Spring	Stainless steel					
5	Armature assembly	NBR, FKM, Stainless steel, PPS					
6	Seal	NBR, FKM					
7	Body	Resin (PPS)					
8	Gasket	NBR, FKM					
9	Base	Aluminum					

(9)

IN port

Normally Open (N.O.)

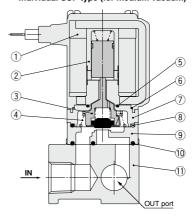
Base material: Aluminum Common SUP type (for air)



Component Parts

No.	Description	Material
1	Solenoid coil	Cu + Fe + Resin
2	Sleeve assembly	Stainless steel, Resin (PPS)
3	Push rod assembly	Resin (PPS), Stainless steel, NBR, FKM
4	Spring	Stainless steel
5	O-ring A	NBR, FKM
6	O-ring B	NBR, FKM

Individual SUP type (for medium vacuum)



No.	Description	Material
7	Adapter	Resin (PPS)
8	O-ring C	NBR, FKM
9	Body	Resin (PPS)
10	Gasket	NBR, FKM
11	Base	Aluminum



Dimensions/Body Material: Aluminum

Mounting hole

Mounting hole

Grommet Grommet (with surge voltage suppressor) Port size 2 x ø5.3 2 x ø5.3

DIN terminal Conduit terminal Cable ø6 to ø12 Q **Q**±2 S±2 œ В 2 x ø5.3 Mounting hole 2 x ø5.3

Mounting hole

													(mm)
Size	Port size		В	В.	B ₁ C		_	_	M	ounting I	bracket c	dimensio	ns
Size	P	A	_ B	D1	C	D		Г	M	U	W	X	Υ
1	1/8, 1/4	19	43	21	61 (67)	30	9.5	20	12.8	46	36	11	6
2	1/4, 3/8	24	45	22.5	76 (84)	35	12	22	19	56	46	13	7
	1/4, 3/8	24	45	22.5	81 (89)	40	12	24.5	19	56	46	13	7
3	1/2	30	50	25	86.5	40	15	24.5	_	_	_	_	_

						Electrical entry							
Size	Port size P	·	Grommet		Grommet voltage suppressor)		DIN terminal			Conduit	terminal		
		Q	R	Q	R	Q	R	S	Q	R	S	Т	
1	1/8, 1/4	27	42 (47.5)	30	28.5 (34)	64.5 34 (39.5)		52.5	99.5 36 (41.5)		68.5	77 (83)	
2	1/4, 3/8	29.5	53.5 (61.5)	32.5	39.5 (47.5)	67	45 (53)	55	102	47 (55)	71	91 (99)	
2	1/4, 3/8	32	58 (66)	35	44.5 (52.5)	69.5	50 (58)	57.5	104.5	52 (60)	73.5	96 (104)	
3	1/2	32	61	35	47.5	69.5	53	57.5	104.5	55	73.5	101.5	

^{():} Denotes the Normally Open (N.O.) dimensions.



VX2 VXK

VXD

VXZ

VXS

VXB

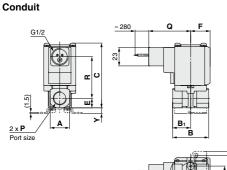
VXE

VXP

VXR

Dimensions/Body Material: Aluminum

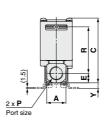
Dimensions/Body Material. Alammar

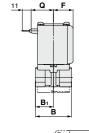


2 x ø5.3

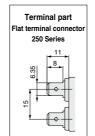
Mounting hole











VXH VXF VX3

VXA

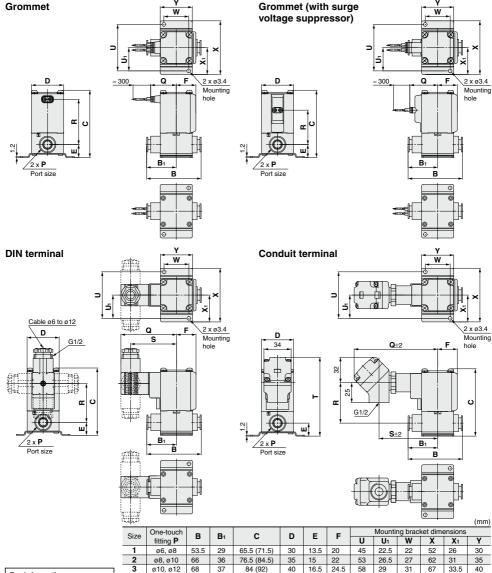
													(mm)
0:	Port size		В	B₁	_	D	_	_	M	lounting I	bracket c	dimensio	าร
Size	P	Α	-	D1	С	ן ט			М	U	W	Х	Y
1	1/8, 1/4	19	43	21	61 (67)	30	9.5	20	12.8	46	36	11	6
2	1/4, 3/8	24	45	22.5	76 (84)	35	12	22	19	56	46	13	7
3	1/4, 3/8	24	45	22.5	81 (89)	40	12	24.5	19	56	46	13	7
3	1/2	30	50	25	86.5	40	15	24.5	_	_	_	_	_

			Electric	al entry	
Size	Port size		Conduit	Flat	terminal type
	_ F	Q	R	Q	R
1	1/8, 1/4	47.5	36 (41.5)	23	42 (47.5)
2	1/4, 3/8	50	47 (55)	25.5	53.5 (61.5)
3	1/4, 3/8	52.5	52 (60)	28	58 (66)
3	1/2	52.5	55	28	61

^{():} Denotes the Normally Open (N.O.) dimensions.



Dimensions/Body Material: Resin



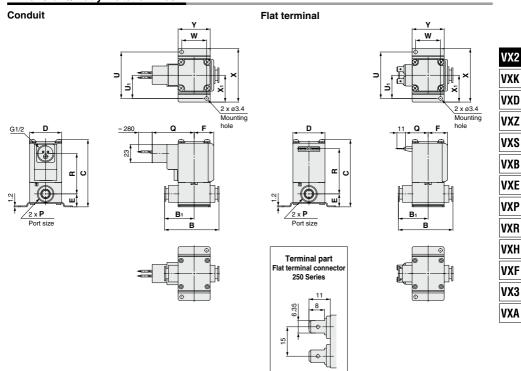
For information on handling One-touch fittings and on appropriate tubing, refer to page 76 and the Fittings & Tubing section of the "Handling Precautions for SMC Products" on the SMC website.

			Electrical entry											
Size	One-touch fitting P	G	irommet		net (with surge e suppressor)	1	DIN termina	I	Conduit terminal					
		Q	R	Q	R	Q	R	S	Q	R	S	Т		
1	ø6, ø8	27	42.5 (48)	30	29 (34.5)	64.5	34.5 (40)	52.5	99.5	36.5 (42)	68.5	81.5 (87)		
2	ø8, ø10	29.5	51 (59)	32.5	37 (45)	67	43 (50.5)	55	102	45 (52.5)	71	91.5 (99.5)		
3	ø10, ø12	32	56.5 (64.5)	35	43 (51)	69.5	48.5 (56.5)	57.5	104.5	50.5 (58.5)	73.5	98.5 (106.5)		

^{():} Denotes the Normally Open (N.O.) dimensions.

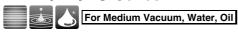


Dimensions/Body Material: Resin



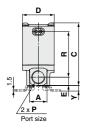
																	(mm)
	0 4								Anumain		leat alima				Electric	al entry	,
Size	One-touch fitting P	В	B₁	С	D	E	F Mounting bracket dimensions Conduit Flat terminal						at terminal				
	Illung F							U	U₁	W	X	X 1	Υ	Q	R	Q	R
1	ø6, ø8	53.5	29	65.5 (71.5)	30	13.5	20	45	22.5	22	52	26	30	47.5	36.5 (42)	23	42.5 (48)
2	ø8, ø10	66	36	76.5 (84.5)	35	15	22	53	26.5	27	62	31	35	50	45 (52.5)	25.5	51 (59)
3	a10 a12	68	37	84 (92)	40	16.5	24.5	58	20	31	67	33.5	40	52.5	50 5 (58 5)	28	56 5 (64 5)

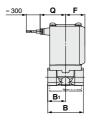
^{():} Denotes the Normally Open (N.O.) dimensions.



Dimensions/Body Material: C37, Stainless Steel

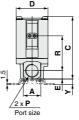
Grommet

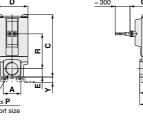






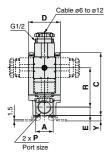
Grommet (with surge voltage suppressor)

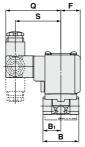


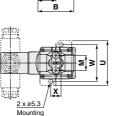




DIN terminal

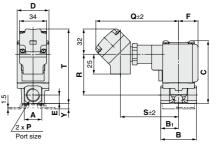


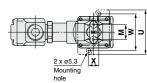




hole

Conduit terminal





													(11111)
Size	Port size		В	B₁	_	_	_	_	M	ounting l	bracket c	limensio	ns
Size	P	Α .	-	D1	С	ע	_		М	U	W	Х	Υ
1	1/8, 1/4	19	43	21	61 (67)	30	9.5	20	12.8	46	36	11	6
2	1/4, 3/8	22	45	22.5	74.5 (82.5)	35	10.5	22	19	56	46	13	7
•	1/4, 3/8	22	45	22.5	79 (87)	40	10.5	24.5	19	56	46	13	7
3	1/2	29.5	50	25	85.5	40	14	24.5	_	_	_	_	_

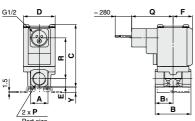
							Electrical entry					
Size	Port size		Grommet		met (with surge ge suppressor)		DIN terminal			Conduit	terminal	
		Q	R	Q	R	Q	R	S	Q	R	S	T
1	1/8, 1/4	27 42 (47.		30	28.5 (34)	64.5	34 (39.5)	52.5	99.5	36 (41.5)	68.5	77 (83)
2	1/4, 3/8	29.5	53.5 (61.5)	32.5	39.5 (47.5)	67	45 (53)	55	102	47 (55)	71	89.5 (97.5)
3	1/4, 3/8	32	57.5 (65.5)	35	44 (52)	69.5	49.5 (57.5)	57.5	104.5	51.5 (59.5)	73.5	94 (102)
	1/2	32	61	35	47.5	69.5	53	57.5	104.5	55	73.5	100.5

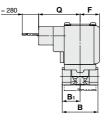
^{():} Denotes the Normally Open (N.O.) dimensions.

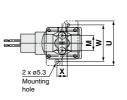


Dimensions/Body Material: C37, Stainless Steel

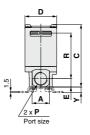
Conduit

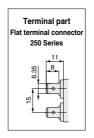


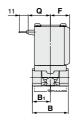


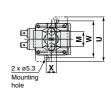


Flat terminal









VX3
VXA

VX2 VXK

VXD VXZ VXS

VXB

VXE

VXP **VXR**

VXH

VXF

													(mm)
Cine	Size Port size A B B1 C D E F										bracket o	dimensio	ns
Size	P	Α .	В	B1	C	ע		-	М	U	W	Х	Y
1	1/8, 1/4	19	43	21	61 (67)	30	9.5	20	12.8	46	36	11	6
2	1/4, 3/8	22	45	22.5	74.5 (82.5)	35	10.5	22	19	56	46	13	7
3	1/4, 3/8	22	45	22.5	79 (87)	40	10.5	24.5	19	56	46	13	7
3	1/2	29.5	50	25	85.5	40	14	24.5	_	-	_	_	_

	Port size		Electric	al entry			
Size	Port Size		Conduit	FI	lat terminal		
		Q	R	Q	R		
1	1/8, 1/4	47.5	36 (41.5)	23	42 (47.5)		
2	1/4, 3/8	50	47 (55)	25.5	53.5 (61.5)		
3	1/4, 3/8	52.5	51.5 (59.5)	28	57.5 (65.5)		
3	1/2	52.5	55	28	61		

^{():} Denotes the Normally Open (N.O.) dimensions.



Dimensions/Body Material: C37, Stainless Steel

Grommet Conduit terminal Q = 300Q±2 = 40 (42)E O œ For steam and heated water With full-wave rectifier (AC type only) **S**±2 Вı В В Port size Port size 2 x ø5.3 Mounting Mounting hole hole Conduit **DIN terminal** Q Cable ø6 to ø12 Q s = 280 G1/2 G1/2 (42)= 45 œ For steam and heated water Œ With full-wave rectifier (AC type only) XX В шЬ 2 x P Port size Port size 2 x ø5.3 Mounting 2 x ø5.3 hole Mounting hole (mm) Port size Mounting bracket dimensions Size Α В В С D Е F М U W 1 1/8, 1/4 19 43 21 61 (67) 30 9.5 20 12.8 46 36 11 6 74.5 (82.5) 2 1/4, 3/8 22 45 22.5 35 10.5 22 19 56 46 13 7 1/4, 3/8 22 45 22.5 79 (87) 40 10.5 24.5 19 56 46 13 7 3 29.5 50 25 85.5 40 24.5 1/2 14 Electrical entry Port size

Q

29.5

27

Grommet

42 (47.5)

53.5 (61.5)

57.5 (65.5)

61

Q

110.5

108

113

Size

1

2

Р

1/8, 1/4

1/4, 3/8

1/4, 3/8

Conduit terminal

R

36 (41.5)

47 (55)

51.5 (59.5)

s

79.5

77

82

82

77 (83)

89.5 (97.5)

94 (102)

100.5

DIN terminal

34 (39.5)

45 (53)

49.5 (57.5)

53

s

52.5

57.5

57.5

55

Q

64.5

69.5

69.5

67

Conduit

36 (41.5)

47 (55)

51.5 (59.5)

55

Q

47.5

52.5

52.5

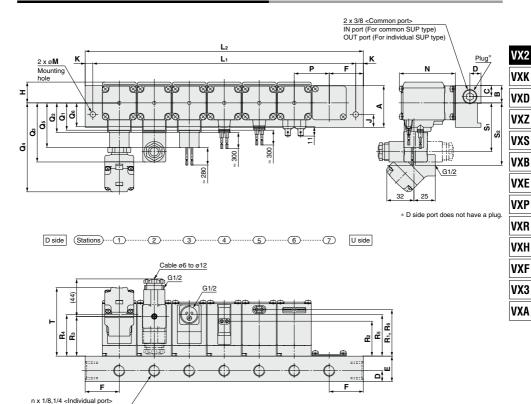
50

³² (): Denotes the Normally Open (N.O.) dimensions.

Flat terminal is not available for valves for steam and heated water.



Dimensions/Manifold/Base Material: Aluminum



										(mm)			
Size	S:i	n (stations)											
Size	Dimensions	2	3	4	5	6	7	8	9	10			
1	L ₁	86	122	158	194	230	266	302	338	374			
	L ₂	100	136	172	208	244	280	316	352	388			
2	L ₁	90	126	162	198	234	270	306	342	378			
	L ₂	108	144	180	216	252	288	324	360	396			
3	L ₁	103	144	185	226	267	308	349	390	431			
	L ₂	121	162	203	244	285	326	367	408	449			

	•		•	•	•				•		•	
Size	Α	В	С	D	Е	F	Н	J	K	М	N	Р
1	38	15.5	10.5	11	25	32	20	12	7	6.5	50.5 (56.5)	36
2	49	18	13	13	30	36	22	15	9	8.5	60.5 (68.5)	36
3	40	20.5	13	13	30	40	24.5	15	a .	Ω 5	65.5 (73.5)	41

Size	Grommet		net Grommet (With surge voltage suppressor)		DIN terminal*			Conduit terminal				Conduit		Flat terminal	
	Q ₁	R ₁	Q ₂	R ₂	Qз	Rз	S ₁	Q ₄	R ₄	S2	Т	Q ₅	R ₅	Q ₆	R ₆
1	27	40.5 (46.5)	30	27 (33)	64.5	32.5 (38.5)	52.5	99.5	34.5 (40.5)	68.5	66.5 (72)	47.5	34.5 (40.5)	23	40.5 (46.5)
2	29.5	49.5 (57.5)	32.5	36 (44)	67	41.5 (49.5)	55	102	43.5 (51.5)	71	75.5 (83.5)	50	43.5 (51.5)	25.5	49.5 (57.5)
3	32	54.5 (63)	35	41 (49)	69.5	46.5 (54.5)	57.5	104.5	48.5 (56.5)	73.5	80.5 (89.5)	52.5	48.5 (56.5)	28	54.5 (63)

^{():} Denotes the Normally Open (N.O.) dimensions.

OUT port (For common SUP type)
IN port (For individual SUP type)

^{*} When using a DIN terminal that faces downward, be careful of interference in the electrical wires and piping.





For Air, Medium Vacuum, Water, Oil and Steam

Replacement Parts

DIN Connector Part No.



<For Class B Coil>

Electrical option	Rated voltage	Connector part no.
	24 VDC	
	12 VDC	
	100 VAC	
	110 VAC	
None	200 VAC	C18312G6GCU
INOTIE	220 VAC	C10312G0GC0
	230 VAC	
	240 VAC	
	24 VAC	
	48 VAC	
	24 VDC	GDM2A-L5
	12 VDC	GDM2A-L6
	100 VAC	GDM2A-L1
	110 VAC	GDM2A-L1
Mith limbs	200 VAC	GDM2A-L2
With light	220 VAC	GDM2A-L2
	230 VAC	GDM2A-L2
	240 VAC	GDM2A-L2
	24 VAC	GDM2A-L5
	48 VAC	GDM2A-L15

<For Class H Coil>

CFOF Class in Coll>		
Electrical option	Rated voltage	Connector part no.
	24 VDC	GDM2A-G-S5
	100 VAC	
	110 VAC	
	200 VAC	
None	220 VAC	GDM2A-R
	230 VAC	GDWZA-R
	240 VAC	
	24 VAC	
	48 VAC	
	24 VDC	GDM2A-G-Z5
	100 VAC	GDM2A-R-L1
	110 VAC	GDM2A-R-L1
	200 VAC	GDM2A-R-L2
With light	220 VAC	GDM2A-R-L2
	230 VAC	GDM2A-R-L2
	240 VAC	GDM2A-R-L2
	24 VAC	GDM2A-R-L5
	48 VAC	GDM2A-R-L5

^{*} Select an appropriate DIN connector suitable for the coil insulation type.

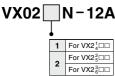
Gasket Part No. for DIN Connector

VCW20-1-29-1 (For Class B Coil) VCW20-1-29-1-F (For Class H Coil)

 Lead Wire Assembly for Flat Terminal (Set of 2 pcs.)

VX021S-1-16FB

Bracket Assembly Part No. (for Metal Body)



- * 2 mounting screws are shipped together with the bracket assembly.
- * On the bottom side of the standard body, there is no female thread for mounting a bracket. Please select XNB□.

Glossary of Terms

Pressure Terminology

1. Maximum operating pressure differential

The maximum pressure differential (the difference between the inlet and outlet pressure) which is allowed for operation. When the outlet pressure is 0 MPa, this becomes the maximum operating pressure.

2. Minimum operating pressure differential

The minimum pressure differential (the difference between the inlet pressure and outlet pressure) required to keep the main valve fully open.

3. Maximum system pressure

The maximum pressure that can be applied inside the pipelines (line pressure).

[The pressure differential of the solenoid valve portion must not exceed the maximum operating pressure differential.]

4. Withstand pressure

The pressure in which the valve must be withstood without a drop in performance after holding for one minute under prescribed pressure and returning to the operating pressure range. [value under the prescribed conditions]

Electrical Terminology

1. Apparent power (VA)

Volt-ampere is the product of voltage (V) and current (A). Power consumption (W): For AC, W = V·A·cos θ .

For DC, $W = V \cdot A$.

Note) $\cos \theta$ shows power factor. $\cos \theta \approx 0.9$

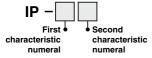
2. Surge voltage

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

3. Degree of protection

A degree defined in the "JIS C 0920: Waterproof test of electric machinery/appliance and the degree of protection against the intrusion of solid foreign objects."

Verify the degree of protection for each product.



●First Characteristics:

Degrees of protection against solid foreign objects

	egrees or protection against solid foreign objects
0	Non-protected
1	Protected against solid foreign objects of 50 mmø and greater
2	Protected against solid foreign objects of 12 mmø and greater
3	Protected against solid foreign objects of 2.5 mmø and greater
4	Protected against solid foreign objects of 1.0 mmø and greater
5	Dust-protected
6	Dust-tight Dust-tight

Electrical Terminology

Second Characteristics: Degrees of protection against water

ı	0	Non-protected	_
	1	Protected against vertically falling water drops	Dripproof type 1
	2	Protected against vertically falling water drops when enclosure tilted up to 15°	Dripproof type 2
ſ	3	Protected against rainfall when enclosure tilted up to 60°	Rainproof type
	4	Protected against splashing water	Splashproof type
	5	Protected against water jets	Water-jet-proof type
ſ	6	Protected against powerful water jets	Powerful water-jet-proof type
ſ	7	Protected against the effects of temporary immersion in water	Immersible type
	8	Protected against the effects of continuous immersion in water	Submersible type

Example) IP65: Dust-tight, Water-jet-proof type

"Water-jet-proof type" means that no water intrudes inside an equipment that could hinder from operating normally by means of applying water for 3 minutes in the prescribed manner. Take appropriate protection measures, since a device is not usable in an environment where a droplet of water is splashed constantly.

Others

1. Material

NBR: Nitrile rubber FKM: Fluororubber

EPDM: Ethylene propylene rubber

2. Oil-free treatment

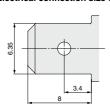
The degreasing and washing of wetted parts

3. Symbol

In the symbol (reliable), when the valve is closed, flow is blocked from port 1 to port 2. However, if the pressure in port 2 is higher than port 1, the valve will not be able to block the fluid and it will flow from port 2 to port 1.

Flat Terminal

Flat terminal/Electrical connection size of molded coil





VX2

VXK VXD

VXZ

VXB VXE

VXP

VXR

VXF

VX3

Solenoid Valve Flow Rate Characteristics

(How to indicate flow rate characteristics)

1. Indication of flow rate characteristics

The flow rate characteristics in equipment such as a solenoid valve, etc. are indicated in their specifications as shown in Table (1).

Table (1) Indication of Flow Rate Characteristics

Corresponding equipment	Indication by international standard	Other indications	Conformed standard
B	C, b	_	ISO 6358: 1989 JIS B 8390: 2000
Pneumatic equipment		s	JIS B 8390: 2000 Equipment: JIS B 8379, 8381-1, 8381-2
		Cv	ANSI/(NFPA)T3.21.3 R1-2008
Process fluid control	Kv	_	IEC60534-1: 2005 IEC60534-2-3: 1997 JIS B 2005-1: 2012
equipment	_	Cv	JIS B 2005-1: 2012 JIS B 2005-2-3: 2004 Equipment: JIS B 8471, 8472, 8473

2. Pneumatic equipment

- 2.1 Indication according to the international standards
- (1) Conformed standard

ISO 6358: 1989 : Pneumatic fluid power—Components using compressible fluids—

Determination of flow rate characteristics

JIS B 8390: 2000 : Pneumatic fluid power—Components using compressible fluids—

How to test flow rate characteristics

(2) Definition of flow rate characteristics

The flow rate characteristics are indicated as a result of a comparison between sonic conductance C and critical pressure ratio b.

- Sonic conductance C: Value which divides the passing mass flow rate of an equipment in a choked flow condition by the product of the upstream absolute pressure and the density in a
- Critical pressure ratio **b**: Pressure ratio (downstream pressure/upstream pressure) which will turn to a choked
 - flow when the value is smaller than this ratio.
- : The flow in which the upstream pressure is higher than the downstream pressure and Choked flow where sonic speed in a certain part of an equipment is reached.

Gaseous mass flow rate is in proportion to the upstream pressure and not dependent

on the downstream pressure.

Subsonic flow Standard condition : Flow greater than the critical pressure ratio

: Air in a temperature state of 20°C, absolute pressure 0.1 MPa (= 100 kPa = 1 bar),

relative humidity 65%.

It is stipulated by adding the "(ANR)" after the unit depicting air volume.

(standard reference atmosphere)

Conformed standard: ISO 8778: 1990 Pneumatic fluid power—Standard reference atmosphere, JIS B 8393: 2000: Pneumatic fluid power—Standard reference atmosphere

(3) Formula for flow rate

It is described by the practical units as following.

When

$$\frac{P_{2} + 0.1}{P_{1} + 0.1} \le b$$
, choked flow

$$\mathbf{Q} = 600 \times \mathbf{C} (\mathbf{P}_1 + 0.1) \sqrt{\frac{293}{273 + \mathbf{T}}}$$
(1)

When

$$\frac{{\bf P}_{2}+0.1}{{\bf P}_{1}+0.1}>{\bf b}$$
, subsonic flow

$$\mathbf{Q} = 600 \times \mathbf{C} (\mathbf{P}_1 + 0.1) \sqrt{1 - \left[\frac{\mathbf{P}_2 + 0.1}{\mathbf{P}_1 + 0.1} - \mathbf{b} \right]^2 \sqrt{\frac{293}{273 + \mathbf{T}}}}$$
(2)

Solenoid Valve Flow Rate Characteristics VX21/22/23 Series

Q: Air flow rate [L/min (ANR)]

C: Sonic conductance [dm³/(s·bar)], dm³ (Cubic decimeter) of SI = L (liter).

b : Critical pressure ratio [—]

P1: Upstream pressure [MPa]

P₂: Downstream pressure [MPa]

T: Temperature [°C]

Note) Formula of subsonic flow is the elliptic analogous curve.

Flow rate characteristics are shown in Graph (1) For details, please use the calculation software available from SMC website.

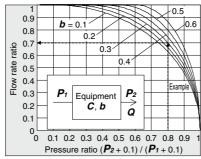
Example)

Obtain the air flow rate for $P_1 = 0.4$ [MPa], $P_2 = 0.3$ [MPa], T = 20 [°C] when a solenoid valve is performed in C = 2 [dm³/(s·bar)] and D = 0.3.

According to formula 1, the maximum flow rate = $600 \times 2 \times (0.4 + 0.1) \times \sqrt{\frac{293}{273 + 20}} = 600 \text{ [L/min (ANR)]}$

Pressure ratio =
$$\frac{0.3 + 0.1}{0.4 + 0.1} = 0.8$$

Based on Graph (1), it is going to be 0.7 if it is read by the pressure ratio as 0.8 and the flow ratio to be $\mathbf{b} = 0.3$. Hence, flow rate = Max. flow x flow ratio = $600 \times 0.7 = 420$ [L/min (ANR)]



Graph (1) Flow rate characteristics

(4) Test method

Attach a test equipment with the test circuit shown in Fig. (1) while maintaining the upstream pressure to a certain level which does not go below 0.3 MPa. Next, measure the maximum flow to be saturated in the first place, then measure this flow rate at 80%, 60%, 40%, 20% and the upstream and downstream pressure. And then, obtain the sonic conductance \bf{C} from this maximum flow rate. In addition, calculate \bf{b} using each data of others and the subsonic flow formula, and then obtain the critical pressure ratio \bf{b} from that average.

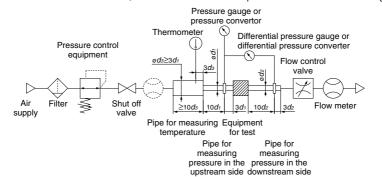


Fig. (1) Test circuit based on ISO 6358: 1989, JIS B 8390: 2000



VX2

VXK

VXD

VXZ VXS

VXB

VXE

VXP

VXR

VXH

VXF

VX3

2.2 Effective area S

(1) Conformed standard

JIS B 8390: 2000: Pneumatic fluid power—Components using compressible fluids—

Determination of flow rate characteristics

Equipment standards: JIS B 8373: Solenoid valve for pneumatics

JIS B 8379: Silencer for pneumatics

JIS B 8381-1: Fittings for pneumatics—Part 1: Push-in fittings for thermoplastic resin tubing JIS B 8381-2: Fittings for pneumatics—Part 2: Compression fittings for thermoplastic resin tubing

(2) Definition of flow rate characteristics

Effective area **S**: The cross-sectional area having an ideal throttle without friction deduced from the calculation of the pressure changes inside an air tank or without reduced flow when discharging the compressed air in a choked flow, from an equipment attached to the air tank. This is the same concept representing the "easy to run through" as sonic conductance **C**.

(3) Formula for flow rate

When

$$\frac{P_{2} + 0.1}{P_{1} + 0.1}$$
 0.5, choked flow

$$Q = 120 \times S (P_1 + 0.1) \sqrt{\frac{293}{273 + T}}$$
 (3)

When

$$\frac{P_{2} + 0.1}{P_{1} + 0.1} > 0.5$$
, subsonic flow

$$P_1 + 0.1$$

 $Q = 240 \times S \sqrt{(P_2 + 0.1) (P_1 - P_2)} \sqrt{\frac{293}{273 + T}}$ (4)

Conversion with sonic conductance C:

Q : Air flow rate[L/min(ANR)]

S: Effective area [mm²]

P1: Upstream pressure [MPa]

P2: Downstream pressure [MPa]

T: Temperature [°C]

Note) Formula for subsonic flow (4) is only applicable when the critical pressure ratio \boldsymbol{b} is the unknown equipment. In the formula (2) by the sonic conductance \boldsymbol{c} , it is the same formula as when $\boldsymbol{b} = 0.5$.

(4) Test method

Attach a test equipment with the test circuit shown in Fig. (2) in order to discharge air into the atmosphere until the pressure inside the air tank goes down to 0.25 MPa (0.2 MPa) from an air tank filled with the compressed air at a certain pressure level (0.5 MPa) which does not go below 0.6 MPa. At this time, measure the discharging time and the residual pressure inside the air tank which had been left until it turned to be the normal values to determine the effective area S, using the following formula. The volume of an air tank should be selected within the specified range by corresponding to the effective area of an equipment for test. In the case of JIS B 8379, the pressure values are in parentheses and the coefficient of the formula is 12.9.

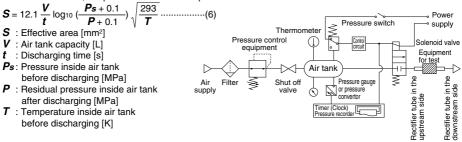


Fig. (2) Test circuit based on JIS B 8390: 2000

Solenoid Valve Flow Rate Characteristics VX21/22/23 Series

2.3 Flow coefficient CV factor

The United States Standard ANSI/(NFPA)T3.21.3: R1-2008R: Pneumatic fluid power—Flow rating test procedure and reporting method for fixed orifice components

This standard defines the Cv factor of the flow coefficient by the following formula that is based on the test conducted by the test circuit analogous to ISO 6358.

$$Cv = \frac{Q}{114.5\sqrt{\frac{\Delta P (P_2 + P_3)}{T_1}}}$$
 (7)

 ΔP : Pressure drop between the static pressure tapping ports [bar]

P₁: Pressure of the upstream tapping port [bar gauge]

 P_2 : Pressure of the downstream tapping port [bar gauge]: $P_2 = P_1 - \Delta P$

Q: Flow rate [L/s standard condition]

Pa: Atmospheric pressure [bar absolute]

T₁: Upstream absolute temperature [K]

Test conditions are $< P_1 + P_2 = 6.5 \pm 0.2$ bar absolute, $T_1 = 297 \pm 5$ K, 0.07 bar $\le \Delta P$ 0.14 bar.

This is the same concept as effective area **A** which ISO 6358 stipulates as being applicable only when the pressure drop is smaller than the upstream pressure and the compression of air does not become a problem.

3. Process fluid control equipment

(1) Conformed standard

IEC60534-1: 2005: Industrial-process control valves. Part 1: control valve terminology and general considerations

IEC60534-2-3: 1997: Industrial-process control valves. Part 2: Flow capacity, Section Three-Test procedures

JIS B 2005-1: 2012: Industrial-process control valves – Part 1: Control valve terminology and general considerations JIS B 2005-2-3: 2004: Industrial-process control valves – Part 2: Flow capacity – Section 3: Test procedures Equipment standards: JIS B 8471: Solenoid valve for water

JIS B 8472: Solenoid valve for steam
JIS B 8473: Solenoid valve for fuel oil

(2) Definition of flow rate characteristics

Kv factor: Value of the clean water flow rate represented by m³/h that runs through the valve (equipment for test) at 5 to 40°C, when the pressure difference is 1 x 105 Pa (1 bar). It is calculated using the following formula:

$$\mathbf{K}\mathbf{v} = \mathbf{Q}\sqrt{\frac{1\times10^5}{\Delta\mathbf{P}}\cdot\frac{\rho}{1000}}$$
....(8)

Kv: Flow coefficient [m3/h]

Q: Flow rate [m3/h]

 ΔP : Pressure difference [Pa]

 ρ : Density of fluid [kg/m³]

(3) Formula of flow rate

It is described by the practical units. Also, the flow rate characteristics are shown in Graph (2).

In the case of liquid:

$$\mathbf{Q} = 53\mathbf{K}\mathbf{v}\sqrt{\frac{\Delta \mathbf{P}}{\mathbf{G}}} \tag{9}$$

Q: Flow rate [L/min]

Kv: Flow coefficient [m3/h]

△**P**: Pressure difference [MPa]

G: Relative density [water = 1]

In the case of saturated aqueous vapor:

$$Q = 232 Kv \sqrt{\Delta P(P_2 + 0.1)}$$
(10)

Q: Flow rate [kg/h]

Kv: Flow coefficient [m3/h]

△P: Pressure difference [MPa]

 P_1 : Upstream pressure [MPa]: $\Delta P = P_1 - P_2$

P2: Downstream pressure [MPa]

VX2

VXK

VXD VXZ

VXS

VXB

VXE

VXP

VXR

VXH

VXF

VX3

Conversion of flow coefficient:

 $Kv = 0.865 \ Cv$ (11)

Here.

Cv factor: Value of the clean water flow rate represented by US gal/min that runs through the valve at 40 to 100°F, when the pressure difference is 1 lbf/in² (psi)

Value is different from **Kv** and **Cv** factors for pneumatic purpose due to different test method.

(4) Test method

Connect the equipment for the test to the test circuit shown in Fig. (3), and run water at 5 to 40°C. Then, measure the flow rate with a pressure difference where vaporization does not occur in a turbulent flow (pressure difference of 0.035 MPa to 0.075 MPa when the inlet pressure is within 0.15 MPa to 0.6 MPa). However, as the turbulent flow is definitely caused, the pressure difference needs to be set with a large enough difference so that the Reynolds number does not fall below 1 x 105, and the inlet pressure needs to be set slightly higher to prevent vaporization of the liquid. Substitute the measurement results in formula (8) to calculate **Kv**.

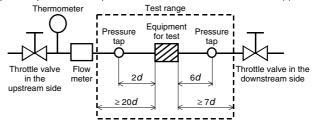
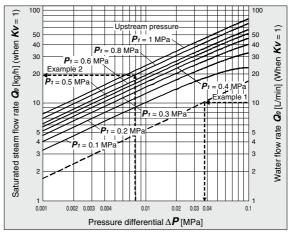


Fig. (3) Test circuit based on IEC60534-2-3, JIS B 2005-2-3



Graph (2) Flow rate characteristics

Example 1)

Obtain the pressure difference when water [15 L/min] runs through the solenoid valve with a $Kv = 1.5 \text{ m}^3\text{/h}$. As the flow rate when Kv = 1 is calculated as the formula: $Q_0 = 15 \times 1/1.5 = 10$ [L/min], read off ΔP when Q_0 is 10 [L/min] in Graph (2). The reading is 0.036 [MPa].

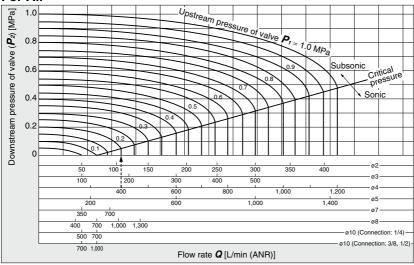
Example 2)

Obtain the saturated steam flow rate when $P_1 = 0.8$ [MPa] and $\Delta P = 0.008$ [MPa] with a solenoid valve with a Kv = 0.05 [m³/h]. Read off Q_0 when P_1 is 0.8 and ΔP is 0.008 in Graph (2), the reading is 20 kg/h. Therefore, the flow rate is calculated as the formula: $Q = 0.05/1 \times 20 = 1$ [kg/h].

Flow Rate Characteristics 1

Note) Use this graph as a guide. In the case of obtaining an accurate flow rate, refer to pages 66 through to 70.

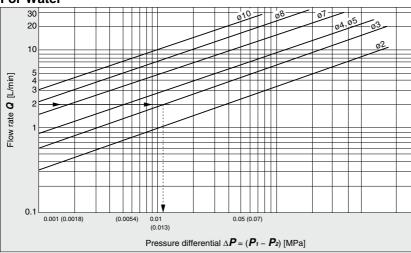
For Air



How to read the graph

The sonic range pressure to generate a flow rate of 400 L/min (ANR) is $P_1 \approx 0.2$ MPa for a ø4 orifice and $P_1 \approx 0.58$ MPa for a ø3 orifice.

For Water



How to read the graph

When a water flow of 2 L/min is generated, $\Delta P \approx 0.013$ MPa for a valve with ø3 orifice.

VX2

VXK

VXD VXZ

VXS

VXB

VXP

VXR

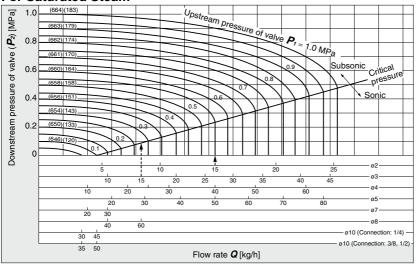
VXH

VX3

Flow Rate Characteristics 2

Note) Use this graph as a guide. In the case of obtaining an accurate flow rate, refer to pages 66 through to 70.

For Saturated Steam



How to read the graph

The sonic range pressure to generate a flow rate of 15 kg/h is P1 ≈ 0.55 MPa for a Ø2 orifice and P1 ≈ 0.28 MPa for a Ø3 orifice.



Be sure to read this before handling the products.

Refer to back page 50 for Safety Instructions and pages 17 to 19 for 2 Port Solenoid Valve for Fluid Control Precautions.

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

If the product is to be in a continuously energized state, please consult SMC beforehand.

The solenoid coil will generate heat when continuously energized. Avoid using in a tightly shut container. Install it in a well ventilated area. Furthermore, do not touch it while it is being energized or right after it is energized.

3. Liquid rings

In cases with a flowing liquid, provide a bypass valve in the system to prevent the liquid from entering the liquid seal circuit.

4. Actuator drive

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.

5. Pressure (including vacuum) holding

It is not usable for an application such as holding the pressure (including vacuum) inside of a pressure vessel because air leakage is entailed in a valve.

- 6. When the conduit type is used as equivalent to an IP65 enclosure, install a wiring conduit etc.
- When an impact, such as water hammer etc., caused by the rapid pressure fluctuation is applied, the solenoid valve may be damaged. Give an attention to it.

Selection

△ Warning

1. Fluid

1) Type of fluid

Before using a fluid, check whether it is compatible with the materials of each model by referring to the fluids listed in this catalog. Use a fluid with a kinematic viscosity of 50 mm²/s or less. If there is something you do not know, please contact SMC.

2) Flammable oil, Gas

Do not use the product with combustion-supporting or flammable fluids.

3) Corrosive gas

Cannot be used since it will lead to cracks by stress corrosion or result in other incidents.

- 4) When a brass body is used, then depending on water quality, corrosion and internal leakage may occur. If such abnormalities occur, exchange the product for a stainless steel body.
- Use an oil-free specification when any oily particle must not enter the passage.
- 6) Applicable fluid on the list may not be used depending on the operating condition. Give adequate confirmation, and then determine a model, just because the compatibility list shows the general case.

Selection

⚠ Warning

2. Fluid quality

<Air>

1) Use clean air.

Do not use compressed air that contains chemicals, synthetic oils including organic solvents, salt or corrosive gases, etc., as it can cause damage or malfunction.

VX2

VXK

VXD

VXZ

VXS

VXB

VXE

VXP

VXR

VXH

VXF

VX3

VXA

2) Install an air filter.

Install air filters close to the valves on the upstream side. A filtration degree of 5 μ m or less should be selected.

3) Install an aftercooler or air dryer, etc.

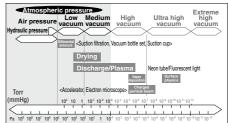
Compressed air that contains excessive drainage may cause malfunction of valves and other pneumatic equipment. To prevent this, install an aftercooler or air dryer, etc.

4) If excessive carbon powder is generated, eliminate it by installing mist separators at the upstream side of valves. If excessive carbon powder is generated by the compressor, it may adhere to the inside of the valves and cause a malfunction.

Refer to Best Pneumatics No.5 for further details on compressed air quality.

<Vacuum>

Please be aware that there is a range of pressure that can be used.



Vacuum piping direction: if the system uses a vacuum pump, we ask that you install the vacuum pump on the secondary side. Also, install a filter on the primary side, and be careful that no foreign object is picked up.

Please replace the valve after operating the device approximately 300,000 times.

SMC



Be sure to read this before handling the products.
Refer to back page 50 for Safety Instructions and pages 17 to 19 for 2 Port Solenoid Valve for Fluid Control Precautions.

Selection

.⚠Warning

<Water>

Be aware that rust stains, chloride separation, etc., from the piping may cause malfunction, leakage, or, in worse case scenarios, damage due to corrosion. Also, such damage may result in the spraying of fluids or scattering of parts. Please be sure to have protective measures in place in case such incidents should occur.

The use of a fluid that contains foreign objects can cause problems such as malfunction and seal failure by promoting wear of the valve seat and armature 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 100 mesh.

The supply water includes materials that create a hard sediment or sludge such as calcium and magnesium. Since this scale and sludge can cause the valve to malfunction, install water softening equipment, and a filter (strainer) directly upstream from the valve to remove these substances.

Tap water pressure:

The water pressure for tap water is normally 0.4 MPa or less. However, in places like a high-rise building, the pressure may be 1.0 MPa. When selecting tap water, be careful of the maximum operating pressure differential.

When using water or heated water, poor operation or leaks may be caused by dezincification, erosion, corrosion, etc. The brass (C37) body of this product uses dezincification resistant material as a standard. We also offer a stainless steel body type with improved corrosion resistance. Please use the one that fits your needs.

<0il>

Generally, FKM is used as seal material, as it is resistant to oil. The resistance of the seal material may deteriorate depending on the type of oil, manufacturer or additives. Check the resistance before using. The kinematic viscosity must not exceed 50 mm²/s.

<Steam:

The use of a steam that contains foreign objects can cause problems such as malfunction and seal failure by promoting wear of the valve seat and armature, and by sticking to the sliding parts of the armature etc. Install a suitable filter (strainer) immediately upstream from the valve.

As a standard, the mesh count for the strainer is 100 mesh. However, the size and shape of foreign objects that occur depends on the operating environment. Check the fluid status and choose an appropriate mesh count.

The supply water to a boiler includes materials that create a hard sediment or sludge such as calcium and magnesium.

Sediment and sludge from steam can cause the valve to not operate properly. Install a water softening device, which removes these materials. Do not use operation steam which contains chemicals, synthetic oils containing organic solvents, salts or corrosive gases, etc., as these can cause damage or deterioration.

The seal material (special FKM) used for wetted parts of the product can withstand steam in standard conditions.

However, the resistance of the sealing material can deteriorate depending on the types of additives such as boiler compounds and water conditioners within the boiler steam. Please only utilize the product after determining the sealing material resistance within the actual usage conditions.

3. Ambient environment

Use within the operable ambient temperature range. Check the compatibility between the product's composition materials and the ambient atmosphere. Be certain that the fluid used does not touch the external surface of the product.

4. Countermeasures against static electricity

Take measures to prevent static electricity since some fluids can cause static electricity.

Selection

∧ Warning

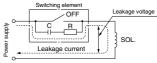
5. Low temperature operation

- The valve can be used in an ambient temperature of between -20 to -10°C. However, take measures to prevent freezing or solidification of impurities, etc.
- 2) When using valves for water application in cold climates, take appropriate countermeasures to prevent the water from freezing in tubing after cutting the water supply from the pump, by draining the water etc. When warming by a heater etc., be careful not to expose the coil portion to a heater. Installation of a dryer, heat retaining of the body is recommended to prevent a freezing condition in which the dew point temperature is high and the ambient temperature is low, and the high flow runs.

⚠ Caution

1. Leakage voltage

When the solenoid valve is operated using the controller, etc., the leakage voltage should be the product allowable leakage voltage or less. 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, C-R element, etc., creating a possible danger that the valve may not turn off.



AC coil: 5% or less of rated voltage DC coil: 2% or less of rated voltage

2. Selecting model

Material depends on fluid. Select optimal models for the fluid.

3. When the fluid is oil.

The kinematic viscosity must not exceed 50 mm²/s.

Mounting

⚠ Warning

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

After mounting is completed, confirm that it has been done correctly by performing a suitable function test.

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

When tightening is performed, apply a wrench or other tool to the outside of the piping connection parts.

Mount a valve with its coil position upward, not downward.

When mounting a valve with its coil positioned downward, foreign objects in the fluid will adhere to the iron core leading to a malfunction. Especially for strict leakage control, such as with vacuum applications and non-leak specifications, the coil must be positioned upward.

4. Do not warm the coil assembly with a heat insulator

Use tape, heaters, etc., for freeze prevention on the piping and body only. They can cause the coil to burn out.





Be sure to read this before handling the products.
Refer to back page 50 for Safety Instructions and pages 17 to 19 for 2 Port Solenoid Valve for Fluid Control Precautions.

Mounting

⚠Warning

- 5. Secure with brackets, except in the case of steel piping and copper fittings.
- 6. Avoid sources of vibration, or adjust the arm from the body to the minimum length so that resonance will not occur.

7. Painting and coating

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

Disassembly/Assembly Procedures

⚠ Caution

 Before starting the disassembly work, be sure to shut off the power supply and pressure supply, and then release the residual pressure.

Disassembly

<N.C.>

1) Loosen the mounting screws.

The coil assembly, seal, return spring, armature assembly and body can be removed.

<N.O.>

1) Loosen the mounting screws.

The coil assembly, push rod assembly, O-rings, adapter and body can be removed.

Assembly

<Common to N.C. and N.O.>

- Mount the components on the body in the reverse order of disassembly.
- When changing the electrical entry direction, turn the coil assembly in a desired direction to mount it.
- 3) Push the coil assembly against the body and tighten the screws two or more rounds diagonally (Fig. 2) in the status that there are no gaps between the coil assembly and body (Fig. 1).

Tighten the screws in the order of " $1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 1 \rightarrow 2 \rightarrow 3 \rightarrow 4$ ".

Proper Tightening Torque (N·m)

rioper rigitiening rolque (N-III)		
VX21	0.5	
VX22	0.7	
VX23	0.7	

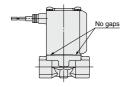




Fig.1 Fig.2

- After tightening the screws, make sure that there are no gaps between the coil and body (Fig. 1).
- * After the disassembly and assembly have been completed, make sure that no leak occurs from the seal. Additionally, when restarting the valve, make sure that the valve operates correctly after checking the safety.

Disassembly/Assembly Procedures

VX2

VXK

VXD

VXZ

VXS

VXB

VXE

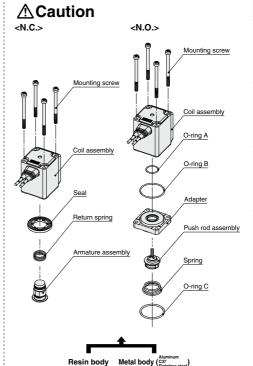
VXP

VXR

VXH

VXF

VX3





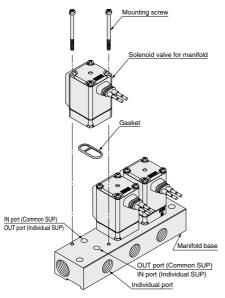


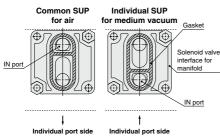
Be sure to read this before handling the products.
Refer to back page 50 for Safety Instructions and pages 17 to 19 for 2 Port Solenoid Valve for Fluid Control Precautions.

Disassembly/Assembly Procedures

∧ Caution

Manifold Exploded View





- * Mounting orientation exists when mounting valves onto manifold base Mount it as shown above.
- * Take great care when special electrical entry direction (XC) is used.

Piping

⚠Warning

 During use, deterioration of the tube or damage to the fittings could cause tubes to come loose from their fittings and thrash about.

To prevent uncontrolled tube movement, install protective covers or fasten tubes securely in place.

For piping the tube, fix the product securely using the mounting holes so that the product is not in the air.

.↑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. Avoid pulling, compressing, or bending the valve body when piping.

- Avoid connecting ground lines to piping, as this may cause electric corrosion of the system.
- Always tighten threads with the proper tightening torque.

When using steel piping, tighten with the proper tightening torque shown below.

Lower tightening torque will lead into fluid leakage.

Tightening Torque for Piping

Thread size	Proper tightening torque (N·m)
Rc1/8	7 to 9
Rc1/4	12 to 14
Rc3/8	22 to 24
Rc1/2	28 to 30

4. Connection of piping to products

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

5. Winding of sealant tape

When connecting pipes, fittings, etc., be sure that chips from the pipe threads and sealing material do not enter the valve.

Furthermore, when sealant tape is used, leave 1.5 to 2 thread ridges exposed at the end of the threads.



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



Be sure to read this before handling the products.

Refer to back page 50 for Safety Instructions and pages 17 to 19 for 2 Port Solenoid Valve for Fluid Control Precautions.

Recommended Piping Conditions

 When connecting tubes using One-touch fittings, provide some spare tube length shown in Fig. 1, recommended piping configuration.

Also, do not apply external force to the fittings when binding tubes with bands etc. (see Fig. 2.)

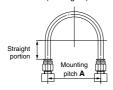


Fig. 1 Recommended piping configuration

Unit: mm

Tube	Mounting pitch A		Straight	
size	Nylon tubing	Soft nylon tubing	Polyurethane tubing	portion length
ø1/8"	44 or more	29 or more	25 or more	16 or more
ø6	84 or more	39 or more	39 or more	30 or more
ø1/4"	89 or more	56 or more	57 or more	32 or more
ø8	112 or more	58 or more	52 or more	40 or more
ø10	140 or more	70 or more	69 or more	50 or more
ø12	168 or more	82 or more	88 or more	60 or more

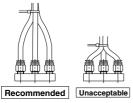


Fig. 2 Binding tubes with bands

Wiring

⚠ Warning

- The solenoid valve is an electrical product. For safety, install an appropriate fuse and circuit breaker before use.
- Do not apply AC voltage to Class "H" coil AC type unless it is built in full-wave rectifier, or the coil will be damaged.

⚠ Caution

As a rule, use electrical wire with a cross sectional area of 0.5 to 1.25 mm² for wiring.

Enthempton of the second

Furthermore, 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.
- 4. When a surge from the solenoid affects the electrical circuitry, install a surge voltage suppressor etc., in parallel with the solenoid. Or, adopt an option that comes with the surge voltage protection circuit. (However, a surge voltage occurs even if the surge voltage protection circuit is used. For details, please consult with SMC.)

VX2

VXK

VXD VXZ

VXS

VXB

VXE

VXR

VXH

VXF

VX3

VXA

77 A



Be sure to read this before handling the products. Refer to back page 50 for Safety Instructions and pages 17 to 19 for 2 Port Solenoid Valve for Fluid Control Precautions.

Operating Environment

⚠ Warning

- 1. Be sure to have appropriate protective measures in place when installed in environments where there is the constant presence of water, such as water spray, condensation, high humidity, etc. This product has an IP65 protective construction; however, when used in the above-mentioned environments, liquid may find its way inside the enclosure through microscopic gaps, possibly resulting in the burning out, short-circuiting, or ignition of coils.
- 2. Do not use in an atmosphere having corrosive gases, chemicals, sea water, or where there is direct contact with any of these.
- 3. Do not use in explosive atmospheres.
- 4. Do not use in locations subject to vibration or impact.
- 5. Do not use in locations where radiated heat will be received from nearby heat sources.
- 6. Employ suitable protective in locations where there is contact with oil or welding spatter, etc.

Maintenance

∕∿Warning

1. Removing the product

The valve will reach a high temperature when used with high temperature fluids. Confirm that the valve temperature has dropped 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) Shut off the power supply.
- 3) Dismount the product.

2. Low frequency operation

Switch valves at least once every 30 days to prevent malfunction. Also, in order to use it under the optimum state, conduct a regular inspection once a half year.

∕ Caution

1. Filters and strainers

- 1) Be careful regarding clogging of filters and strainers.
- 2) Replace filter elements after one year of use, or earlier if the pressure drop reaches 0.1 MPa.
- 3) Clean strainers when the pressure drop reaches 0.1 MPa.

2. Lubrication

When using after lubricating, never forget to lubricate continuously.

3. Storage

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

4. Exhaust the drainage from an air filter periodically.

Operating Precautions

⚠ Warning

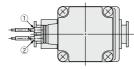
- 1. If there is a possibility of reverse pressure being applied to the valve, take countermeasures such as mounting a check valve on the downstream side of the valve.
- 2. When problems are caused by a water hammer, install water hammer relief equipment (accumulator etc.), or use an SMC water hammer relief valve (VXR series). For details, please consult with SMC.

Electrical Connections

⚠ Caution

■ Grommet

Class B coil: AWG20 Insulator O.D. 2.6 mm Class H coil: AWG18 Insulator O.D. 2.1 mm



Rated	Lead wi	re color
voltage	1	2
DC	Black	Red
100 VAC	Blue	Blue
200 VAC	Red	Red
Other AC	Gray	Gray

* There is no polarity.

■ DIN terminal Disassembly

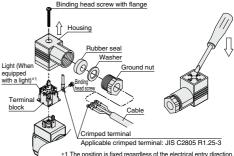
- 1. After loosening the binding head screw with flange, then if the housing is pulled in the direction of the arrow, the connector will be removed from the solenoid valve.
- 2. Pull out the binding head screw with flange from the housing.
- 3. There is a cutout on the bottom of the terminal block. Insert a small flat head screwdriver, etc. into this cutout, and remove the terminal block from the housing. (See figure below.)
- 4. Remove the ground nut, and pull out the washer and the rubber seal.
- 1. Pass the cable through the ground nut, washer and rubber seal in this order, and insert these parts into the housing.
- 2. Loosen the binding head screw of the terminal block, then insert the core wire or the crimped terminal of the lead wire into the terminal, and securely fix it with the binding head screw. The binding head screw of the terminal block is M3.

Note 1) Tighten the screw to a torque of between 0.5 and 0.6 N·m. Note 2) Cable O.D.: ø6 to ø12 mm

Note 3) For an outside cable diameter of ø9 to 12 mm, remove the internal parts of the rubber seal before using.

Assembly

- 1. Pass the cable through the ground nut, washer, rubber seal and the housing in this order, and connect to the terminal block. Then, set the terminal block inside the housing. (Push in the terminal block until it snaps into position.)
- 2. Insert the rubber seal and the washer in this order into the cable entry of the housing, and then tighten the ground nut securely.
- 3. Insert the gasket between the bottom part of the terminal block and the plug attached to the equipment, and then insert the binding head screw with flange from the top of the housing, and tighten it. Note 1) Tighten the screw to a torque of between 0.5 and 0.6 N·m.
 - Note 2) The orientation of the connector can be changed in steps of 90° by changing the method of assembling the housing and the terminal block.





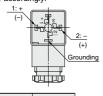
Be sure to read this before handling the products.

Refer to back page 50 for Safety Instructions and pages 17 to 19 for 2 Port Solenoid Valve for Fluid Control Precautions.

Electrical Connections

Caution

Internal connections are as shown below. Make connections to the power supply accordingly.



Terminal no.	1	2
DIN terminal	+(-)	-(+)
* There is no polarity.		

■ Conduit terminal

Disassembly

 Loosen the mounting screw, and remove the terminal cover from the conduit terminal.

Wiring

- 1. Insert the cable into the conduit terminal.
- Loosen the screw with UP terminal of the conduit terminal, then insert the core wire or the crimped terminal of the lead wire into the terminal, and securely fix it with the screw with UP terminal. Note 1) Tighten the screw to a torque of between 0.5 and 0.6 N·m.

Assembly

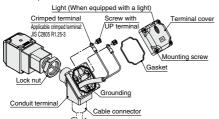
 Insert the gasket into the conduit terminal, and then clamp the terminal cover with the mounting screw.

Note 1) Tighten the screw to a torque of between 0.5 and 0.6 N·m.

Note 2) When changing the orientation of the conduit terminal,
carry out the following procedure.

- Apply a tool (monkey wrench, spanner, etc.) to the width across flats of the conduit terminal, and turn the terminal in the counterclockwise direction.
- 2. Loosen the lock nut.
- Turn the conduit terminal in the clamping direction (clockwise direction) to about 15° ahead of the desired position.
- Turn the lock nut by hand to the coil side until it is lightly tightened.
- 5. Apply a tool to the width across flats of the conduit terminal, and turn it to the desired position (through an angle of about 15°) so as to clamp the conduit terminal.

Note) When changing the orientation by applying additional tightening force to the conduit terminal from the factory-set position, turn no more than one half a turn.



⚠ Caution

■ Conduit terminal

Make connections according to the marks shown below.

- Use the tightening torques below for each section.
- Properly seal the terminal connection (G1/2) with the special wiring conduit etc.

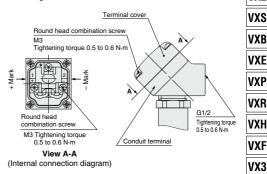
VX2

VXK

VXD

VXZ

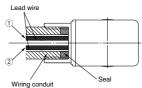
VXA



■ Conduit

When used as an IP65 equivalent, use seal to install the wiring conduit. Also, use the tightening torque below for the conduit.

Class B coil: AWG20 Insulator O.D. 2.5 mm Class H coil: AWG18 Insulator O.D. 2.1 mm



(Bore size G1/2 Tightening torque 0.5 to 0.6 N·m)

D. I. I. II.	Lead wire color	
Rated voltage	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.



VX21/22/23 Series Specific Product Precautions 8 Be sure to read this before handling the products.

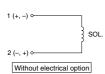
Be sure to read this before handling the products.

Refer to back page 50 for Safety Instructions and pages 17 to 19 for 2 Port Solenoid Valve for Fluid Control Precautions.

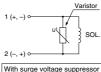
Electrical Circuits

[DC circuit]

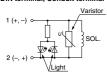
Grommet, Flat terminal



Grommet, DIN terminal, Conduit terminal, Conduit



DIN terminal. Conduit terminal



With light/surge voltage suppressor

[AC circuit]

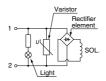
 For AC (Class B), the standard product is equipped with surge voltage suppressor.

Grommet, DIN terminal, Conduit terminal, Conduit



Without electrical option

DIN terminal, Conduit terminal



With light/surge voltage suppressor

One-touch Fitting

∧ Caution

For information on handling One-touch fittings and on appropriate tubing, refer to page 76 and the Fittings & Tubing section of the "Handling Precautions for SMC Products" on the SMC website.