

Direct Operated 2 Port Solenoid Valve

For Air, Water, Oil, Steam

Built-in full-wave rectifier type is now available.

Reduced
power consumption
(DC spec.)

6 W → **4.5 w**

8 W → **7 w**

11.5 W → **10.5 w**

Energy saving type: **0.8 w**
(Held at 24 VDC)



New

VX2

Series **VX21/22/23**

Solenoid valves for various fluids used in a wide variety of

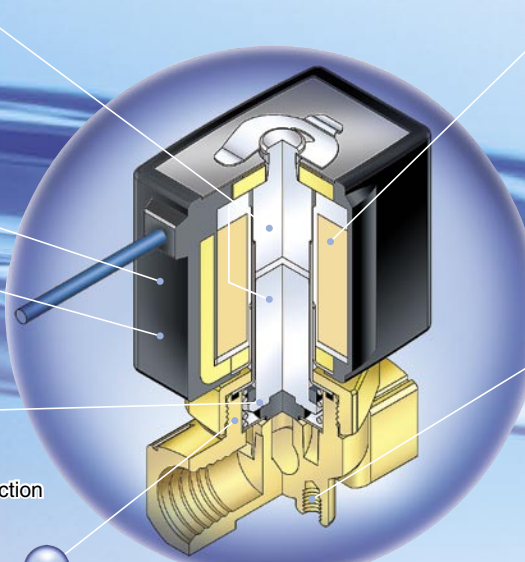
Improved corrosion resistance
Special magnetic material adopted

Enclosure: IP65

Flame resistance UL94V-0 conformed
Flame resistant mold coil material

Low-noise construction
Special construction results in the reduction of metal noise. (DC spec.)

Improved maintenance performance
Maintenance is performed easily due to the threaded assembly.



Reduced power consumption (DC spec.)

VX21: 6 W → **4.5 W**

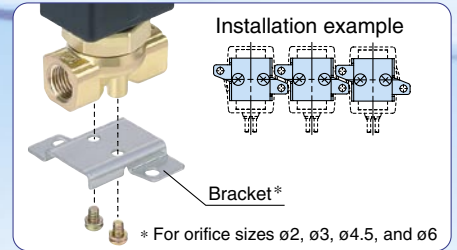
VX22: 8 W → **7 W**

VX23: 11.5 W → **10.5 W**

Energy saving type: 0.8 W
(Held at 24 VDC)

With mounting threads on the bottom

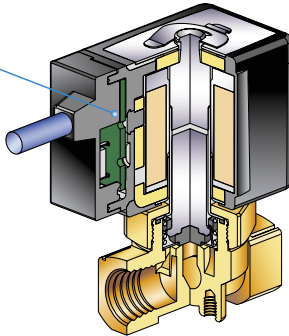
A dedicated bracket is available.



Built-in full-wave rectifier type

New

Built-in full-wave rectifier



Improved durability (SMC comparison: approx. double the service life)
Service life is extended by the special construction.

Reduced buzz noise

Rectified to DC by the full-wave rectifier, resulting in a substantial buzz noise reduction.

Reduced apparent power (standard product: comparison with shading coil type)

VX21: 10 VA → **7 VA**

VX22: 20 VA → **9.5 VA**

VX23: 32 VA → **12 VA**

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.

Direct Operated 2 Port Solenoid Valve

For Air, Water, Oil, Steam

New Series VX21/22/23



Normally Closed (N.C.)

Model	Orifice size						Port size	Material	
	2 mm ϕ	3 mm ϕ	4.5 mm ϕ	6 mm ϕ	8 mm ϕ	10 mm ϕ		Body	Seal
VX21	●	●	●	—	—	—	1/8, 1/4	Brass Stainless steel	NBR FKM EPDM PTFE
VX22	—	●	●	●	●	●	1/4, 3/8 1/2		
VX23	—	●	●	●	●	●	1/4, 3/8 1/2		

Normally Open (N.O.)

Model	Orifice size				Port size	Material	
	2 mm ϕ	3 mm ϕ	4.5 mm ϕ	6 mm ϕ		Body	Seal
VX21	●	●	●	—	1/8, 1/4	Brass Stainless steel	NBR FKM EPDM PTFE
VX22	—	●	●	●	1/4, 3/8		
VX23	—	●	●	●	1/4, 3/8		

Manifold

Model	Orifice size				Port size (Common SUP type)		Material		
	2 mm ϕ	3 mm ϕ	4.5 mm ϕ	6 mm ϕ	IN port	OUT port	Body	Base	Seal
VX21	●	●	●	—	3/8	1/8 1/4	Aluminum Brass Stainless steel	Aluminum Brass Stainless steel	NBR FKM EPDM PTFE
VX22	—	●	●	●					
VX23	—	●	●	●					



Features 1



applications — **New VX Series variations**

Pilot Operated 2 Port

New VXD21/22/23

For Air, Water, Oil



Valve type	Port size	Orifice size mmØ
N.C./N.O.	1/4 to 1 32 A to 50 A	10 to 50

Pilot Operated 2 Port for Zero Differential Pressure

New VXZ22/23

For Air, Vacuum, Water, Oil



Valve type	Port size	Orifice size mmØ
N.C./N.O.	1/4 to 1	10 to 25

Direct Operated 3 Port

New VX31/32/33

For Air, Vacuum, Water, Steam, Oil



Valve type	Port size	Orifice size mmØ
N.C./N.O. COM.	1/8 to 3/8	1.5 to 4

Air Operated 2/3 Port

VXA21/22, VXA31/32

For Air, Vacuum, Water, Oil

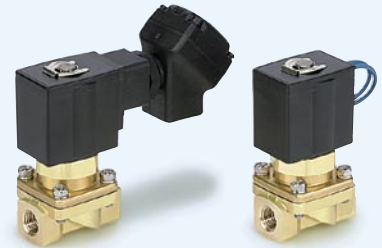


Model	Valve type	Port size	Orifice size mmØ
VXA21/22	N.C./N.O.	1/8 to 1/2	3 to 10
VXA31/32	C.O.	1/8 to 3/8	1.5 to 4

Pilot Operated 2 Port for High Pressure

VXH22

For Air, Water, Oil



Valve type	Port size	Orifice size mmØ
N.C.	1/4 to 1/2	10

The VX series has been renewed as the **new VX series**, with a new construction

Direct Operated 2 Port Solenoid Valve

Series VX21/22/23

For Air, Water, Oil, Steam

Specifications



Single Unit

Valve

Normally closed (N.C.)
Normally open (N.O.)

Solenoid Coil

Coil: Class B, Class H

Rated Voltage

100 VAC, 200 VAC, 110 VAC,
220 VAC, 240 VAC, 230 VAC,
48 VAC, 24 VDC, 12 VDC

Material

Body — Brass, Stainless steel
Seal — NBR, FKM, EPDM, PTFE

Electrical Entry

- Grommet
- Conduit
- DIN terminal
- Conduit terminal



Normally Closed (N.C.)

Model	VX21	VX22	VX23	
Orifice size	2 mmø	—	—	—
	3 mmø	●	—	●
	4.5 mmø	●	—	●
	6 mmø	—	●	●
	8 mmø	—	●	●
Port size	1/8	1/4	1/2	1/4
	1/4	3/8	—	1/2

Normally Open (N.O.)

Model	VX21	VX22	VX23
Orifice size	2 mmø	—	—
	3 mmø	●	●
	4.5 mmø	●	●
	6 mmø	—	●
Port size	1/8	1/4	1/4
	1/4	3/8	3/8

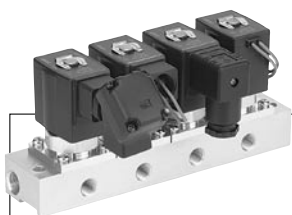
For Air

For Water

For Oil

For Steam

Energy Saving Type



Manifold

Valve

Normally closed (N.C.)
Normally open (N.O.)

Base

Common SUP type, Individual SUP type (Base material: Aluminum only)

Solenoid Coil

Coil: Class B, Class H

Rated Voltage

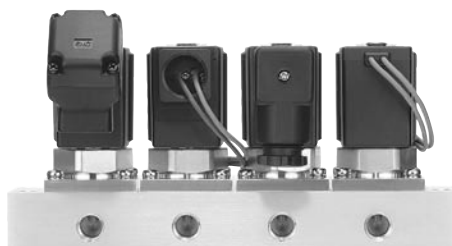
100 VAC, 200 VAC, 110 VAC,
220 VAC, 240 VAC, 230 VAC,
48 VAC, 24 VDC, 12 VDC

Material

Body — Aluminum, Brass, Stainless steel
Base — Aluminum, Brass, Stainless steel
Seal — NBR, FKM, EPDM, PTFE

Electrical Entry

- Grommet
- Conduit
- DIN terminal
- Conduit terminal



Manifold

Model	VX21	VX22	VX23
Orifice size	2 mmø	●	—
	3 mmø	●	●
	4.5 mmø	●	●
	6 mmø	—	●
(Common SUP type) Port size	3/8		
	1/8, 1/4		

Construction

Dimensions

Common Specifications

Standard Specifications

Valve specifications	Valve construction		Direct operated poppet	
	Withstand pressure	MPa	5.0	
	Body material		Brass (C37), Stainless steel	
	Seal material		NBR, FKM, EPDM, PTFE	
	Enclosure		Dust-tight, Low jetproof (equivalent to IP65) ^{Note)}	
	Environment		Location without corrosive or explosive gases	
Coil specifications	Rated voltage	AC	100 VAC, 200 VAC, 110 VAC, 220 VAC, 230 VAC, 240 VAC, 48 VAC	
		DC	24 VDC, 12 VDC	
	Allowable voltage fluctuation		±10% of rated voltage	
	Allowable leakage voltage	AC (Class B coil, Built-in full-wave rectifier type)		10% or less of rated voltage
		DC (Class B coil only)		2% or less of rated voltage
Coil insulation type		Class B, Class H		

* Electrical entry: Grommet with surge voltage suppressor (GS) has a rating of IP40.

Solenoid Coil Specifications

Normally Closed (N.C.)

DC Specification

Model	Power consumption (W)	Temperature rise (C°) ^{Note)}
VX21	4.5	45
VX22	7	45
VX23	10.5	60

AC Specification (Class B coil, Built-in full-wave rectifier type)

Model	Apparent power (VA)*	Temperature rise (C°) ^{Note)}
VX21	7	55
VX22	9.5	60
VX23	12	65

* There is no difference in the frequency and the inrush and energised apparent power, since a rectifying circuit is used in the AC spec. (Class B coil, Built-in full-wave rectifier type).

Note) The value at ambient temperature of 20°C and when the rated voltage is applied.

AC Specification

Model	Frequency (Hz)	Apparent power (VA)		Temperature rise (C°) ^{Note)}
		Inrush	Energised	
VX21	50	19	10	50
	60	16	8	45
VX22	50	43	20	65
	60	35	17	60
VX23	50	62	32	65
	60	52	27	60

Note) The value at ambient temperature of 20°C and when the rated voltage is applied.

Normally Open (N.O.)

DC Specification

Model	Power consumption (W)	Temperature rise (C°) ^{Note)}
VX21	4.5	45
VX22	7	45
VX23	10.5	60

AC Specification (Class B coil, Built-in full-wave rectifier type)

Model	Apparent power (VA)*	Temperature rise (C°) ^{Note)}
VX21	7	55
VX22	9.5	60
VX23	12	65

* There is no difference in the frequency and the inrush and energised apparent power, since a rectifying circuit is used in the AC spec. (Class B coil, built-in full-wave rectifier type).

Note) The value at ambient temperature of 20°C and when the rated voltage is applied.

AC Specification

Model	Frequency (Hz)	Apparent power (VA)		Temperature rise (C°) ^{Note)}
		Inrush	Energised	
VX21	50	22	11	55
	60	18	8	50
VX22	50	46	20	65
	60	38	18	60
VX23	50	64	32	65
	60	54	27	60

Note) The value at ambient temperature of 20°C and when the rated voltage is applied.

Applicable Fluid Check List

All Options (Single Unit)

VX2 0 1

Option symbol

Fluid and application	Option symbol	Seal material	Body/Shading coil material ^{Note 6)}	Coil insulation type ^{Note 4)}	Note
Air	-	NBR	Brass (C37)/-	B	Select the built-in full-wave rectifier type for the AC spec.
	G		Stainless steel/-		
Medium vacuum, ^{Note 1)} Non-leak, Oil-free	V ^{Note 2)}	FKM	Brass (C37)/-	B	Select the built-in full-wave rectifier type for the AC spec.
	M ^{Note 2)}		Stainless steel/-		
Water	-	NBR	Brass (C37)/Cu	B	
	G		Stainless steel/Ag		
Heated water	E	EPDM	Brass (C37)/Cu	H	
	P		Stainless steel/Ag		
Oil ^{Note 3)}	A	FKM	Brass (C37)/Cu	B	
	H		Stainless steel/Ag		
	D		Brass (C37)/Cu	H	
	N		Stainless steel/Ag		
Steam	S	PTFE	Brass (C37)/Cu	H	
	Q		Stainless steel/Ag		
High corrosive spec., Oil-free	L ^{Note 2)}	FKM	Stainless steel/Ag	B	
Copper-free, Fluoro-free ^{Note 5)}	J	EPDM	Stainless steel/Ag	B	
	P			H	
Other combinations	B	EPDM	Brass (C37)/Cu	B	
	C	PTFE	Stainless steel/Ag	B	
	K				

All Options (Manifold)

VX2 1 1

Option symbol

Base symbol

Fluid and application	Option symbol	Base symbol	Seal material	Body/Shading coil material ^{Note 6)}	Coil insulation type ^{Note 4)}	Note
Air	-	00	NBR	Aluminum/-	B	Select the built-in full-wave rectifier type for the AC spec.
Medium vacuum, Non-leak, Oil-free ^{Note 1)}	V ^{Note 2)}	00	FKM	Aluminum/-	B	Select the built-in full-wave rectifier type for the AC spec.
Water	-	-	NBR	Brass (C37)/Cu	B	
	G			Stainless steel/Ag		
Heated water	E	-	EPDM	Brass (C37)/Cu	H	
	P			Stainless steel/Ag		
Oil ^{Note 3)}	A	-	FKM	Brass (C37)/Cu	B	
	H			Stainless steel/Ag		
	D			Brass (C37)/Cu	H	
	N			Stainless steel/Ag		
Steam	S	-	PTFE	Brass (C37)/Cu	H	
	Q			Stainless steel/Ag		
High corrosive spec., Oil-free	L ^{Note 2)}	-	FKM	Stainless steel/Ag	B	
Non-leak, Copper-free, Oil-free ^{Note 5)}	R	00	FKM	Aluminum/Ag	B	

Note 1) The leakage amount (10⁻⁴ Pa·m³/s) of "V", "M" options are values when the differential pressure is 0.1 MPa.

Note 2) "V", "M", "L" options are for non-lube treatment.

Note 3) The kinematic viscosity of the fluid must not exceed 50 mm²/s.

The special construction of the armature adopted in the built-in full-wave rectifier type gives an improvement in OFF response by providing clearance on the absorbed surface when it is switched ON.

Select the DC spec. or AC spec. (Built-in full-wave rectifier type) when the kinematic viscosity is higher than water or when the OFF response is prioritised.

Note 4) Coil insulation type Class H: AC spec. only

Note 5) The nuts (non-wetted parts) are nickel-plated brass (C37).

Note 6) There is no shading coil attached to the DC spec. (Built-in full wave rectifier type).

* Please contact SMC when fluids other than above are used.

Series VX21/22/23

⚠ When the fluid is air.

Please consider the VCA series when using air because it was specifically designed for it. (The VCA series is limited to air to improve its function and service life.)

When you operate the VX series (AC spec.) with air, select the built-in full-wave rectifier type.

- The special construction of the armature reduces abrasion, resulting in a longer service life.
- Reduced buzz noise

Best suited for medical equipment, low-noise environments, etc.

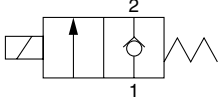
For Air/Single Unit

(Inert gas, Non-leak, Medium vacuum)

Model/Valve Specifications

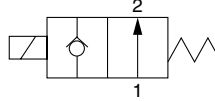
N.C.

Passage symbol



N.O.

Passage symbol



Normally Closed (N.C.)

Port size	Orifice size (mm)	Model	Max. operating pressure differential (MPa)	Flow characteristics			Max. system pressure (MPa)	Weight (g)			
				C _d (dm ³ /(s·bar))	b	C _v					
1/8 (6A)	2	VX2110-01	1.5	0.59	0.48	0.18	3.0	300			
	3	VX2120-01	0.6	1.2	0.45	0.33					
	4.5	VX2130-01	0.2	2.3	0.46	0.61					
1/4 (8A)	2	VX2110-02	1.5	0.59	0.48	0.18	3.0	470 620 300 470 620 470 620 560 700 560 700			
		VX2120-02	0.6	1.2	0.45	0.33					
	3	VX2220-02	1.5	1.2	0.45	0.33					
		VX2320-02	3.0	2.3	0.46	0.61					
		VX2130-02	0.2	2.3	0.46	0.61					
	4.5	VX2230-02	0.35	4.1	0.30	1.10					
		VX2330-02	0.9	6.4	0.30	1.60					
	6	VX2240-02	0.15	8.8	0.30	2.00					
		VX2340-02	0.35	11	0.30	2.20					
	8	VX2250-02	0.08	11	0.30	2.20					
		VX2350-02	0.2	11	0.30	2.20					
	10	VX2260-02	0.03	11	0.30	2.20					
VX2360-02		0.07	11	0.30	2.20						
3/8 (10A)	3	VX2220-03	1.5	1.2	0.45	0.33	3.0	470 620 470 620 470 620 560 700 560 700 560 700			
		VX2320-03	3.0	2.3	0.46	0.61					
	4.5	VX2230-03	0.35	4.1	0.30	1.10					
		VX2330-03	0.9	6.4	0.30	1.60					
	6	VX2240-03	0.15	8.8	0.30	2.00					
		VX2340-03	0.35	11	0.30	2.20					
	8	VX2250-03	0.08	11	0.30	2.20					
		VX2350-03	0.2	11	0.30	2.20					
	10	VX2260-03	0.03	11	0.30	2.20					
		VX2360-03	0.07	11	0.30	2.20					
	1/2 (15A)	10	VX2260-04	0.03	11	0.30			2.20	1.0	560 700
			VX2360-04	0.07	11	0.30			2.20		

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

- Refer to "Glossary of Terms" on page 37 for details on the max. operating pressure differential and the max. system pressure.
- If you intend to use any of the solenoid valves at the rated maximum operating pressure for the AC spec. with shading coil, please contact SMC beforehand.

Ambient and Fluid Temperature

Fluid temperature (°C)		Ambient temperature (°C)
Solenoid valve option symbol		
-	G	-20 to 60
V	M	
-10 (Note)	to 60	-10 (Note) to 60

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

Normally Open (N.O.)

Port size	Orifice size (mm)	Model	Max. operating pressure differential (MPa)	Flow characteristics			Max. system pressure (MPa)	Weight (g)			
				C _d (dm ³ /(s·bar))	b	C _v					
1/8 (6A)	2	VX2112-01	1.5	0.59	0.48	0.18	3.0	320			
	3	VX2122-01	0.7	1.2	0.45	0.33					
	4.5	VX2132-01	0.3	2.3	0.46	0.61					
1/4 (8A)	2	VX2112-02	1.5	0.59	0.48	0.18	3.0	500 660 320 500 660 500 660 500 660 500 660			
		VX2122-02	0.7	1.2	0.45	0.33					
	3	VX2222-02	1.0	1.2	0.45	0.33					
		VX2322-02	1.6	2.3	0.46	0.61					
		VX2132-02	0.3	4.1	0.30	1.10					
	4.5	VX2232-02	0.45	4.1	0.30	1.10					
		VX2332-02	0.8	6.4	0.30	1.60					
	6	VX2242-02	0.25	8.8	0.30	2.00					
		VX2342-02	0.45	11	0.30	2.20					
	3/8 (10)	3	VX2222-03	1.0	1.2	0.45			0.33	3.0	500 660 500 660 500 660
			VX2322-03	1.6	2.3	0.46			0.61		
		4.5	VX2232-03	0.45	4.1	0.30			1.10		
VX2332-03			0.8	6.4	0.30	1.60					
6		VX2242-03	0.25	8.8	0.30	2.00					
		VX2342-03	0.45	11	0.30	2.20					

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

- Refer to "Glossary of Terms" on page 37 for details on the max. operating pressure differential and the max. system pressure.

Valve Leakage Rate

Internal Leakage

Seal material	Leakage rate	
	Air	Non-leak, ^(Note) Medium vacuum
NBR, FKM	1 cm ³ /min or less	10 ⁻⁶ Pa·m ³ /sec or less

External Leakage

Seal material	Leakage rate	
	Air	Non-leak, ^(Note) Medium vacuum
NBR, FKM	1 cm ³ /min or less	10 ⁻⁶ Pa·m ³ /sec or less

Note) Value for option "V", "M" (Non-leak, Medium vacuum)

How to Order (Single Unit)

Model
Refer to the table (1) shown below for availability.

Orifice size
Refer to the table (1) shown below for availability.

Valve/Body configuration

0	N.C. / Single unit
2	N.O. / Single unit

Solenoid valve option
Refer to the table (2) shown below for availability.

-	—
Z	Oil-free spec.

Select "-" because the solenoid valve options "V", "M" are the oil-free treatment.

Suffix

-	Rc
T	NPTF
F	G
N	NPT

Thread type

Rated voltage

1	100 VAC 50/60 Hz	6	12 VDC
2	200 VAC 50/60 Hz	7	240 VAC 50/60 Hz
3	110 VAC 50/60 Hz	8	48 VAC 50/60 Hz
4	220 VAC 50/60 Hz	J	230 VAC 50/60 Hz
5	24 VDC		

* Refer to the table (3) shown below for availability.

Refer to page 28 for ordering coil only.

Bracket

-	None
B	With bracket

* Brackets VX021N-12A and VX022N-12A are packaged together with the valve.
* Refer to the table (4) if a bracket is ordered separately.

Built-in full-wave rectifier type

Electrical entry

<p>G - Grommet</p> <p>GS - With grommet surge voltage suppressor</p> <p>T - With conduit terminal</p> <p>TS - With conduit terminal and surge voltage suppressor</p> <p>TL - With conduit terminal and light</p> <p>TZ - With conduit terminal, surge voltage suppressor and light</p>	<p>C - Conduit</p> <p>D - DIN terminal</p> <p>DS - DIN terminal with surge voltage suppressor</p> <p>DL - DIN terminal with light</p> <p>DZ - DIN terminal with surge voltage suppressor and light</p> <p>DO - For DIN terminal (without connector, gasket is included.)</p> <p>* DIN type is available with Class B coils only.</p>
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Connector

Table (1) Port/Orifice Size – Port Size

Normally Closed (N.C.)

Solenoid valve (Port size)			Orifice symbol (Diameter)						
Model	VX21	VX22	VX23	1 (2 mmø)	2 (3 mmø)	3 (4.5 mmø)	4 (6 mmø)	5 (8 mmø)	6 (10 mmø)
Port no. (Port size)	01 (1/8)	—	—	●	●	●	—	—	—
	02 (1/4)	—	—	●	●	●	—	—	—
	—	02 (1/4)	02 (1/4)	—	●	●	●	●	●
	—	03 (3/8)	03 (3/8)	—	●	●	●	●	●
—	04 (1/2)	04 (1/2)	—	—	—	—	—	—	●

Normally Open (N.O.)

Solenoid valve (Port size)			Orifice symbol (Diameter)				
Model	VX21	VX22	VX23	1 (2 mmø)	2 (3 mmø)	3 (4.5 mmø)	4 (6 mmø)
Port no. (Port size)	01 (1/8)	—	—	●	●	●	—
	02 (1/4)	—	—	●	●	●	—
	—	02 (1/4)	02 (1/4)	—	●	●	●
	—	03 (3/8)	03 (3/8)	—	●	●	●

Table (2) Solenoid Valve Option

Option symbol	Seal material	Body material	Coil insulation type	Note
Nil	NBR	Brass (C37)	B	Non-leak (10 ⁻⁶ Pam ³ /sec), Oil-free, Medium vacuum (0.1 Pa.abs)
G		Stainless steel		
V	FKM	Brass (C37)		
M		Stainless steel		

Please consider the VCA series when using air because it was specifically designed for it. (The VCA series is limited to air to improve its function and service life.)

⚠ When the fluid is air.

When you operate the VX series (AC spec.) with air, select the built-in full-wave rectifier type.

- The special construction of the armature reduces abrasion, resulting in a longer service life.
- Reduced buzz noise

Dimensions → page 24 (Single unit)

Table (3) Rated Voltage – Electrical Option

Rated voltage		Class B			
AC/DC	Voltage symbol	Voltage	S With surge voltage suppressor	L With light	Z With light and surge voltage suppressor
AC	1	100 V	—	●	—
	2	200 V	—	●	—
	3	110 V	—	●	—
	4	220 V	—	●	—
	7	240 V	—	—	—
	8	48 V	—	—	—
DC	J	230 V	—	—	—
	5	24 V	●	●	●
	6	12 V	●	—	—

* Option "S", "Z" are not available as a surge voltage suppressor is integrated into the AC/Class B coil, as standard.

Table (4) Bracket Part No.

Model	Part no.
VX21 ¹ / ₈ 0	VX021N-12A
VX22 ² / ₄ 0	VX022N-12A
VX23 ³ / ₈ 0	
VX22 ⁵ / ₈ 0	VX023N-12A-L
VX23 ⁵ / ₈ 0	

Specifications

For Air

For Water

For Oil

For Steam

Energy Saving Type

Construction

Dimensions

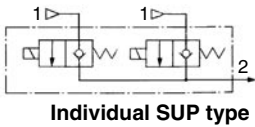
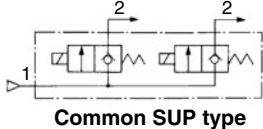
For Air/Manifold

(Inert gas, Non-leak, Medium vacuum)

Solenoid Valve for Manifold/Valve Specifications

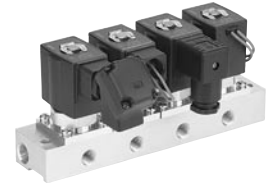
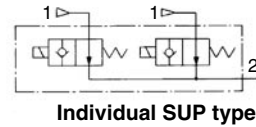
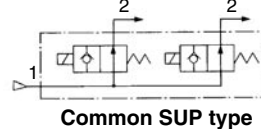
N.C.

Passage symbol



N.O.

Passage symbol



⚠ When the fluid is air.

When you operate the VX series (AC spec.) with air, select the built-in full-wave rectifier type.

- The special construction of the armature reduces abrasion, resulting in a longer service life.
 - Reduced buzz noise
- Best suited for medical equipment, low-noise environments, etc.

Normally Closed (N.C.)

Orifice size (mm)	Model	Max. operating pressure differential (MPa)	Flow characteristics			Max. system pressure (MPa)
			C [dm ³ /(s·bar)]	b	Cv	
2	VX2111-00	1.5	0.59	0.48	0.18	3.0
	VX2121-00	0.6				
3	VX2221-00	1.5	1.2	0.45	0.33	
		VX2321-00				
4.5	VX2131-00	0.2	2.3	0.46	0.61	
	VX2231-00	0.35				
	VX2331-00	0.9				
6	VX2241-00	0.15	4.1	0.30	1.10	
	VX2341-00	0.35				

- Refer to "Glossary of Terms" on page 37 for details on the max. operating pressure differential and the max. system pressure.
- If you intend to use any of the solenoid valves at the rated maximum operating pressure for the AC spec. with shading coil, please contact SMC beforehand.

Normally Open (N.O.)

Orifice size (mm)	Model	Max. operating pressure differential (MPa)	Flow characteristics			Max. system pressure (MPa)
			AC, DC	C [dm ³ /(s·bar)]	b	
2	VX2113-00	1.5	1.5	0.59	0.48	3.0
	VX2123-00	0.7				
3	VX2223-00	1.0	1.2	0.45	0.33	
		VX2323-00				
4.5	VX2133-00	0.3	2.3	0.46	0.61	
	VX2233-00	0.45				
	VX2333-00	0.8				
6	VX2243-00	0.25	4.1	0.30	1.10	
	VX2343-00	0.45				

- Refer to "Glossary of Terms" on page 37 for details on the max. operating pressure differential and the max. system pressure.

Ambient and Fluid Temperature

Fluid temperature (°C)		Ambient temperature (°C)
Solenoid valve option symbol		
-	R	-20 to 60
V	V	
-10 (Note)	to 60	
-10 (Note)	to 60	

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

Valve Leakage Rate

Internal Leakage

Seal material	Leakage rate	
	Air	Non-leak, (Note) Medium vacuum
NBR, FKM	1 cm ³ /min or less	10 ⁻⁶ Pa·m ³ /sec or less

External Leakage

Seal material	Leakage rate	
	Air	Non-leak, (Note) Medium vacuum
NBR, FKM	1 cm ³ /min or less	10 ⁻⁶ Pa·m ³ /sec or less

Note) Value for option "V", "M" (Non-leak, Medium vacuum)

How to Order (Solenoid Valve for Manifold)

AC VX 21 2 1 [] [] - 00 - 1 G R 1

DC VX 21 2 1 [] [] - 00 - 5 G 1

Model • Refer to the table (1) shown below for availability.

Orifice size • Refer to the table (1) shown below for availability.

Valve/Body configuration •

1	N.C. (For manifold)
3	N.O. (For manifold)

Solenoid valve option • Refer to the table (2) shown below for availability.

Rated voltage

1	100 VAC 50/60 Hz	6	12 VDC
2	200 VAC 50/60 Hz	7	240 VAC 50/60 Hz
3	110 VAC 50/60 Hz	8	48 VAC 50/60 Hz
4	220 VAC 50/60 Hz	J	230 VAC 50/60 Hz
5	24 VDC		

* Refer to the table (3) shown below for availability.

Suffix •

-	-
Z	Oil-free spec.

Select "-" because the solenoid valve options "V", "R" are the oil-free treatment.

Electrical entry •

G - Grommet
GS - With grommet surge voltage suppressor

C - Conduit

T - With conduit terminal
TS - With conduit terminal and surge voltage suppressor
TL - With conduit terminal and light
TZ - With conduit terminal, surge voltage suppressor and light

D - DIN terminal
DS - DIN terminal with surge voltage suppressor
DL - DIN terminal with light
DZ - DIN terminal with surge voltage suppressor and light
DO - For DIN terminal (without connector, gasket is included.)

* DIN type is available with Class B coils only.

Refer to page 28 for ordering coil only.

How to Order Manifold Bases

VVX21
VVX22
VVX23

1 [] [] [] - 07 - 1

Number of manifolds

02	2 stations
⋮	⋮
10	10 stations

Thread type

-	Rc
T	NPTF
F	G
N	NPT

Port size (Out port)

1	1/8
2	1/4

* All IN ports are 3/8.

Manifold base

Blanking plate part no.

For VX21: VX011-001

For VX22/23: VX011-006

Seal material

-	NBR
F	FKM

Suffix

-	-
Z	Oil-free spec.

Base

-	Common SUP type
V	Individual SUP type

How to Order Manifold Assemblies (Example)

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

Example

VVX211-05-1 1 set "*" is the symbol for mounting.

* VX2111-00-1G1 4 sets Add an "*" in front of the part numbers for solenoid valves, etc. to be mounted.

* VX011-001..... 1 set

①-----②-----③-----④-----⑤-----⑥

Enter the product's part number in order, counting from the 1st station on the left in the manifold arrangement, when viewed with the individual ports in front.

* Refer to the table (3) for the available combinations between each electrical option (S, L, Z) and the rated voltage.

* Option "S", "Z" are not available as a surge voltage suppressor is integrated into the AC/Class coil B, as standard.

Table (1) Port/Orifice Size

Solenoid valve	Orifice symbol (Diameter)			
	1 (2 mmø)	2 (3 mmø)	3 (4.5 mmø)	4 (6 mmø)
VX21	●	●	●	—
VX22	—	●	●	●
VX23	—	●	●	●

Table (2) Solenoid Valve Option

Option symbol	Body, Base material	Seal material	Coil insulation type	Note
-		NBR		—
V	Aluminum	FKM	B	Non-leak, Medium vacuum, Oil-free
R				Non-leak, Copper-free, Oil-free ^{Note}

Note) The nuts (non-wetted parts), are nickel-plated brass (C37).

⚠ When the fluid is air.

When you operate the VX series (AC spec.) with air, select the built-in full-wave rectifier type.

- The special construction of the armature reduces abrasion, resulting in a longer service life.
- Reduced buzz noise

Best suited for medical equipment, low-noise environments, etc.

Table (3) Rated Voltage – Electrical Option

Rated voltage		Class B			
AC/DC	Voltage symbol	Voltage	S With surge voltage suppressor	L With light	Z With light and surge voltage suppressor
AC	1	100 V	—	●	—
	2	200 V	—	●	—
	3	110 V	—	●	—
	4	220 V	—	●	—
	7	240 V	—	—	—
	8	48 V	—	—	—
	J	230 V	—	—	—
DC	5	24 V	●	●	●
	6	12 V	●	—	—

* Option "S", "Z" are not available as a surge voltage suppressor is integrated into the AC/Class B coil, as standard.

Dimensions → page 26 (Manifold)

Specifications

For Air

For Water

For Oil

For Steam

Energy Saving Type

Construction

Dimensions

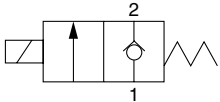
Series VX21/22/23

For Water /Single Unit

Model/Valve Specifications

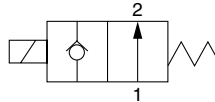
N.C.

Passage symbol



N.O.

Passage symbol



Normally Closed (N.C.)

Port size	Orifice size (mm)	Model	Max. operating pressure differential (MPa)		Flow characteristics		Max. system pressure (MPa)	Note) Weight (g)
			AC	DC AC (Built-in full-wave rectifier type)	Av x 10 ⁻⁶ m ²	Cv converted		
1/8 (6A)	2	VX2110-01	2.0	1.5	4.1	0.17	3.0	300
	3	VX2120-01	0.9	0.5	7.9	0.33		
	4.5	VX2130-01	0.4	0.2	15.0	0.61		
1/4 (8A)	2	VX2110-02	2.0	1.5	4.1	0.17	3.0	470 620 300 470 620 470 620 560 700 560 700
		VX2120-02	0.9	0.5	7.9	0.33		
		VX2220-02	1.7	1.5				
	3	VX2320-02	2.5	3.0	15.0	0.61		
		VX2130-02	0.4	0.2				
		VX2230-02	0.6	0.35				
	4.5	VX2330-02	0.85	0.9	26.0	1.10		
		VX2240-02	0.35	0.15				
		VX2340-02	0.55	0.3				
	6	VX2250-02	0.13	0.08	38.0	1.60		
		VX2350-02	0.17	0.2				
		VX2260-02	0.08	0.03				
8	VX2360-02	0.1	0.07	46.0	1.90			
	VX2260-02	0.08	0.03					
	VX2360-02	0.1	0.07					
3/8 (10A)	3	VX2220-03	1.7	1.5	7.9	0.33	3.0	470 620 470 620 560 700 560 700 560 700
		VX2320-03	2.5	3.0				
		VX2230-03	0.6	0.35				
	4.5	VX2330-03	0.85	0.9	26.0	1.10		
		VX2240-03	0.35	0.15				
		VX2340-03	0.55	0.3				
	6	VX2250-03	0.13	0.08	38.0	1.60		
		VX2350-03	0.17	0.2				
		VX2260-03	0.08	0.03				
	8	VX2360-03	0.1	0.07	53.0	2.20		
		VX2260-03	0.08	0.03				
		VX2360-03	0.1	0.07				
10	VX2260-03	0.08	0.03	53.0	2.20			
	VX2360-03	0.1	0.07					
	VX2360-03	0.1	0.07					
1/2 (15A)	10	VX2260-04	0.08	0.03	53.0	2.20	1.0	560 700
		VX2360-04	0.1	0.07				

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

• Refer to "Glossary of Terms" on page 37 for details on the max. operating pressure differential and the max. system pressure.

Normally Open (N.O.)

Port size	Orifice size (mm)	Model	Max. operating pressure differential (MPa)	Flow characteristics		Max. system pressure (MPa)	Note) Weight (g)	
				Av x 10 ⁻⁶ m ²	Cv converted			
1/8 (6A)	2	VX2112-01	0.9	4.1	0.17	3.0	320	
	3	VX2122-01	0.45	7.9	0.33			
	4.5	VX2132-01	0.2	15.0	0.61			
1/4 (8A)	2	VX2112-02	0.9	4.1	0.17	3.0	500 660 320 500 660 500 660 500 660 500 660	
		VX2122-02	0.45	7.9	0.33			
		VX2222-02	0.8					
	3	VX2322-02	1.2	15.0	0.61			
		VX2132-02	0.2					
		VX2232-02	0.3					
	4.5	VX2332-02	0.6	26.0	1.10			
		VX2242-02	0.15					
		VX2342-02	0.35					
	3/8 (10)	3	VX2222-03	0.8	7.9			0.33
			VX2322-03	1.2				
			VX2232-03	0.3				
4.5		VX2332-03	0.6	15.0	0.61			
		VX2242-03	0.15					
		VX2342-03	0.35					

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

• Refer to "Glossary of Terms" on page 37 for details on the max. operating pressure differential and the max. system pressure.

Ambient and Fluid Temperature

Fluid temperature (°C)		Ambient temperature (°C)
Solenoid valve option symbol		
- , G, L	E, P	
1 to 60	1 to 99	-20 to 60

Note) With no freezing

Valve Leakage Rate

Internal Leakage

Seal material	Leakage rate (Water)
NBR, FKM, EPDM	0.1 cm ³ /min or less

External Leakage

Seal material	Leakage rate (Water)
NBR, FKM, EPDM	0.1 cm ³ /min or less

How to Order (Single Unit)

Model
Refer to the table (1) shown below for availability.

Orifice size
Refer to the table (1) shown below for availability.

Valve/Body configuration

0	N.C. / Single unit
2	N.O. / Single unit

Solenoid valve option
Refer to the table (2) shown below for availability.

Suffix

-	-
Z	Oil-free spec.

Select "-" because the solenoid valve option "L" is the oil-free treatment.
AC/Class B oil-free coils are applicable to the full-wave rectifier type only.
Select the full-wave rectifier type.

Rated voltage

1	100 VAC 50/60 Hz	6	12 VDC
2	200 VAC 50/60 Hz	7	240 VAC 50/60 Hz
3	110 VAC 50/60 Hz	8	48 VAC 50/60 Hz
4	220 VAC 50/60 Hz	J	230 VAC 50/60 Hz
5	24 VDC		

* Refer to the table (3) shown below for availability.

Refer to page 28 for ordering coil only.

Port size
Refer to the table (1) shown below for availability.

Thread type

-	Rc
T	NPTF
F	G
N	NPT

Electrical entry

-	None
R	Built-in full-wave rectifier type (Class B only)

Bracket

-	None
B	With bracket

* Brackets VX021N-12A and VX022N-12A are packaged together with the valve.
* Refer to the table (4) if a bracket is ordered separately.

Full-wave rectifier

-	None
R	Built-in full-wave rectifier type (Class B only)

Electrical entry options:

- G - Grommet**
- GS - With grommet surge voltage suppressor**
- C - Conduit**
- T - With conduit terminal**
- TS - With conduit terminal and surge voltage suppressor**
- TL - With conduit terminal and light**
- TZ - With conduit terminal, surge voltage suppressor and light**
- D - DIN terminal**
- DS - DIN terminal with surge voltage suppressor**
- DL - DIN terminal with light**
- DZ - DIN terminal with surge voltage suppressor and light**
- DO - For DIN terminal (without connector, gasket is included.)**

* DIN type is available with Class B coils only.

* Refer to the table (3) for the available combinations between each electrical option (S, L, Z) and the rated voltage.
* Option "S", "Z" are not available as a surge voltage suppressor is integrated into the AC/Class B coil (Built-in full-wave rectifier type), as standard.

Table (1) Port/Orifice Size – Port Size Normally Closed (N.C.)

Solenoid valve (Port size)			Orifice symbol (Diameter)						
Model	VX21	VX22	VX23	1 (2 mmø)	2 (3 mmø)	3 (4.5 mmø)	4 (6 mmø)	5 (8 mmø)	6 (10 mmø)
Port no. (Port size)	01 (1/8)	—	—	●	●	●	—	—	—
	02 (1/4)	—	—	●	●	●	—	—	—
	—	02 (1/4)	02 (1/4)	—	●	●	●	●	●
	—	03 (3/8)	03 (3/8)	—	●	●	●	●	●
	—	04 (1/2)	04 (1/2)	—	—	—	—	—	●

Normally Open (N.O.)

Solenoid valve (Port size)			Orifice symbol (Diameter)				
Model	VX21	VX22	VX23	1 (2 mmø)	2 (3 mmø)	3 (4.5 mmø)	4 (6 mmø)
Port no. (Port size)	01 (1/8)	—	—	●	●	●	—
	02 (1/4)	—	—	●	●	●	—
	—	02 (1/4)	02 (1/4)	—	●	●	●
	—	03 (3/8)	03 (3/8)	—	●	●	●

Table (3) Rated Voltage – Electrical Option

Rated voltage			Class B			Class H		
AC/DC	Voltage symbol	Voltage	S With surge voltage suppressor	L With light	Z With light/surge voltage suppressor	S With surge voltage suppressor	L With light	Z With light/surge voltage suppressor
AC	1	100 V	●	●	●	●	●	●
	2	200 V	●	●	●	●	●	●
	3	110 V	●	●	●	●	●	●
	4	220 V	●	●	●	●	●	●
	7	240 V	●	—	—	●	—	—
	8	48 V	●	—	—	●	—	—
	J	230 V	●	—	—	●	—	—
DC	5	24 V	●	●	●	DC spec. is not available.		
	6	12 V	●	—	—	DC spec. is not available.		

* Option "S", "Z" are not available as surge voltage suppressor is integrated into the AC/Class B coil (Built-in full-wave rectifier type), as standard.

Table (2) Solenoid Valve Option

Option symbol	Seal material	Body/Shading coil material	Coil insulation type	Note
-	NBR	Brass (C37)/Cu	B	—
G	EPDM	Stainless steel/Ag	H	Heated water (AC only)
E		Brass (C37)/Cu		
P		Stainless steel/Ag	B	High corrosive, Oil-free
L	FKM	Stainless steel/Ag	B	—

Table (4) Bracket Part No.

Model	Part no.
VX21 ¹ ₃ 0	VX021N-12A
VX22 ² ₄ 0	VX022N-12A
VX23 ² ₄ 0	
VX22 ⁵ ₆ 0	VX023N-12A-L
VX23 ⁵ ₆ 0	

Dimensions → page 24 (Single unit)

Specifications

For Air

For Water

For Oil

For Steam

Energy Saving Type

Construction

Dimensions

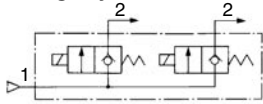
For Water /Manifold

Solenoid Valve for Manifold/Valve Specifications



N.C.

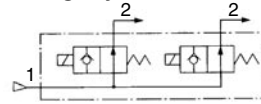
Passage symbol



Common SUP type

N.O.

Passage symbol



Common SUP type

Normally Closed (N.C.)

Orifice size (mmø)	Model	Max. operating pressure differential (MPa)		Flow characteristics		Max. system pressure (MPa)
		AC	DC AC (Built-in full-wave rectifier type)	Av x 10 ⁻⁶ m ²	Cv converted	
2	VX2111	2.0	1.5	4.1	0.17	3.0
	VX2121	0.9	0.5			
3	VX2221	1.7	1.5	7.9	0.33	
	VX2321	2.5	3.0			
4.5	VX2131	0.4	0.2	15	0.61	
	VX2231	0.6	0.35			
	VX2331	0.85	0.9			
6	VX2241	0.35	0.15	26	1.10	
	VX2341	0.55	0.3			

Refer to "Glossary of Terms" on page 37 for details on the max. operating pressure differential and the max. system pressure.

Normally Open (N.O.)

Orifice size (mmø)	Model	Max. operating pressure differential (MPa)	Flow characteristics		Max. system pressure (MPa)
			Av x 10 ⁻⁶ m ²	Cv converted	
2	VX2113	0.9	4.1	0.17	3.0
	VX2123	0.45			
3	VX2223	0.8	7.9	0.33	
	VX2323	1.2			
4.5	VX2133	0.2	15	0.61	
	VX2233	0.3			
	VX2333	0.6			
6	VX2243	0.15	26	1.10	
	VX2343	0.35			

Refer to "Glossary of Terms" on page 37 for details on the max. operating pressure differential and the max. system pressure.

Ambient and Fluid Temperature

Fluid temperature (°C)		Ambient temperature (°C)
Solenoid valve option symbol		
G, L	E, P	
1 to 60	1 to 99	-20 to 60

Note) With no freezing

Valve Leakage Rate

Internal Leakage

Seal material	Leakage rate (Water)
NBR, FKM, EPDM	0.1 cm ³ /min or less

External Leakage

Seal material	Leakage rate (Water)
NBR, FKM, EPDM	0.1 cm ³ /min or less

How to Order (Solenoid Valve for Manifold)

AC VX 21 2 1 [] [] - 1 G R 1

DC VX 21 2 1 [] [] - 5 G 1

Model Refer to the table (1) shown below for availability.

Orifice size Refer to the table (1) shown below for availability.

Valve/Body configuration

1	N.C. (For manifold)
3	N.O. (For manifold)

Solenoid valve option Refer to the table (2)-(1) shown below for availability.

Suffix

-	-
Z	Oil-free spec.

Select "-" because the solenoid valve option "L" is the oil-free treatment. AC/Class B oil-free coils are applicable to the full-wave rectifier type only. Select the full-wave rectifier type.

Rated voltage

1	100 VAC 50/60 Hz	6	12 VDC
2	200 VAC 50/60 Hz	7	240 VAC 50/60 Hz
3	110 VAC 50/60 Hz	8	48 VAC 50/60 Hz
4	220 VAC 50/60 Hz	J	230 VAC 50/60 Hz
5	24 VDC		

* Refer to the table (3) shown below for availability.

Refer to page 28 for ordering coil only.

Electrical entry

G - Grommet
GS - With grommet surge voltage suppressor

C - Conduit

T - With conduit terminal
TS - With conduit terminal and surge voltage suppressor
TL - With conduit terminal and light
TZ - With conduit terminal, surge voltage suppressor and light

D - DIN terminal
DS - DIN terminal with surge voltage suppressor
DL - DIN terminal with light
DZ - DIN terminal with surge voltage suppressor and light
DO - For DIN terminal (without connector, gasket is included.)

* DIN type is available with Class B coils only.

Full-wave rectifier

Nil	None
R	Built-in full-wave rectifier type (Class B only)

How to Order Manifold Bases

VVX21
VVX22 1 [] C [] - 07 - 1
VVX23

Port size (OUT port)

1	1/8
2	1/4

* All IN ports are 3/8.

Manifold base

Thread type

-	Rc
T	NPTF
F	G
N	NPT

Number of manifolds

02	2 stations
:	:
10	10 stations

Suffix

-	-
Z	Oil-free spec.

Blanking plate part no.

For VX21: VVX21-3A

For VX22: VVX22-3A

For VX23: VVX23-3A

Seal material

-	NBR
F	FKM
E	EPDM

Base, Seal material Refer to the table (2)-(2).

How to Order Manifold Assemblies (Example)

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

Example

VVX211C-05-1 1 set "*" is the symbol for mounting.

* VX2111-1G1 4 sets Add an "*" in front of the part numbers

* VVX21-3A 1 set for solenoid valves, etc. to be mounted.

Enter the product's part number in order, counting from the 1st station on the left in the manifold arrangement, when viewed with the individual ports in front.

Table (1) Port/Orifice Size

Solenoid valve	Orifice symbol (Diameter)			
	1 (2 mmø)	2 (2 mmø)	3 (4.5 mmø)	4 (6 mmø)
VX21	●	●	●	—
VX22	—	●	●	●
VX23	—	●	●	●

Table (2) Solenoid Valve Option

Solenoid valve option symbol (1)	Base, Seal material symbol (2)	Body, Base/Shading coil material	Seal material	Coil insulation type	Note
-	C	Brass (C37)/Cu	NBR	B	—
G	S	Stainless steel/Ag	EPDM	H	Heated water (AC only)
E	CE	Brass (C37)/Cu			
P	SE	Stainless steel/Ag	FKM	B	High corrosive, Oil-free
L	SF	Stainless steel/Ag			

Table (3) Rated Voltage – Electrical Option

Rated voltage	Voltage symbol	Voltage	Class B			Class H		
			S	L	Z	S	L	Z
AC	1	100 V	●	●	●	●	●	●
	2	200 V	●	●	●	●	●	●
	3	110 V	●	●	●	●	●	●
	4	220 V	●	●	●	●	●	●
	7	240 V	●	—	—	●	—	—
	8	48 V	●	—	—	●	—	—
DC	J	230 V	●	—	—	●	—	—
	5	24 V	●	●	●	DC spec. is not available.		
	6	12 V	●	—	—	DC spec. is not available.		

* Option "S", "Z" are not available as a surge voltage suppressor is integrated into the AC/Class B coil (Built-in full-wave rectifier type), as a standard.

Dimensions → page 27 (Manifold)

Specifications

For Air

For Water

For Oil

For Steam

Energy Saving Type

Construction

Dimensions

Series VX21/22/23

⚠ When the fluid is oil.

The kinematic viscosity of the fluid must not exceed 50 mm²/s.

The special construction of the armature adopted in the built-in full-wave rectifier type gives an improvement in OFF response by providing clearance on the absorbed surface when it is switched ON.

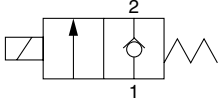
Select the DC spec. or AC spec. (Built-in full-wave rectifier type) when the kinematic viscosity is higher than water or when the OFF response is prioritised.

For Oil /Single Unit

Model/Valve Specifications

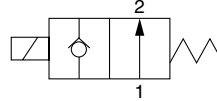
N.C.

Passage symbol



N.O.

Passage symbol



Normally Closed (N.C.)

Port size	Orifice size (mmø)	Model	Max. operating pressure differential (MPa)		Flow characteristics		Max. system pressure (MPa)	Note) Weight (g)
			AC	DC AC (Built-in full-wave rectifier type)	Av x 10 ⁻⁶ m ²	Cv converted		
1/8 (6A)	2	VX2110-01	1.5	1.5	4.1	0.17	300	
	3	VX2120-01	0.5	0.5	7.9	0.33		
	4.5	VX2130-01	0.2	0.15	15	0.61		
1/4 (8A)	2	VX2110-02	1.5	1.5	4.1	0.17	3.0	
		VX2120-02	0.5	0.5	7.9	0.33		
		VX2220-02	1.2	1.2				
	VX2320-02	1.7	2.0					
	3	VX2130-02	0.2	0.15	15	0.61		
		VX2230-02	0.35	0.3				
		VX2330-02	0.55	0.85				
	4.5	VX2240-02	0.2	0.1	26	1.10		
		VX2340-02	0.35	0.3				
		VX2250-02	0.1	0.08				
	6	VX2350-02	0.14	0.2	38	1.60		
		VX2260-02	0.05	0.03				
VX2360-02		0.08	0.07					
3/8 (10A)	3	VX2220-03	1.2	1.2	7.9	0.33	1.0	
		VX2320-03	1.7	2.0				
		VX2230-03	0.35	0.3				
	4.5	VX2330-03	0.55	0.85	15	0.61		
		VX2240-03	0.2	0.1				
		VX2340-03	0.35	0.3				
	6	VX2250-03	0.1	0.08	38	1.60		
		VX2350-03	0.14	0.2				
		VX2260-03	0.05	0.03				
	8	VX2360-03	0.08	0.07	53	2.20		
		VX2260-03	0.05	0.03				
		VX2360-03	0.08	0.07				
10	VX2260-03	0.05	0.03	53	2.20			
	VX2360-03	0.08	0.07					
	VX2260-03	0.05	0.03					
1/2 (15A)	10	VX2260-04	0.05	0.03	53	2.20		
		VX2360-04	0.08	0.07				
		VX2260-04	0.05	0.03				

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

• Refer to "Glossary of Terms" on page 37 for details on the max. operating pressure differential and the max. system pressure.

Normally Closed (N.C.)

Port size	Orifice size (mmø)	Model	Max. operating pressure differential (MPa)	Flow characteristics		Max. system pressure (MPa)	Note) Weight (g)
				AC, DC	Cv converted		
			Av x 10 ⁻⁶ m ²	Cv converted			
1/8 (6A)	2	VX2112-01	0.8	4.1	0.17	320	
	3	VX2122-01	0.45	7.9	0.33		
	4.5	VX2132-01	0.2	15	0.61		
1/4 (8A)	2	VX2112-02	0.8	4.1	0.17	3.0	
		VX2122-02	0.45	7.9	0.33		
		VX2222-02	0.7				
	VX2322-02	1.0					
	3	VX2132-02	0.2	15	0.61		
		VX2232-02	0.3				
		VX2332-02	0.6				
	4.5	VX2242-02	0.15	26	1.10		
		VX2342-02	0.35				
		VX2222-03	0.7				7.9
	VX2322-03	1.0					
	VX2232-03	0.3	15	0.61			
VX2332-03	0.6						
VX2242-03	0.15	26			1.10		
VX2342-03	0.35						



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

• Refer to "Glossary of Terms" on page 37 for details on the max. operating pressure differential and the max. system pressure.

Ambient and Fluid Temperature

Fluid temperature (°C)		Ambient temperature (°C)
Solenoid valve option symbol		
A, H	D, N	
-5 Note) to 60	-5 Note) to 120	-20 to 60

Note) kinematic viscosity: 50 mm²/s or less

Valve Leakage Rate

Internal Leakage

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

External Leakage

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

How to Order (Single Unit)

Model
Refer to the table (1) shown below for availability.

Orifice size
Refer to the table (1) shown below for availability.

Valve/Body configuration

0	N.C. / Single unit
2	N.O. / Single unit

Solenoid valve option
Refer to the table (2) shown below for availability.

-	—
Z	Oil-free spec.

AC/Class is oil-free coils are applicable to the full-wave rectifier type only.
Select the full-wave rectifier type.

Suffix

-	Rc
T	NPTF
F	G
N	NPT

Thread type
Refer to the table (1) shown below for availability.

Rated voltage

1	100 VAC 50/60 Hz	6	12 VDC
2	200 VAC 50/60 Hz	7	240 VAC 50/60 Hz
3	110 VAC 50/60 Hz	8	48 VAC 50/60 Hz
4	220 VAC 50/60 Hz	J	230 VAC 50/60 Hz
5	24 VDC		

* Refer to the table (3) shown below for availability.

Refer to page 28 for ordering coil only.

Bracket

-	None
B	With bracket

* Brackets VX021N-12A and VX022N-12A are together with the valve.
* Refer to the table (4) if a bracket is ordered separately.

Full-wave rectifier

Nil	None
R	Built-in full-wave rectifier type (Class B only)

Electrical entry

<p>G - Grommet GS - With grommet surge voltage suppressor</p>	<p>C - Conduit</p>
<p>T - With conduit terminal TS - With conduit terminal and surge voltage suppressor TL - With conduit terminal and light TZ - With conduit terminal, surge voltage suppressor and light</p>	<p>D - DIN terminal DS - DIN terminal with surge voltage suppressor DL - DIN terminal with light DZ - DIN terminal with surge voltage suppressor and light DO - For DIN terminal (without connector, gasket is included.)</p> <p>* DIN type is available with Class B coils only.</p>

Table (1) Port/Orifice Size Normally Closed (N.C.)

Solenoid valve (Port size)			Orifice symbol (Diameter)						
Model	VX21	VX22	VX23	1 (2 mmø)	2 (3 mmø)	3 (4.5 mmø)	4 (6 mmø)	5 (8 mmø)	6 (10 mmø)
Port no. (Port size)	01 (1/8)	—	—	●	●	●	—	—	—
	02 (1/4)	—	—	●	●	●	—	—	—
	—	02 (1/4)	02 (1/4)	—	●	●	●	●	●
	—	03 (3/8)	03 (3/8)	—	●	●	●	●	●
—	04 (1/2)	04 (1/2)	—	—	—	—	—	—	●

Normally Open (N.O.)

Solenoid valve (Port size)			Orifice symbol (Diameter)				
Model	VX21	VX22	VX23	1 (2 mmø)	2 (3 mmø)	3 (4.5 mmø)	4 (6 mmø)
Port no. (Port size)	01 (1/8)	—	—	●	●	●	—
	02 (1/4)	—	—	●	●	●	—
	—	02 (1/4)	02 (1/4)	—	●	●	●
	—	03 (3/8)	03 (3/8)	—	●	●	●

Table (3) Rated Voltage – Electrical Option

Rated voltage			Class B			Class H		
AC/DC	Voltage symbol	Voltage	S With surge voltage suppressor	L With light	Z With light/surge voltage suppressor	S With surge voltage suppressor	L With light	Z With light/surge voltage suppressor
AC	1	100 V	●	●	●	●	●	●
	2	200 V	●	●	●	●	●	●
	3	110 V	●	●	●	●	●	●
	4	220 V	●	●	●	●	●	●
	7	240 V	●	—	—	●	—	—
	8	48 V	●	—	—	●	—	—
DC	J	230 V	●	—	—	●	—	—
	5	24 V	●	●	●	DC spec. is not available.		
	6	12 V	●	—	—	DC spec. is not available.		

* Option "S", "Z" are not available as a surge voltage suppressor is integrated into the AC/Class B coil, (built-in full-wave rectifier type), as a standard.

* Refer to the table (3) for the available combinations between each electrical option (S, L, Z) and the rated voltage.
* Option "S", "Z" are not available as a surge voltage suppressor is integrated into the AC/Class B coil (built-in full-wave rectifier type), as standard.

Table (2) Solenoid Valve Option

Option symbol	Seal material	Body/Shading coil material	Coil insulation type
A	FKM	Brass (C37)/Cu	B
H		Stainless steel/Ag	
D		Brass (C37)/Cu	H
N		Stainless steel/Ag	

Additives contained in oil are different depending on the type and manufacturer, therefore the durability of the seal materials may vary. For details, please consult with SMC.

Table (4) Bracket Part No.

Model	Part no.
VX21 ¹ / ₈ 0	VX021N-12A
VX22 ² / ₄ 0	VX022N-12A
VX23 ² / ₄ 0	
VX22 ⁵ / ₀ 0	VX023N-12A-L
VX23 ⁵ / ₀ 0	

Dimensions → page 24 (Single unit)

⚠ When the fluid is oil.

The kinematic viscosity of the fluid must not exceed 50 mm²/s.

The special construction of the armature adopted in the built-in full-wave rectifier type gives an improvement in OFF response by providing clearance on the absorbed surface when it is switched ON.

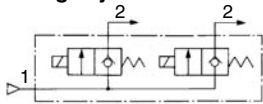
Select the DC spec. or AC spec. (Built-in full-wave rectifier type) when the kinematic viscosity is higher than water or when the OFF response is prioritised.

For Oil/Manifold

Solenoid Valve for Manifold/Valve Specifications

N.C.

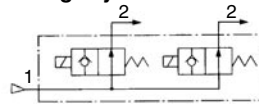
Passage symbol



Common SUP type

N.O.

Passage symbol



Common SUP type



Normally Closed (N.C.)

Orifice size (mmø)	Model	Max. operating pressure differential (MPa)		Flow characteristics		Max. system pressure (MPa)
		AC	DC AC (Built-in full-wave rectifier type)	Av x 10 ⁻⁶ m ²	Cv converted	
2	VX2111	1.5	1.5	4.1	0.17	3.0
	VX2121	0.5	0.5			
3	VX2221	1.2	1.2	7.9	0.33	
	VX2321	1.7	2.0			
4.5	VX2131	0.2	0.15	15	0.61	
	VX2231	0.35	0.3			
	VX2331	0.55	0.85			
6	VX2241	0.2	0.1	26	1.10	
	VX2341	0.35	0.3			

Refer to "Glossary of Terms" on page 37 for details on the max. operating pressure differential and the max. system pressure.

Normally Open (N.O.)

Orifice size (mmø)	Model	Max. operating pressure differential (MPa)	Flow characteristics		Max. system pressure (MPa)
		AC, DC	Av x 10 ⁻⁶ m ²	Cv converted	
2	VX2113	0.8	4.1	0.17	3.0
	VX2123	0.45			
3	VX2223	0.7	7.9	0.33	
	VX2323	1.0			
4.5	VX2133	0.2	15	0.61	
	VX2233	0.3			
	VX2333	0.6			
6	VX2243	0.15	26	1.10	
	VX2343	0.35			

Refer to "Glossary of Terms" on page 37 for details on the max. operating pressure differential and the max. system pressure.

Ambient and Fluid Temperature

Fluid temperature (°C)		Ambient temperature (°C)
Solenoid valve option symbol		
A,H	D,N	-20 to 60
-5 ^{Note)} to 60	-5 ^{Note)} to 120	

Note) kinematic viscosity: 50 mm²/s or less

Valve Leakage Rate

Internal Leakage

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

External Leakage

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

How to Order (Solenoid Valve for Manifold)

Model AC VX 21 2 1 A 1 GR 1
 DC VX 21 2 1 A 5 G 1

Valve/Body configuration

1	N.C. (For manifold)
3	N.O. (For manifold)

Orifice size Refer to the table (1) shown below for availability.

Solenoid valve option Refer to the table (2)-(1) shown below for availability.

Rated voltage

1	100 VAC 50/60 Hz	6	12 VDC
2	200 VAC 50/60 Hz	7	240 VAC 50/60 Hz
3	110 VAC 50/60 Hz	8	48 VAC 50/60 Hz
4	220 VAC 50/60 Hz	J	230 VAC 50/60 Hz
5	24 VDC		

* Refer to the table (3) shown below for availability.

Suffix

-	—
Z	Oil-free spec.

AC/Class B oil-free coils are applicable to the full-wave rectifier type only. Select the full-wave rectifier type.

Electrical entry

G - Grommet
 GS - With grommet surge voltage suppressor

C - Conduit

D - DIN terminal
 DS - DIN terminal with surge voltage suppressor
 DL - DIN terminal with light
 DZ - DIN terminal with surge voltage suppressor and light
 DO - For DIN terminal (without connector, gasket is included.)

T - With conduit terminal
 TS - With conduit terminal and surge voltage suppressor
 TL - With conduit terminal and light
 TZ - With conduit terminal, surge voltage suppressor and light

Full-wave rectifier

-	None
R	Built-in full-wave rectifier type (Class B only)

* Refer to the table (1) for the available combinations between each electrical option (S, L, Z) and the rated voltage.
 * Option "S", "Z" are not available as a surge voltage suppressor is integrated into the AC/Class B coil (Built-in full-wave rectifier type), as standard.

How to Order Manifold Bases

VVX21
 VVX22 1 CF 07-1
 VVX23

Number of manifolds

02	2 stations
⋮	⋮
10	10 stations

Port size (OUT port)

1	1/8
2	1/4

* All IN ports are 3/8.

Thread type

-	Rc
T	NPTF
F	G
N	NPT

Suffix

-	—
Z	Oil-free spec.

Base, Seal material Refer to the table (2)-(2).

Manifold base

Blanking plate part no.
 For VX21: VVX21-3A-F
 For VX22: VVX22-3A-F
 For VX23: VVX23-3A-F

Seal material: FKM

How to Order Manifold Assemblies (Example)

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

Example
 VVX211CF-05-1..... 1 set * "S" is the symbol for mounting.
 * VX211A-1G1..... 4 sets Add an "*" in front of the part numbers for solenoid valves, etc. to be mounted.
 * VVX21-3A-F..... 1 set

Enter the product's part number in order, counting from the 1st station on the left in the manifold arrangement, when viewed with the individual ports in front.

Table (1) Port/Orifice Size

Solenoid valve	Orifice symbol (Diameter)			
	1 (2 mmø)	2 (3 mmø)	3 (4.5 mmø)	4 (6 mmø)
VX21	●	●	●	—
VX22	—	●	●	●
VX23	—	●	●	●

Table (2) Solenoid Valve Option

Solenoid valve option symbol (1)	Base, Seal material symbol (2)	Body, Base/ Shading coil material	Seal material	Coil insulation type	Note
A	CF	Brass (C37)/Cu	FKM	B	—
H	SF	Stainless steel/Ag		H	AC only
D	CF	Brass (C37)/Cu			
N	SF	Stainless steel/Ag			

Additives contained in oil are different depending on the type and manufacturer, therefore the durability of the seal materials may vary. For details, please consult with SMC.

Table (3) Rated Voltage – Electrical Entry – Electrical Option

Rated voltage	AC/ DC	Voltage symbol	Voltage	Class B			Class H		
				With surge voltage suppressor	With light	With light/ surge voltage suppressor	With surge voltage suppressor	With light	With light/ surge voltage suppressor
AC	1	100 V	●	●	●	●	●	●	
	2	200 V	●	●	●	●	●	●	
	3	110 V	●	●	●	●	●	●	
	4	220 V	●	●	●	●	●	●	
	7	240 V	●	—	—	●	—	—	
	8	48 V	●	—	—	●	—	—	
DC	J	230 V	●	—	—	●	—	—	
	5	24 V	●	●	●	DC spec. is not available.			
	6	12 V	●	—	—	DC spec. is not available.			

* Option "S", "Z" are not available as a surge voltage suppressor is integrated into the AC/Class B coil (Built-in full-wave rectifier type), as a standard.

Dimensions → page 27 (Manifold)

Specifications

For Air

For Water

For Oil

For Steam

Energy Saving Type

Construction

Dimensions

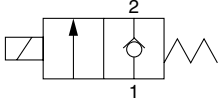
Series VX21/22/23

For Steam /Single Unit

Model/Valve Specifications

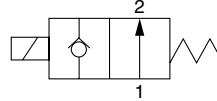
N.C.

Passage symbol



N.O.

Passage symbol



Normally Closed (N.C.)

Port size	Orifice size (mmø)	Model	Max. operating pressure differential (MPa)		Flow characteristics		Max. system pressure (MPa)	Note) Weight (g)
			AC	Av x 10 ⁻⁶ m ²	Cv converted			
1/8 (6A)	2	VX2110-01	1.0	4.1	0.17	1.0	300	
	3	VX2120-01	1.0	7.9	0.33			
	4.5	VX2130-01	0.45	15	0.61			
1/4 (8A)	2	VX2110-02	1.0	4.1	0.17			
	3	VX2120-02	1.0	7.9	0.33			
		VX2130-02	0.45	15	0.61			
	4.5	VX2230-02	0.75					
		VX2330-02	1.0	26	1.10			
	6	VX2240-02	0.4					
	VX2340-02	0.5	38	1.60				
8	VX2250-02	0.15						
	VX2350-02	0.2	46	1.90				
10	VX2260-02	0.08						
	VX2360-02	0.1	53	2.20				
3/8 (10A)	3	VX2220-03			1.0	7.9	0.33	1.0
	4.5	VX2230-03	0.75	15	0.61			
		VX2330-03	1.0					
	6	VX2240-03	0.4	26	1.10			
		VX2340-03	0.5					
	8	VX2250-03	0.15	38	1.60			
		VX2350-03	0.2					
	10	VX2260-03	0.08	53	2.20			
		VX2360-03	0.1					
	1/2 (15A)	10	VX2260-04	0.08	53	2.20	0.5	560
		VX2360-04	0.1	700				



Note) Weight of grommet type. Add 60 g for conduit terminal type.
 • Refer to "Glossary of Terms" on page 37 for details on the max. operating pressure differential and the max. system pressure.

Normally Open (N.O.)

Port size	Orifice size (mmø)	Model	Max. operating pressure differential (MPa)		Flow characteristics		Max. system pressure (MPa)	Note) Weight (g)
			AC	Av x 10 ⁻⁶ m ²	Cv converted			
1/8 (6A)	2	VX2112-01	1.0	4.1	0.17	1.0	320	
	3	VX2122-01	0.7	7.9	0.33			
	4.5	VX2132-01	0.3	15	0.61			
1/4 (8A)	2	VX2112-02	1.0	4.1	0.17			
	3	VX2122-02	0.7	7.9	0.33			
		VX2222-02	1.0					
	4.5	VX2132-02	0.3	15	0.61			
		VX2232-02	0.45					
		VX2332-02	0.8	26	1.10			
6	VX2242-02	0.25						
		VX2342-02	0.45	7.9	0.33			
3	VX2222-03	1.0						
3/8 (10)	4.5	VX2232-03	0.45	15	0.61			
		VX2332-03	0.8					
	6	VX2242-03	0.25	26	1.10			
		VX2342-03	0.45					



Note) Weight of grommet type. Add 60 g for conduit terminal type.
 • Refer to "Glossary of Terms" on page 37 for details on the max. operating pressure differential and the max. system pressure.

Ambient and Fluid Temperature

Max. fluid temperature (°C)	Ambient temperature (°C)
Solenoid valve option symbol	
S, Q	-20 to 60
183	

Valve Leakage Rate

Internal Leakage

Seal material	Leakage rate (Air)
PTFE	300 cm ³ /min or less

External Leakage

Seal material	Leakage rate (Air)
PTFE	1 cm ³ /min or less

How to Order (Single Unit)

Model • Refer to the table (1) shown below for availability.

Orifice size • Refer to the table (1) shown below for availability.

Valve/Body configuration

0	N.C. / Single unit
2	N.O. / Single unit

Suffix

-	—
Z	Oil-free spec.

Thread type

-	Rc
T	NPTF
F	G
N	NPT

Rated voltage

1	100 VAC 50/60 Hz	7	240 VAC 50/60 Hz
2	200 VAC 50/60 Hz	8	48 VAC 50/60 Hz
3	110 VAC 50/60 Hz	J	230 VAC 50/60 Hz
4	220 VAC 50/60 Hz		

* Refer to the table (3) shown below for availability.

Refer to page 28 for ordering coil only.

Solenoid valve option • Refer to the table (2) shown below for availability.

Port size • Refer to the table (1) shown below for availability.

Bracket

-	None
B	With bracket

* Brackets VX021N-12A and VX022N-12A are packaged together with the valve.
* Refer to the table (4) if a bracket is ordered separately.

Electrical entry

G - Grommet
GS - With grommet surge voltage suppressor

C - Conduit

T - With conduit terminal
TS - With conduit terminal and surge voltage suppressor
TL - With conduit terminal and light
TZ - With conduit terminal, surge voltage suppressor and light

* Refer to the table (3) for the available combinations between each electrical option (S, L, Z) and the rated voltage.

Table (1) Port/Orifice Size Normally Closed (N.C.)

Solenoid valve (Port size)			Orifice symbol (Diameter)						
Model	VX21	VX22	VX23	1 (2 mmø)	2 (3 mmø)	3 (4.5 mmø)	4 (6 mmø)	5 (8 mmø)	6 (10 mmø)
Port no. (Port size)	01 (1/8)	—	—	●	●	●	—	—	—
	02 (1/4)	—	—	●	●	●	—	—	—
	—	02 (1/4)	02 (1/4)	—	—	●	●	●	●
	—	03 (3/8)	03 (3/8)	—	● (VX22)	●	●	●	●
	—	04 (1/2)	04 (1/2)	—	—	—	—	—	●

Normally Open (N.O.)

Solenoid valve (Port size)			Orifice symbol (Diameter)				
Model	VX21	VX22	VX23	1 (2 mmø)	2 (3 mmø)	3 (4.5 mmø)	4 (6 mmø)
Port no. (Port size)	01 (1/8)	—	—	●	●	●	—
	02 (1/4)	—	—	●	●	●	—
	—	02 (1/4)	02 (1/4)	—	●	●	●
	—	03 (3/8)	03 (3/8)	—	●	●	●

Table (2) Solenoid Valve Option

Option symbol	Seal material	Body/Shading coil material	Coil insulation type
S	PTFE	Brass (C37)/Cu	H
Q		Stainless steel/Ag	

Solenoid coil: AC/Class H only

Table (3) Rated Voltage – Electrical Option

Rated voltage			Class H		
AC/DC	Voltage symbol	Voltage	S With surge voltage suppressor	L With light	Z With light/surge voltage suppressor
AC	1	100 V	●	●	●
	2	200 V	●	●	●
	3	110 V	●	●	●
	4	220 V	●	●	●
	7	240 V	●	—	—
	8	48 V	●	—	—
DC	J	230 V	●	—	—
	5	24 V	DC spec. is not available.		
	6	12 V	DC spec. is not available.		

Table (4) Bracket Part No.

Model	Part no.
VX21 ¹ / ₃ 0	VX021N-12A
VX22 ² / ₃ 0	VX022N-12A
VX23 ² / ₄ 0	
VX22 ² / ₆ 0	VX023N-12A-L
VX23 ² / ₆ 0	

Specifications

For Air

For Water

For Oil

For Steam

Energy Saving Type

Construction

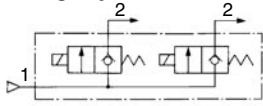
Dimensions

For Steam /Manifold

Solenoid Valve for Manifold/Valve Specifications

N.C.

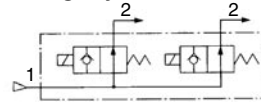
Passage symbol



Common SUP type

N.O.

Passage symbol



Common SUP type

Normally Closed (N.C.)

Orifice size (mmø)	Model	Max. operating pressure differential (MPa)	Flow characteristics		Max. system pressure (MPa)
		AC	Av x 10 ⁻⁶ m ²	Cv converted	
2	VX2111	1.0	4.1	0.17	3.0
3	VX2121	1.0	7.9	0.33	
4.5	VX2131	0.45	15	0.61	
	VX2231	0.75			
6	VX2241	1.0	26	1.10	
	VX2341	0.4			



• Refer to "Glossary of Terms" on page 37 for details on the max. operating pressure differential and the max. system pressure.

Normally Open (N.O.)

Orifice size (mmø)	Model	Max. operating pressure differential (MPa)	Flow characteristics		Max. system pressure (MPa)
		AC	Av x 10 ⁻⁶ m ²	Cv converted	
2	VX2113	1.0	4.1	0.17	3.0
3	VX2123	0.7	7.9	0.33	
	VX2223	1.0			
4.5	VX2133	0.3	15	0.61	
	VX2233	0.45			
6	VX2333	0.8	26	1.10	
	VX2243	0.25			
	VX2343	0.45			



• Refer to "Glossary of Terms" on page 37 for details on the max. operating pressure differential and the max. system pressure.

Ambient and Fluid Temperature

Power source	Max. fluid temperature (°C)	Ambient temperature (°C)
	Solenoid valve option symbol	
AC	S, Q	-20 to 60
	183	

Valve Leakage Rate

Internal Leakage

Seal material	Leakage rate (Air)
PTFE	300 cm ³ /min or less

External Leakage

Seal material	Leakage rate (Air)
PTFE	1 cm ³ /min or less

How to Order (Solenoid Valve for Manifold)

AC VX 21 2 3 S 1 G 1

Model
Refer to the table (1) shown below for availability.

Orifice size
Refer to the table (1) shown below for availability.

Valve type

1	N.C.
3	N.O.

Solenoid valve option
Refer to the table (2)-(1) shown below for availability.

Rated voltage

1	100 VAC 50/60 Hz	7	240 VAC 50/60 Hz
2	200 VAC 50/60 Hz	8	48 VAC 50/60 Hz
3	110 VAC 50/60 Hz	J	230 VAC 50/60 Hz
4	220 VAC 50/60 Hz		

Suffix

-	—
Z	Oil-free spec.

Electrical entry

G - Grommet GS - With grommet surge voltage suppressor	C - Conduit
T - With conduit terminal TS - With conduit terminal and surge voltage suppressor	
TL - With conduit terminal and light TZ - With conduit terminal, surge voltage suppressor and light	

* Refer to the table (3) for the available combinations between each electrical option (S, L, Z) and the rated voltage.

* Refer to the table (3) shown below for availability.

Refer to page 28 for ordering coil only.

How to Order Manifold Bases

VVX21
VVX22
VVX23

1 **CP** **07** **1**

Port size (OUT port)

1	1/8
2	1/4

* All IN ports are 3/8.

Thread type

-	Rc
T	NPTF
F	G
N	NPT

Number of manifolds

02	2 stations
⋮	⋮
10	10 stations

Suffix

-	—
Z	Oil-free spec.

Base, Seal material
Refer to the table (2)-(2).

● **Blanking plate part no.**

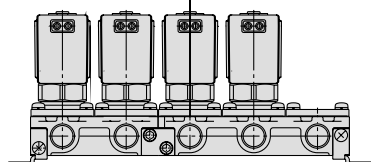
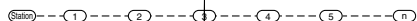
For VX21: VVX21-3A-P
For VX22: VVX22-3A-P
For VX23: VVX23-3A-P

● **Seal material: PTFE**

How to Order Manifold Assemblies (Example)

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

Example
VVX211CP-05-1..... 1 set "*" is the symbol for mounting.
* VX2111S-1G1 4 sets Add an "*" in front of the part numbers
* VVX21-3A-P 1 set for solenoid valves, etc. to be mounted.



Enter the product's part number in order, counting from the 1st station on the left in the manifold arrangement, when viewed with the individual ports in front.

Table (1) Port/Orifice Size

Solenoid valve	Orifice symbol (Diameter)			
	1 (2 mmø)	2 (3 mmø)	3 (4.5 mmø)	4 (6 mmø)
VX21	●	●	●	—
VX22	—	● (N.O.)	●	●
VX23	—	—	●	●

Table (2) Solenoid Valve Option

Solenoid valve option symbol (1)	Base, Seal material symbol (2)	Body, Base/Shading coil material	Seal material	Coil insulation type
S	CP	Brass (C37)/Cu	PTFE	H
Q	SP	Stainless steel/Ag		

Table (3) Rated Voltage – Electrical Option

Rated voltage		Class H			
AC/DC	Voltage symbol	Voltage	With surge voltage suppressor	With light	With light/surge voltage suppressor
AC	1	100 V	●	●	●
	2	200 V	●	●	●
	3	110 V	●	●	●
	4	220 V	●	●	●
	7	240 V	●	—	—
	8	48 V	●	—	—
DC	5	24 V	●	—	—
	6	12 V	●	—	—

DC spec. is not available.

Dimensions → page 27 (Manifold)

Specifications

For Air

For Water

For Oil

For Steam

Energy Saving Type

Construction

Dimensions

Energy Saving Type Series VX21/22/23 For Air, Water

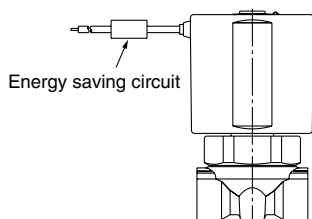
- Substantially reduced power consumption while holding due to the power saving circuit
- Substantially reduced heat generation by a continuously energised solenoid coil (temperature increase of 10°C or less)

Solenoid Coil Electrical Specifications

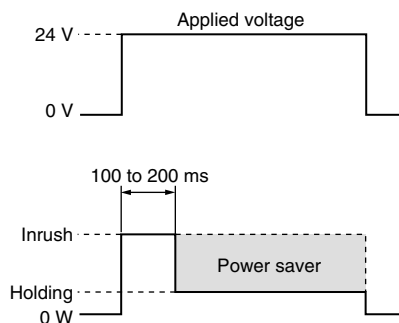
Model	VX21	VX22	VX23	
Rated voltage (V)	24 DC <small>Note)</small>			
Power consumption (W)	Inrush	3	4	5
	Holding	0.8	0.8	0.8

(Enclosure equivalent to IP40 enclosure)

Note) There is polarity: Red (+), Black (-)



Energy Saving Type/Electrical Power Waveform (Rated voltage at 24 VDC)



Model/Valve Specifications

N.C.

Normally Closed (N.C.)

Port size	Orifice size (mm)	Model	Max. operating pressure differential (MPa)	Flow characteristics					Max. system pressure (MPa)						
				DC	$Av \times 10^{-6} \text{ m}^2$	Cv converted	$C[\text{dm}^3/(\text{s}\cdot\text{bar})]$	b		Cv					
1/8 (6A)	2	VX2110-01	1.0	4.1	0.17	0.59	0.48	0.18	3.0						
	3	VX2120-01	0.3	7.9	0.33	1.2	0.45	0.33							
	4.5	VX2130-01	0.1	15.0	0.61	2.4	0.44	0.61							
1/4 (8A)	2	VX2110-02	1.0	4.1	0.17	0.59	0.48	0.18	3.0						
	3	VX2120-02	0.3	7.9	0.33	1.2	0.45	0.33							
		VX2220-02	0.8												
		VX2320-02	1.0												
	4.5	VX2130-02	0.1	15.0	0.61	2.3	0.46	0.61	1.0						
		VX2230-02	0.15												
		VX2330-02	0.2												
		6	VX2240-02							0.05	26.0	1.10	4.1	0.30	1.10
			VX2340-02							0.1					
		8	VX2250-02							0.03	38.0	1.60	6.4	0.30	1.60
VX2350-02			0.05												
10	VX2360-02	0.02	46.0	1.90	8.8	0.30	2.00								

Refer to "Glossary of Terms" on page 37 for details on the max. operating pressure differential and the max. system pressure.

Port size	Orifice size (mm)	Model	Max. operating pressure differential (MPa)	Flow characteristics					Max. system pressure (MPa)
				DC	$Av \times 10^{-6} \text{ m}^2$	Cv converted	$C[\text{dm}^3/(\text{s}\cdot\text{bar})]$	b	
3/8 (10A)	3	VX2220-03	0.8	7.9	0.33	1.2	0.45	0.33	3.0
		VX2320-03	1.0						
	4.5	VX2230-03	0.15	15.0	0.61	2.3	0.46	0.61	
		VX2330-03	0.2						
	6	VX2240-03	0.05	26.0	1.10	4.1	0.30	1.10	
		VX2340-03	0.1						
8	VX2250-03	0.03	38.0	1.60	6.4	0.30	1.60		
	VX2350-03	0.05							
10	VX2360-03	0.02	53.0	2.20	11	0.30	2.20		
1/2 (15A)	10	VX2360-04	0.02	53.0	2.20	11	0.30	2.20	



Refer to "Glossary of Terms" on page 37 for details on the max. operating pressure differential and the max. system pressure.

Ambient and Fluid Temperature

Power source	Fluid temperature (°C)		Ambient temperature (°C)
	Solenoid valve option symbol		
	-, G		
DC	1 to 40		-20 to 40

Note) With no freezing

Valve Leakage Rate

Internal Leakage

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

External Leakage

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

How to Order (Single Unit)

Normally Closed (N.C.)

VX 21 2 0 - 01 - 5 GY1 -

Specifications

For Air

For Water

For Oil

For Steam

Energy Saving Type

Construction

Dimensions

Model • Refer to the table (1) shown below for availability.

Orifice size • Refer to the table (1) shown below for availability.

Solenoid valve option • Refer to the table (2) shown below for availability.

Suffix •

-	—
Z	Oil-free spec.

Select "-" because the solenoid valve options "V", "M", "L" are the oil-free treatment.

Port size • Refer to the table (1) shown below for availability.

Thread type •

-	Rc
T	NPTF
F	G
N	NPT

Rated voltage •

5	24 VDC
---	--------

Bracket

-	None
B	With bracket

* VX021N-12A and VX022N-12A are packaged together with the valve.
* Refer to the table (3) if bracket is separately ordered.

Electrical entry

GY-Conduit
(With power saving circuit)

Table (1) Port/Orifice Size
Normally Closed (N.C.)

Solenoid valve (Port size)				Orifice symbol (Diameter)					
Model	VX21	VX22	VX23	1 (2 mmø)	2 (3 mmø)	3 (4.5 mmø)	4 (6 mmø)	5 (8 mmø)	6 (10 mmø)
Port no. (Port size)	01 (1/8)	—	—	●	●	●	—	—	—
	02 (1/4)	—	—	●	●	●	—	—	—
	—	02 (1/4)	02 (1/4)	—	●	●	●	●	● (VX23)
	—	03 (3/8)	03 (3/8)	—	●	●	●	●	● (VX23)
	—	04 (1/2)	04 (1/2)	—	—	—	—	—	● (VX23)

Table (3) Bracket Part No.

Model	Part no.
VX21 ¹ / ₃ 0	VX021N-12A
VX22 ² / ₃ 0	VX022N-12A
VX23 ² / ₄ 0	VX023N-12A-L
VX22 ⁵ / ₈ 0	
VX23 ⁵ / ₈ 0	

Table (2) Solenoid Valve Option

Option symbol	Seal material	Body material	Coil insulation type	Operating fluid
-	NBR	Brass (C37)	B	Water, Air
G		Stainless steel		
V	FKM	Brass (C37)		Non-leak (10 ⁻⁶ Pa·m ³ /sec), , Oil-free, Medium vacuum (0.1 Pa-abs)
M		Stainless steel		High corrosive spec., Oil-free
L				

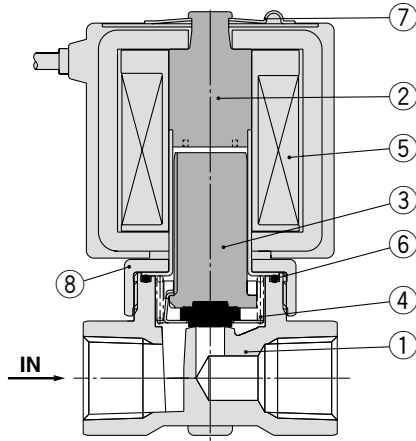
Series VX21/22/23

For Air, Water, Oil, Steam

Construction: Single Unit

Normally closed (N.C.)

Body material: Brass, Stainless steel



Component Parts

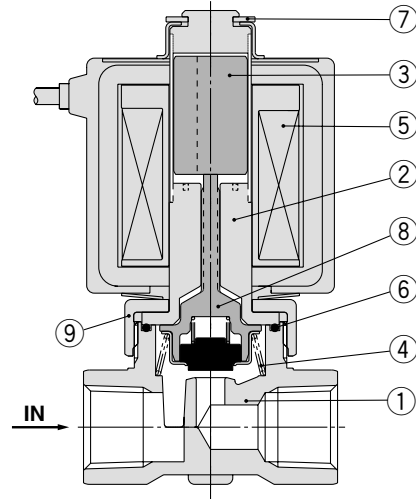
No.	Description	Material	
		Body material brass specification	Body material stainless steel specification
1	Body	Brass	Stainless steel
2	Tube assembly ^{Note)}	Stainless steel, Cu	Stainless steel, Ag
3	Armature assembly	(NBR, FKM, EPDM, PTFE) Stainless steel, PPS	
4	Return spring	Stainless steel	
5	Solenoid coil	—	
6	O-ring	(NBR, FKM, EPDM, PTFE)	
7	Clip	SK	
8	Nut	Brass	Brass, Ni plated

The materials in parentheses are the seal materials.

Note) Cu and Ag are not applicable to the DC spec. and to the AC spec. (Built-in full-wave rectifier).

Normally open (N.O.)

Body material: Brass, Stainless steel



Component Parts

No.	Description	Material	
		Body material brass specification	Body material stainless steel specification
1	Body	Brass	Stainless steel
2	Tube assembly ^{Note)}	Stainless steel, Cu	Stainless steel, Ag
3	Armature assembly	Stainless steel	
4	Return spring	Stainless steel	
5	Solenoid coil	—	
6	O-ring	(NBR, FKM, EPDM, PTFE)	
7	Clip	SK	
8	Push rod assembly	(NBR, FKM, EPDM, PTFE) Stainless steel, PPS	
9	Nut	Brass	Brass, Ni plated

The materials in parentheses are the seal materials.

Note) Cu and Ag are not applicable to the DC spec. and to the AC spec. (Built-in full-wave rectifier).

Construction: Manifold

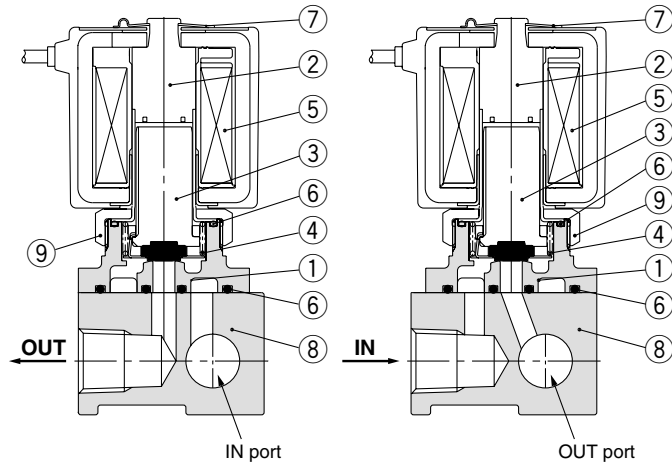
Normally closed (N.C.)

Base material: Aluminum

Fluid: Air

Common SUP type

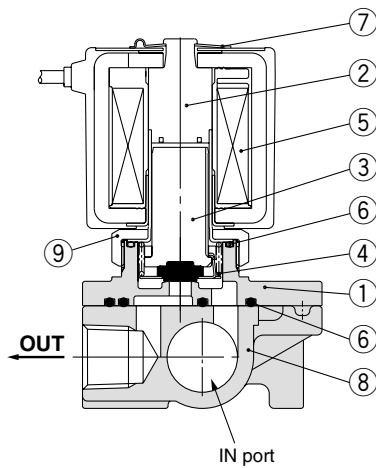
Individual SUP type



Base material: Brass, Stainless steel

Fluid: Water, Oil, Steam

Common SUP type



Component Parts

No.	Description	Material		
		Base material aluminum specification	Base material brass specification	Base material stainless steel specification
1	Body	Aluminum	Brass	Stainless steel
2	Tube assembly ^{Note)}	Stainless steel, Cu		Stainless steel, Ag
3	Armature assembly	(NBR, FKM, EPDM, PTFE) Stainless steel, PPS		
4	Return spring	Stainless steel		
5	Solenoid coil	—		
6	O-ring	(NBR, FKM, EPDM, PTFE)		
7	Clip	SK		
8	Base	Aluminum	Brass	Stainless steel
9	Nut	Brass, Ni plated	Brass	Brass, Ni plated

The materials in parentheses are the seal materials.

Note) Cu and Ag are not inapplicable to the DC spec. and to the AC spec. (Built-in full-wave rectifier).

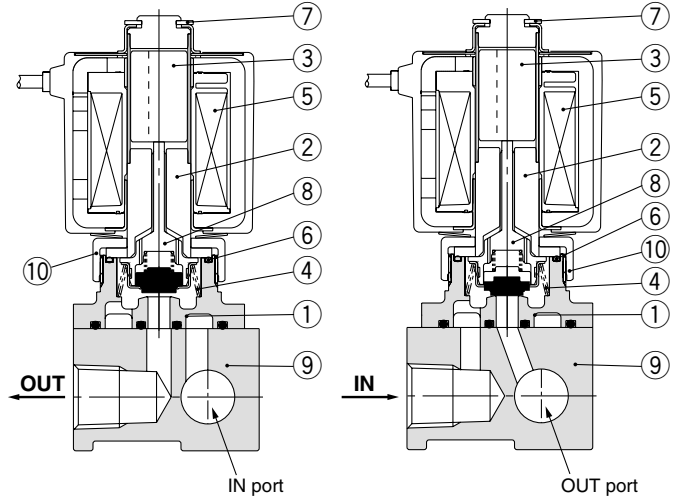
Normally open (N.O.)

Base material: Aluminum

Fluid: Air

Common SUP type

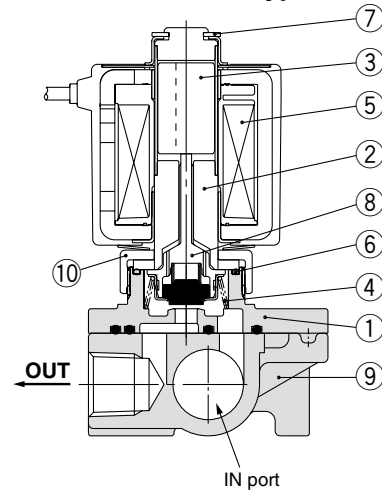
Individual SUP type



Base material: Brass, Stainless steel

Fluid: Water, Oil, Steam

Common SUP type



Component Parts

No.	Description	Material		
		Base material aluminum specification	Base material brass specification	Base material stainless steel specification
1	Body	Aluminum	Brass	Stainless steel
2	Tube assembly ^{Note)}	Stainless steel, Cu		Stainless steel, Ag
3	Armature assembly	Stainless steel		
4	Return spring	Stainless steel		
5	Solenoid coil	—		
6	O-ring	(NBR, FKM, EPDM, PTFE)		
7	Clip	SK		
8	Push rod assembly	(NBR, FKM, EPDM, PTFE) Stainless steel, PPS		
9	Base	Aluminum	Brass	Stainless steel
10	Nut	Brass, Ni plated	Brass	Brass, Ni plated

The materials in parentheses are the seal materials.

Note) Cu and Ag are not inapplicable to the DC spec. and to the AC spec. (Built-in full-wave rectifier).

Specifications

For Air

For Water

For Oil

For Steam

Energy Saving Type

Construction

Dimensions

Series VX21/22/23

For Air, Water, Oil, Steam

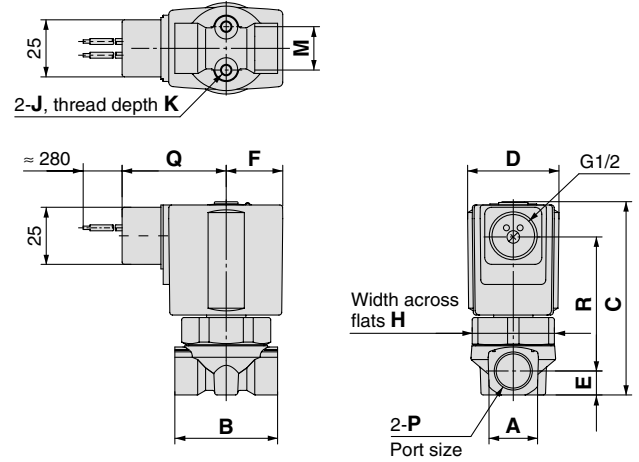
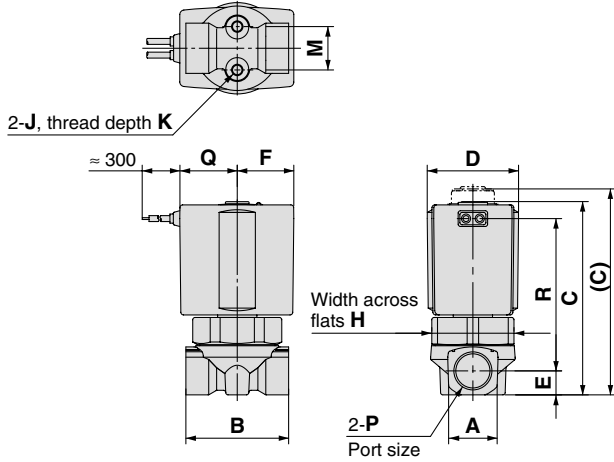
Dimensions: Single Unit/Body Material: Brass, Stainless Steel

Normally closed (N.C.): VX21□0/VX22□0/VX23□0

Normally open (N.O.): VX21□2/VX22□2/VX23□2

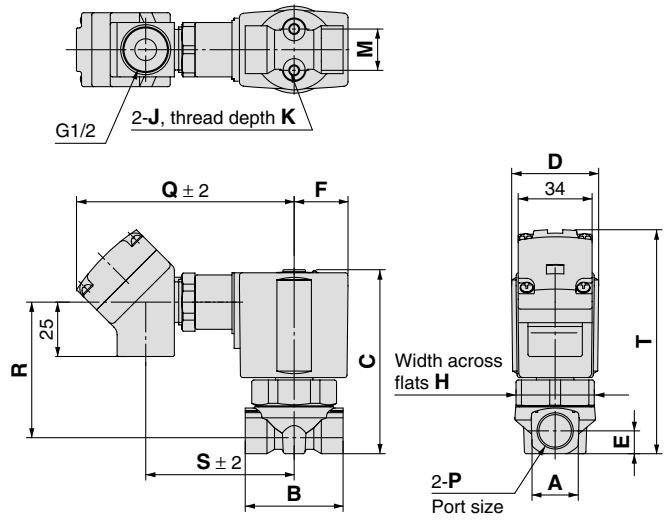
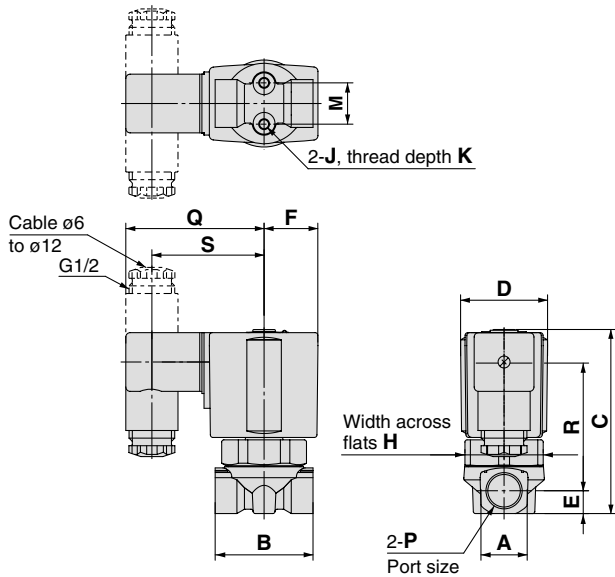
Grommet: G

Conduit: C



DIN terminal: D

Conduit terminal: T



(mm)

Model		Orifice size	Port size P	A	B	C	D	E	F	H	Bracket mounting		
N.C.	N.O.										J	K	M
VX21□0	VX21□2	ø2, ø3, ø4.5	1/8, 1/4	18	40	68 (76)	30	9	19.5	27	M4	6	12.8
VX22□0	VX22□2	ø3, ø4.5, ø6	1/4, 3/8	22	45	78 (86)	35	10.5	22.5	32	M5	8	19
VX22□0	—	ø8, ø10	1/4, 3/8, 1/2	30	50	85		14			M5	8	23
VX23□0	VX23□2	ø3, ø4.5, ø6	1/4, 3/8	22	45	85.5 (93)	40	10.5	25	36	M5	8	19
VX23□0	—	ø8, ø10	1/4, 3/8, 1/2	30	50	92		14			M5	8	23

(mm)

Model		Orifice size	Port size P	Electrical entry ^{Note 2)}								Electrical entry (Built-in full-wave rectifier type) ^{Note 2)}													
N.C.	N.O.			Grommet		Conduit		DIN terminal		Conduit terminal		Grommet		Conduit		DIN terminal		Conduit terminal							
				Q	R	Q	R	Q	R	S	Q	R	S	T	Q	R	Q	R	Q	R	S	Q	R	S	T
VX21□0	VX21□2	ø2, ø3, ø4.5	1/8, 1/4	19.5	50	40	42.5	58.5	42	46.5	92	42.5	61	83.5	30	46	48.5	41	65.5	42	53.5	100.5	41	69.5	82
VX22□0	VX22□2	ø3, ø4.5, ø6	1/4, 3/8	22.5	60	43	52.5	61.5	52	49.5	95	52.5	64	95	33	56	51.5	51	68.5	52	56.5	103.5	51	72.5	93.5
VX22□0	—	ø8, ø10	1/4, 3/8, 1/2		63	55.5	55	58.5	55	58	52	98	55.5	64	101.5	33	59	51.5	54	68.5	55	56.5	103.5	54	72.5
VX23□0	VX23□2	ø3, ø4.5, ø6	1/4, 3/8	25.5	66	46	58.5	64	58	52	98	58.5	66.5	101	36	62	54	57	71	58	59	106	57	75	99.5
VX23□0	—	ø8, ø10	1/4, 3/8, 1/2		69	61.5	64	61	58	52	98	61.5	66.5	107.5	36	65	54	60	71	61	59	106	60	75	106

Note 1) The figures in parentheses are the normally open (N.O.) type dimensions.

Note 2) Add 1.5 mm to "R" and "T" dimensions for the N.O. spec.

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

For Air, Water, Oil, Steam

Dimensions: Single Unit/Body Material: Brass, Stainless Steel

Normally closed (N.C.): VX21□0/VX22□0/VX23□0

Normally open (N.O.): VX21□2/VX22□2/VX23□2

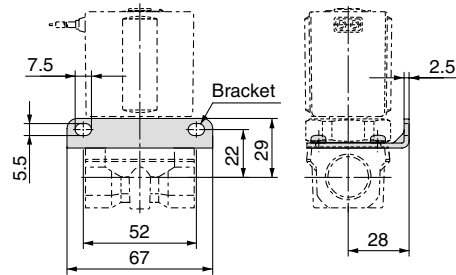
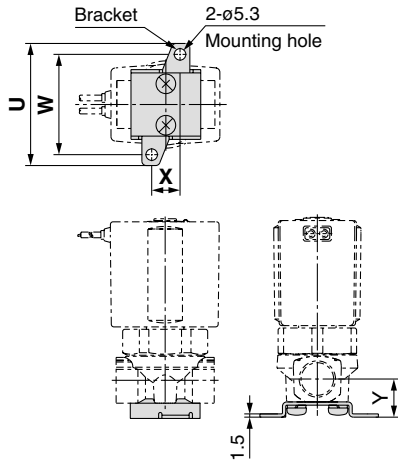
Specifications with bracket

Orifice $\phi 2, \phi 3, \phi 4.5, \phi 6$

(Packaged together with valve)

Orifice $\phi 8, \phi 10$

(Assembled at the time of shipment)



(mm)

Model		Orifice size	Port size P	Bracket mounting			
N.C.	N.O.			U	W	X	Y
VX21□0	VX21□2	$\phi 2, \phi 3, \phi 4.5$	1/8, 1/4	46	36	11	15
VX22□0	VX22□2	$\phi 3, \phi 4.5, \phi 6$	1/4, 3/8	56	46	13	17.5
VX22□0	—	$\phi 8, \phi 10$	1/4, 3/8, 1/2	—	—	—	—
VX23□0	VX23□2	$\phi 3, \phi 4.5, \phi 6$	1/4, 3/8	56	46	13	17.5
VX23□0	—	$\phi 8, \phi 10$	1/4, 3/8, 1/2	—	—	—	—

Specifications

For Air

For Water

For Oil

For Steam

Energy Saving Type

Construction

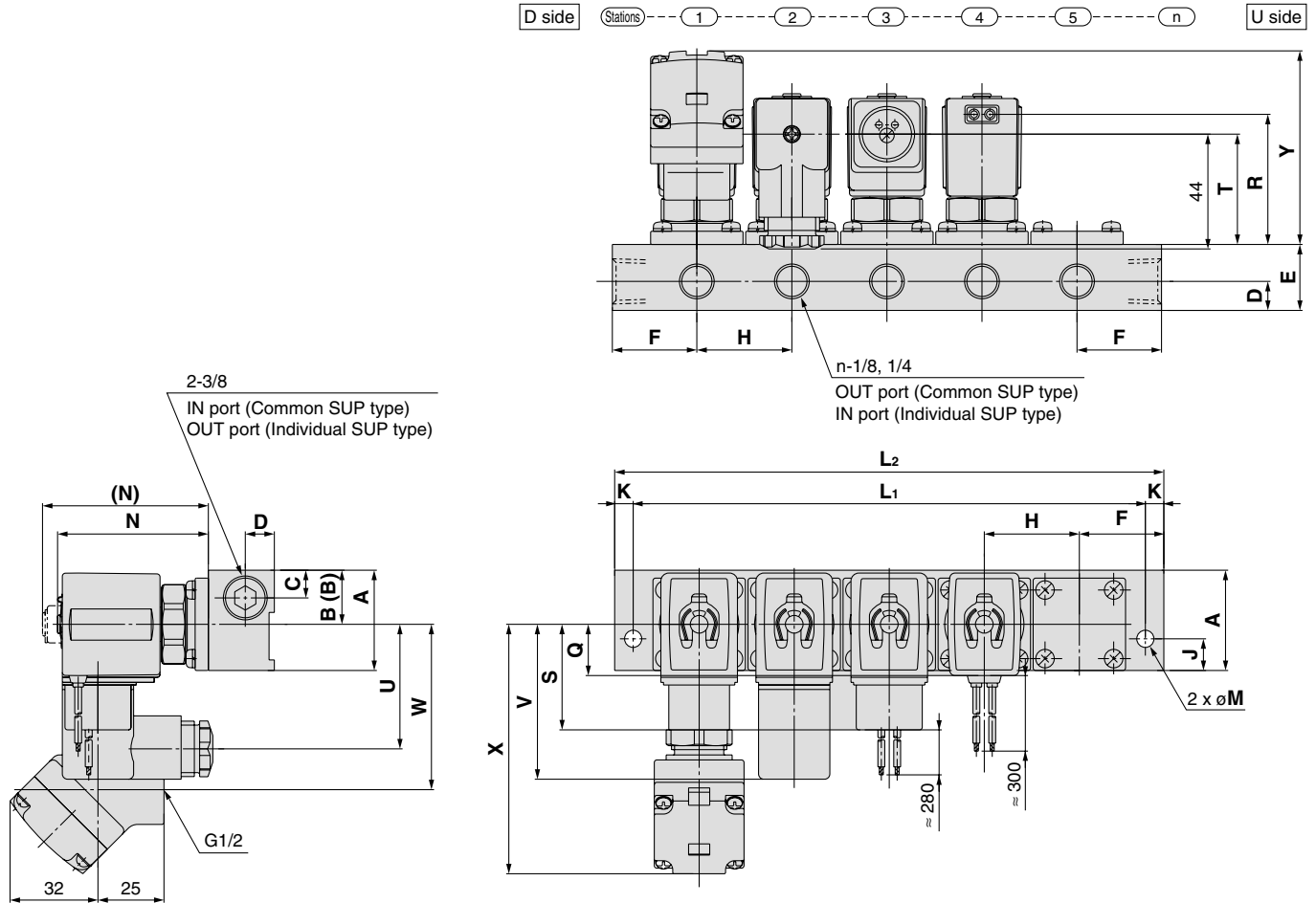
Dimensions

Series VVX21/22/23

For Air

Dimensions: Manifold/Base Material: Aluminum

Normally closed (N.C.): VVX21/VVX22/VVX23
 Normally open (N.O.):



(mm)

Model	Dimension	n (Stations)								
		2	3	4	5	6	7	8	9	10
VVX21	L ₁	86	122	158	194	230	266	302	338	374
	L ₂	100	136	172	208	244	280	316	352	388
VVX22	L ₁	108	154	200	246	292	338	384	430	476
VVX23	L ₂	126	172	218	264	310	356	402	448	494

(mm)

Model	A	B	(B) Individual SUP type	C	D	E	F	H	J	K	M	N
VVX21	38	20.5	17.5	10.5	11	25	32	36	12	7	6.5	57.5 (65.5)
VVX22	49	26.5	22.5	13	13	30	40	46	15	9	8.5	66.5 (74.5)
VVX23	49	26.5	22.5	13	13	30	40	46	15	9	8.5	71.5 (80)

(mm)

Model	Electrical entry										Electrical entry (Built-in full-wave rectifier type) ^{Note 2)}									
	Grommet		Conduit		DIN terminal			Conduit terminal			Grommet		Conduit		DIN terminal		Conduit terminal			
	Q	R	S	T	U	V	T	W	X	Y	Q	R	S	T	U	V	T	W	X	Y
VVX21	19.5	48.5	40	41	46.5	58.5	40.5	61	92	73	30	44.5	48.5	40	53.5	65.5	41	69.5	100.5	72
VVX22	22.5	58.5	43	51	49.5	61.5	50.5	64	95	83	33	54.5	51.5	50	56.5	68.5	51	72.5	103.5	82
VVX23	25.5	63	46	55.5	52	64	55	66.5	98	87.5	36	59	54	54	59	71	55	75	106	86

Note 1) The figures in parentheses are the normally open (N.O.) type dimensions.

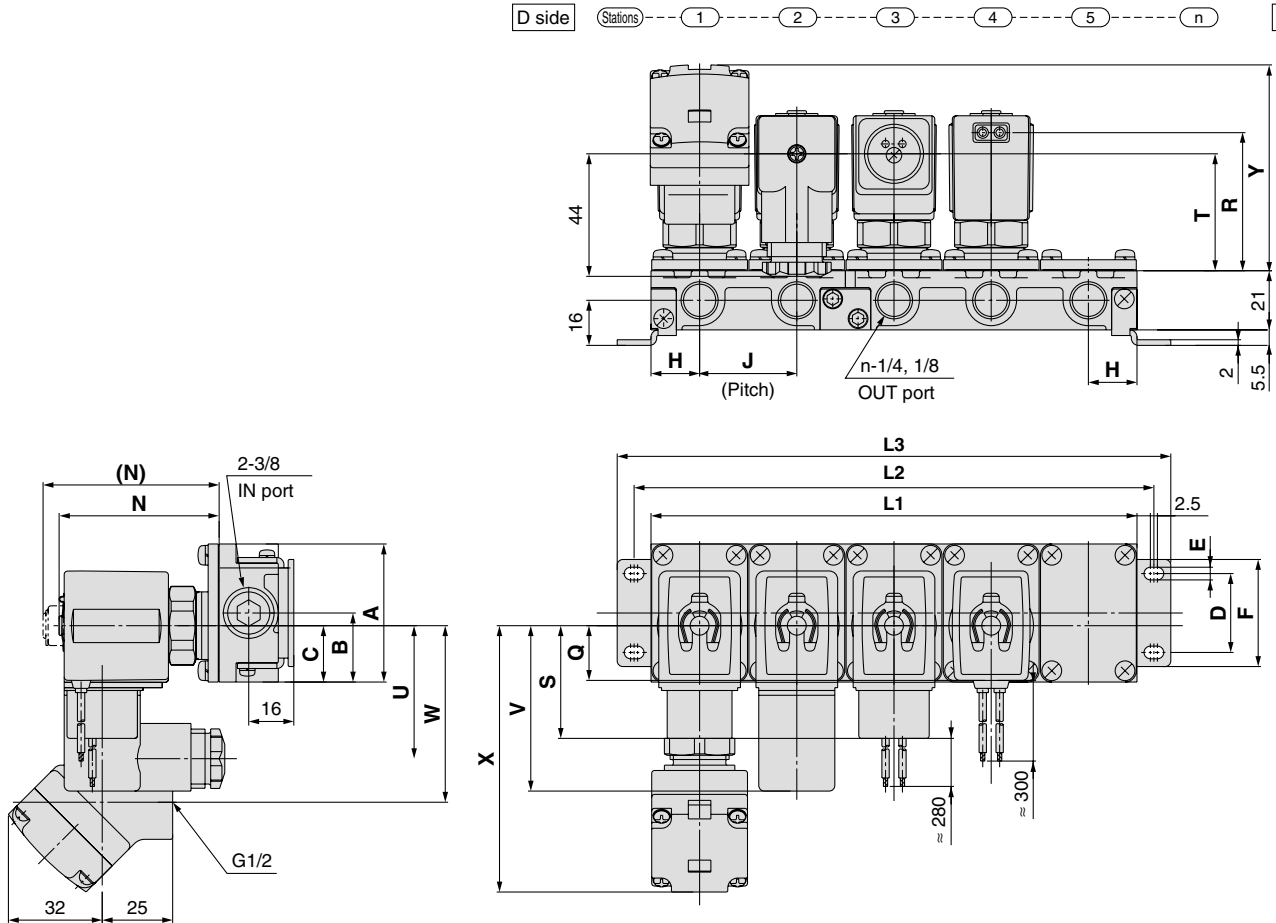
Note 2) Add 1.5 mm to "R", "T" and "Y" dimensions for the N.O. spec.

Direct Operated 2 Port Solenoid Valve Series VVX21/22/23

For Water, Oil, Steam

Dimensions: Manifold/Base Material: Brass, Stainless Steel

Normally closed (N.C.): VVX21/VVX22/VVX23
 Normally open (N.O.)



Model	Dimension	n (Stations)								
		2	3	4	5	6	7	8	9	10
VVX21	L ₁	69	103.5	138	172.5	207	241.5	276	310.5	345
	L ₂	81	115.5	150	184.5	219	253.5	288	322.5	357
	L ₃	93	127.5	162	196.5	231	265.5	300	334.5	369
VVX22	L ₁	77	115.5	154	192.5	231	269.5	308	346.5	385
	L ₂	89	127.5	166	204.5	243	281.5	320	358.5	397
	L ₃	101	139.5	178	216.5	255	293.5	332	370.5	409
VVX23	L ₁	83	124.5	166	207.5	249	290.5	332	373.5	415
	L ₂	95	136.5	178	219.5	261	302.5	344	385.5	427
	L ₃	107	148.5	190	231.5	273	314.5	356	397.5	439
Manifold composition		2 stns. x 1	3 stns. x 1	2 stns. x 2	2 stns. + 3 stns.	3 stns. x 2	2 stns. x 2 + 3 stns.	2 stns. + 3 stns. x 2	3 stns. x 3	2 stns. x 2 + 3 stns. x 2

Model	A	B	C	D	E	F	H	J	N
VVX21	49	24.5	20	28	4.5	38	17.3	34.5	56 (64)
VVX22	57	28.5	25.5	30	5.5	42	19.3	38.5	64.5 (72.5)
VVX23	57	28.5	25.5	30	5.5	42	20.8	41.5	72.5 (81)

Model	Electrical entry ^{Note 2)}									Electrical entry (Built-in full-wave rectifier type) ^{Note 2)}										
	Grommet		Conduit		DIN terminal			Conduit terminal		Grommet		Conduit		DIN terminal			Conduit terminal			
	Q	R	S	T	U	V	T	W	X	Y	Q	R	S	T	U	V	T	W	X	Y
VVX21	19.5	47	40	39.5	46.5	58.5	39	61	92	71.5	30	43	48.5	38	53.5	65.5	39	69.5	100.5	70
VVX22	22.5	56.5	43	49	49.5	61.5	48.5	64	95	81	33	52.5	51.5	47.5	56.5	68.5	48.5	72.5	103.5	80
VVX23	25.5	64	46	56.5	52	64	56	66.5	98	88.5	36	60	54	55	59	71	56	75	106	87

Note 1) The figures in parentheses are the normally open (N.O.) type dimensions.
 Note 2) Add 1.5 mm to "R", "T" and "Y" dimensions for the N.O. spec.

Specifications

For Air

For Water

For Oil

For Steam

Energy Saving Type

Construction

Dimensions

Series VX21/22/23

For Air, Water, Oil, Steam

Replacement Parts

• Solenoid coil assembly part no.

VX02 **1**N-**1**G-□-□

Series

1	VX21□□
2	VX22□□
3	VX23□□

Valve

Symbol	Valve
-	N.C.
2	N.O.

Rated voltage (Note)

1	100 VAC 50/60 Hz
2	200 VAC 50/60 Hz
3	110 VAC 50/60 Hz
4	220 VAC 50/60 Hz
5	24 VDC
6	12 VDC
7	240 VAC 50/60 Hz
8	48 VAC 50/60 Hz
J	230 VAC 50/60 Hz

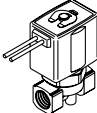
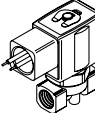
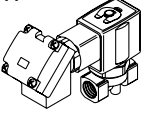
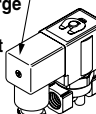
Coil insulation type (Note)

-	Class B
H*	Class H

* DIN terminal and DC spec. are not available.

Note) Refer to the table (1) for the available combinations.

Electrical entry

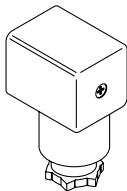
<p>G - Grommet</p> <p>GS - With grommet surge voltage suppressor</p> 	<p>C - Conduit</p> 
<p>T - With conduit terminal</p> <p>TS - With conduit terminal and surge voltage suppressor</p> <p>TL - With conduit terminal and light</p> <p>TZ - With conduit terminal, surge voltage suppressor and light</p> 	<p>D - DIN terminal</p> <p>DS - DIN terminal with surge voltage suppressor</p> <p>DL - DIN terminal with light</p> <p>DZ - DIN terminal with surge voltage suppressor and light</p> <p>DO - For DIN terminal (without connector)</p> <p>* DIN type is available with Class B coils only.</p> 

* Refer to the table (1) for the available combinations between each electrical option (S, L, Z) and the rated voltage.

• DIN connector part no.

Without electrical option **GDM2A**

With electrical option **GDM2A**-□-□



Electrical option

S	With surge voltage suppressor
L	With light
Z	With light/surge voltage suppressor

* Refer to the table (1) for the available combinations between each electrical option (S, L, Z) and the rated voltage.

Rated voltage

1	100 VAC, 110 VAC
2	200 VAC, 220 VAC, 230 VAC, 240 VAC
5	24 VDC
6	12 VDC
15	48 VAC

AC/Class B coil (Built-in full-wave rectifier)

VX02 **1**N-**1**GR-□

Series

1	VX21□□
2	VX22□□
3	VX23□□

Valve

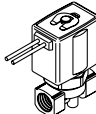
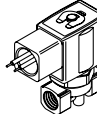
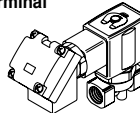
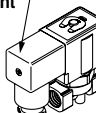
Symbol	Valve
-	N.C.
2	N.O.

Rated voltage (Note)

1	100 VAC 50/60 Hz
2	200 VAC 50/60 Hz
3	110 VAC 50/60 Hz
4	220 VAC 50/60 Hz
7	240 VAC 50/60 Hz
8	48 VAC 50/60 Hz
J	230 VAC 50/60 Hz

Note) Refer to the table (1) for the available combinations.

Electrical entry

<p>G - Grommet</p> 	<p>C - Conduit</p> 
<p>T - With conduit terminal</p> <p>TL - With conduit terminal and light</p> 	<p>D - DIN terminal</p> <p>DL - DIN terminal with light</p> <p>DO - For DIN terminal (without connector, gasket is included.)</p> <p>Connector</p> 

* Refer to the table (1) for the available combinations between each electrical option and rated voltage.

* Surge voltage suppressor is integrated into the AC/Class B coil (Built-in full-wave rectifier type), as standard.

Table (1) Rated Voltage – Electrical Option

AC/DC	Rated voltage		Class B			Class H		
	Volume symbol	Voltage	S With surge voltage suppressor	L With light	Z With light/surge voltage suppressor	S With surge voltage suppressor	L With light	Z With light/surge voltage suppressor
AC	1	100 V	●	●	●	●	●	●
	2	200 V	●	●	●	●	●	●
	3	110 V	●	●	●	●	●	●
	4	220 V	●	●	●	●	●	●
	7	240 V	●	—	—	●	—	—
	8	48 V	●	—	—	●	—	—
	J	230 V	●	—	—	●	—	—
DC	5	24 V	●	●	●	DC spec. is not available.		
	6	12 V	●	—	—	DC spec. is not available.		

* Option "S", "Z" are not available as a surge voltage suppressor is integrated into the AC/Class B coil (Built-in full-wave rectifier type), as standard.

* Replacement of solenoid coils:

- DC and AC coils cannot be interchanged in order to change the voltage.
- DC and AC/Class B (Built-in full-wave rectifier type) coils can be interchanged in order to change the voltage.
- All DC coil voltages are interchangeable.
- Class B (Built-in full-wave rectifier type) and Class H coils cannot be interchanged.

• Gasket part no. for DIN connector

VCW20-1-29-1

● Name plate part no.

AZ-T-VX Valve model

↑ Enter by referring to
 "How to Order"
 (Single Unit).

● Clip part no. (For N.C.)

For VX21: **VX021N-10**

For VX22: **VX022N-10**

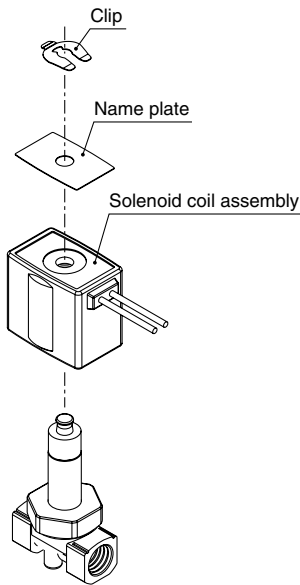
For VX23: **VX023N-10**

● Clip part no. (For N.O.)

For VX21: **ETW-7**

For VX22: **ETW-8**

For VX23: **ETW-9**



Specifications

For Air

For Water

For Oil

For Steam

Energy Saving
Type

Construction

Dimensions

Solenoid Valve Flow Characteristics

(How to indicate flow characteristics)

1. Indication of flow characteristics

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

Table (1) Indication of Flow Characteristics

Corresponding equipment	Indication by international standard	Other indications	Conformed standard
Pneumatic equipment	C, b	—	ISO 6358: 1989 JIS B 8390: 2000
	—	S	JIS B 8390: 2000 Equipment: JIS B 8373, 8374, 8375, 8379, 8381
	—	Cv	ANSI/(NFPA)T3.21.3: 1990
Process fluid control equipment	Av	—	IEC60534-2-3: 1997 JIS B 2005: 1995
	—	Cv	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 characteristics

The flow 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 absolute upstream pressure and the density in a standard condition.

Critical pressure ratio b : Choked flow will occur when the pressure ratio (downstream pressure/up stream pressure) is at or smaller than the critical pressure ratio.

Choked flow : The flow in which the upstream pressure is higher than the downstream pressure and where sonic speed is reached in a certain part of the equipment.
Gaseous mass flow rate is in proportion to the upstream pressure and not dependent on the downstream pressure.

Subsonic flow : Flow when the pressure ratio is greater than the critical pressure ratio.

Standard condition : 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

$$\frac{P_2 + 0.1}{P_1 + 0.1} \leq b, \text{ choked flow}$$

$$Q = 600 \times C(P_1 + 0.1) \sqrt{\frac{293}{273 + t}} \dots\dots\dots(1)$$

When

$$\frac{P_2 + 0.1}{P_1 + 0.1} > b, \text{ subsonic flow}$$

$$Q = 600 \times C(P_1 + 0.1) \sqrt{1 - \left[\frac{\frac{P_2 + 0.1}{P_1 + 0.1} - b}{1 - b} \right]^2} \sqrt{\frac{293}{273 + t}} \dots\dots\dots(2)$$

Q : Air flow rate [dm³/min (ANR)], the SI unit dm³ (Cubic decimetre) is also allowed to be described by ℓ (liter). 1 dm³ = 1 ℓ

Solenoid Valve Flow Characteristics

C : Sonic conductance [dm³/(s·bar)]

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 characteristics are shown in Graph (1) For details, please make use of SMC's "Energy Saving Program".

Example)

Obtain the air flow rate when **P₁** = 0.4 [MPa], **P₂** = 0.3 [MPa], **t** = 20 [°C] for a solenoid valve where

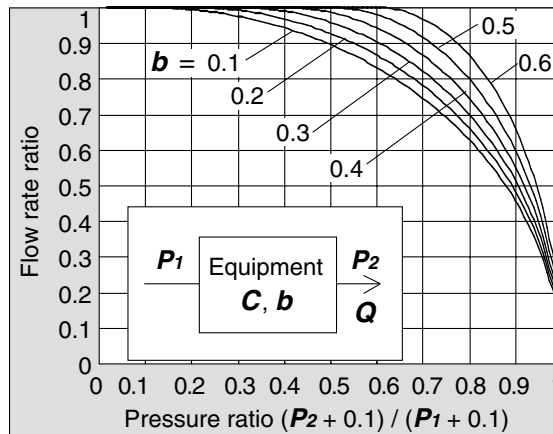
C = 2 [dm³/(s·bar)] and **b** = 0.3.

According to formula (1), the maximum flow rate = $600 \times 2 \times (0.4 + 0.1) \times \sqrt{\frac{293}{273 + 20}} = 600$ [dm³/min (ANR)]

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

Based on Graph (1), the flow rate ratio is going to be 0.7 if it is read with a pressure ratio of 0.8 and the flow ratio of **b** = 0.3.

Hence, flow rate = Max. flow rate x flow rate ratio = 600 x 0.7 = 420 [dm³/min (ANR)]



Graph (1) Flow characteristics

(4) Test method

Pipe the test equipment to the test circuit shown in Fig. (1). Keep the upstream pressure at a certain constant level above 0.3MPa. First measure the maximum flow rate in saturation. Then, measure the flow rate, upstream pressure and downstream pressure each at 80%, 60%, 40% and 20% points of the flow rate. Calculate the sonic conductance C from the maximum flow rate. Also, substitute other data for variables in the formula for subsonic flow and obtain the critical pressure rate b by averaging the critical pressure rates at those points.

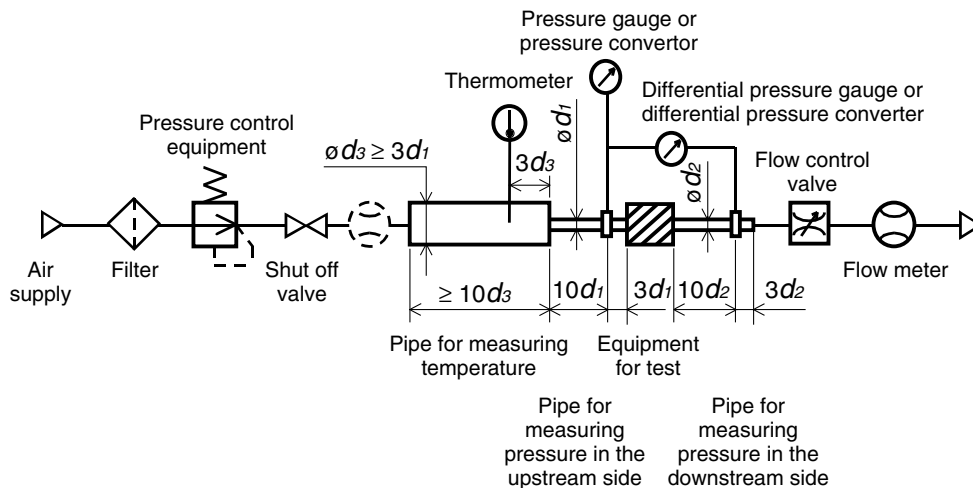


Fig. (1) Test circuit based on ISO 6358, JIS B 8390

Solenoid Valve Flow Characteristics

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: 2 port solenoid valve for pneumatics
JIS B 8374: 3 port solenoid valve for pneumatics
JIS B 8375: 4 port, 5 port solenoid valve for pneumatics
JIS B 8379: Silencer for pneumatics
JIS B 8381: Fittings of flexible joint for pneumatics**

(2) Definition of flow characteristics

Effective area S : The flow ability of a component, represented by its equivalent "ideal" cross section area. This effective area is calculated under sonic conditions by measuring pressure loss in an air tank. Like sonic conductance C , the effective area is a method of expressing the flow rate of a product.

(3) Formula for flow rate

When

$$\frac{P_2 + 0.1}{P_1 + 0.1} \leq 0.5, \text{ choked flow}$$

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

When

$$\frac{P_2 + 0.1}{P_1 + 0.1} > 0.5, \text{ subsonic flow}$$

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

Conversion with sonic conductance C :

$$S = 5.0 \times C \dots\dots\dots(5)$$

Q : Air flow rate[dm³/min(ANR)], dm³ (cubic decimetre) is also allowed to be described by ℓ (liter) 1 dm³ = 1 ℓ

S : Effective area [mm²]

P_1 : Upstream pressure [MPa]

P_2 : Downstream pressure [MPa]

t : Temperature [°C]

Note) Formula for subsonic flow (4) is only applicable when the critical pressure ratio b is unknown. It is the same as the formula for sonic conductance C (2) only when $b=0.5$.

(4) Test method

Pipe the test equipment to the test circuit shown in Fig. (2). Fill the air tank with compressed air and keep the pressure at a constant level above 0.6MPa (0.5 MPa). Then discharge the air until the pressure in the tank drops to 0.25MPa (0.2 MPa). Measure the time required to discharge the air and the residual pressure in the air tank after leaving it until the pressure becomes stable in order to calculate the effective sectional area S by the following formula. Select the capacity of the air tank according to the effective sectional area of the test equipment. In the case of JIS B 8373, 8374, 8375, 8379, 8381, the pressure values are in parentheses and the coefficient of formula is 12.9.

$$S = 12.1 \frac{V}{t} \log_{10} \left(\frac{P_s + 0.1}{P + 0.1} \right) \frac{293}{T} \dots\dots\dots(6)$$

S : Effective area [mm²]

V : Air tank capacity [dm³]

t : Discharging time [s]

P_s : Pressure inside air tank before discharging [MPa]

P : Residual pressure inside air tank after discharging [MPa]

T : Temperature inside air tank before discharging [K]

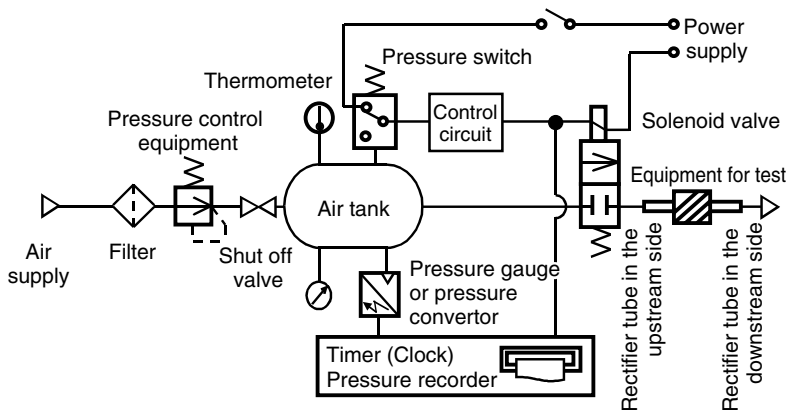


Fig. (2) Test circuit based on JIS B 8390

Solenoid Valve Flow Characteristics

2.3 Flow coefficient C_v factor

The United States Standard ANSI/(NFPA)T3.21.3:1990: Pneumatic fluid power—Flow rating test procedure and reporting method for fixed orifice components

Defines the of flow coefficient C_v factor by the following formula which is based on testing conducted with a test circuit analogous to ISO 6358.

$$C_v = \frac{Q}{114.5 \sqrt{\frac{\Delta P (P_2 + P_a)}{T_1}}} \dots\dots\dots(7)$$

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

P_1 : 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 [dm³/s standard condition]

P_a : Atmospheric pressure [bar absolute]

T_1 : Upstream absolute temperature [K]

Test conditions are $< P_1 + P_a = 6.5 \pm 0.2$ bar absolute, $T_1 = 297 \pm 5$ K, $0.07 \text{ bar} \leq \Delta P \leq 0.14$ bar.

This is the same concept as effective area A which ISO6358 stipulates as being applicable only when the pressure drop is smaller in relation to the upstream pressure so that the compression of air is negligible.

3. Process fluid control equipment

(1) Conformed standard

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

JIS B 2005: 1995: Test method for the flow coefficient of a valve

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 characteristics

Av factor: It is the value representing the flow of clean water in m³/s which runs through a valve (equipment for test) when the pressure difference is 1 Pa. It is calculated using the following formula.

$$Av = Q \sqrt{\frac{\rho}{\Delta P}} \dots\dots\dots(8)$$

Av : Flow coefficient [m²]

Q : Flow rate [m³/s]

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 characteristics are shown in Graph (2).

In the case of liquid:

$$Q = 1.9 \times 10^6 Av \sqrt{\frac{\Delta P}{G}} \dots\dots\dots(9)$$

Q : Flow rate [ℓ/min]

Av : Flow coefficient [m²]

ΔP : Pressure difference [MPa]

G : Relative density [water = 1]

In the case of saturated aqueous vapour:

$$Q = 8.3 \times 10^6 Av \sqrt{\Delta P (P_2 + 0.1)} \dots\dots\dots(10)$$

Q : Flow rate [kg/h]

Av : Flow coefficient [m²]

ΔP : Pressure difference [MPa]

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

P_2 : Downstream pressure [MPa]

Solenoid Valve Flow Characteristics

Conversion of flow coefficient:

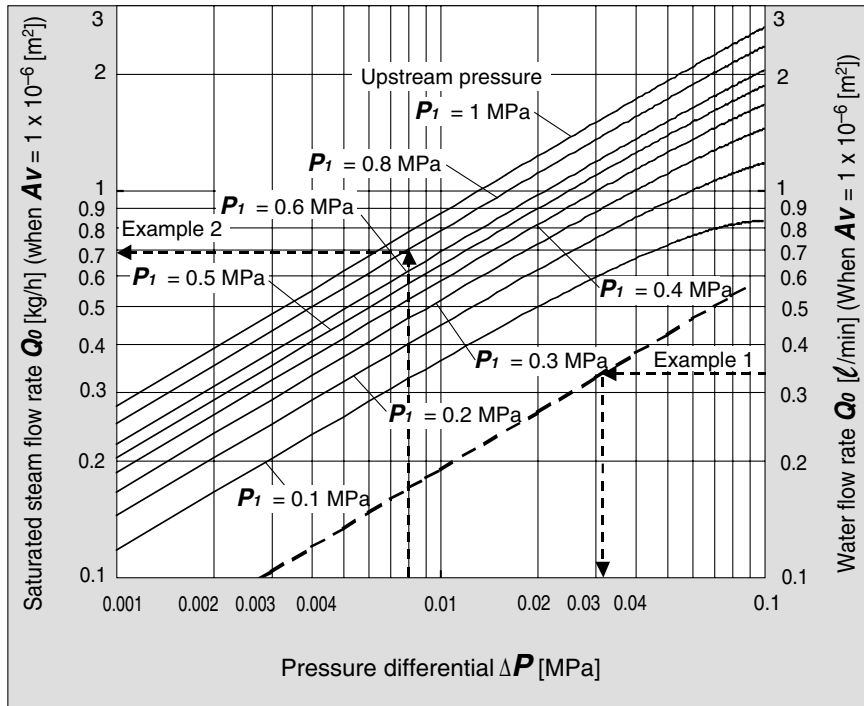
$$Av = 28 \times 10^{-6} Kv = 24 \times 10^{-6} Cv \dots\dots\dots(11)$$

Here,

Kv factor: It is the value representing the flow rate of clean water in m³/h which runs through a valve at 5 to 40°C, when the pressure difference is 1 bar.

Cv factor (Reference values): It is the value representing the flow rate of clean water in US gal/min which runs through a valve at 60°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.



Graph (2) Flow characteristics

Example 1)

Obtain the pressure difference when 15 [l/min] of water runs through a solenoid valve with an **Av** = 45 × 10⁻⁶ [m²]. Since **Qo** = 15/45 = 0.33 [l/min], according to Graph (2), if reading **ΔP** when **Qo** is 0.33, it will be 0.031 [MPa].

Example 2)

Obtain the saturated steam flow rate when **P1** = 0.8 [MPa], **ΔP** = 0.008 [MPa] with a solenoid valve with an **Av** = 1.5 × 10⁻⁶ [m²]. According to Graph (2), if reading **Qo** when **P1** is 0.8 and **ΔP** is 0.008, it is 0.7 [kg/h]. Hence, the flow rate **Q** = 0.7 × 1.5 = 1.05 [kg/h].

(4) Test method

Attach a test equipment with the test circuit shown in Fig. (3). Then, run water at 5 to 40°C, and measure the flow rate with a pressure difference of 0.075 MPa. However, the pressure difference needs to be set with a large enough difference so that the Reynolds number does not go below a range of 4 × 10⁴.

By substituting the measurement results for formula (8) to figure out **Av**.

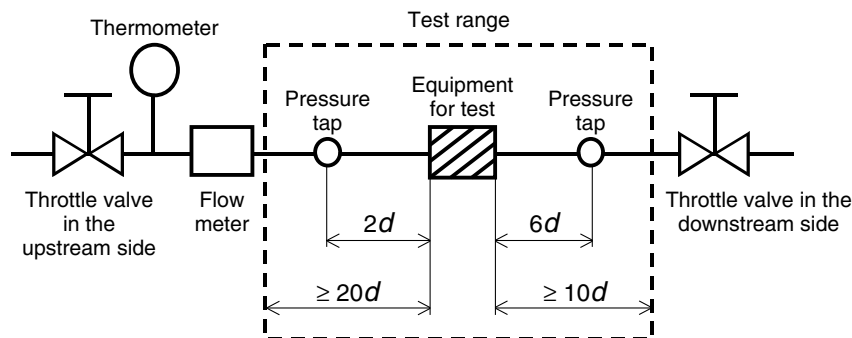
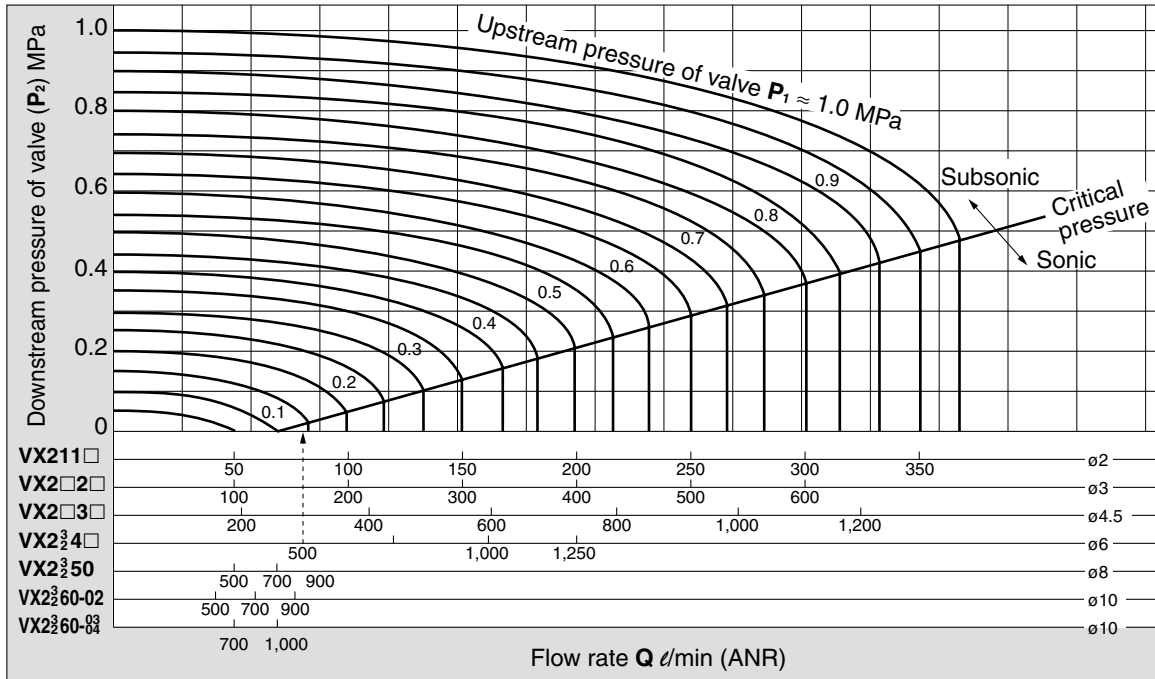


Fig. (3) Test circuit based on IEC60534-2-3, JIS B 2005

Flow Characteristics

Note) Use this graph as a guide. In the case of obtaining an accurate flow rate, refer to pages 30 through to 34.

For Air



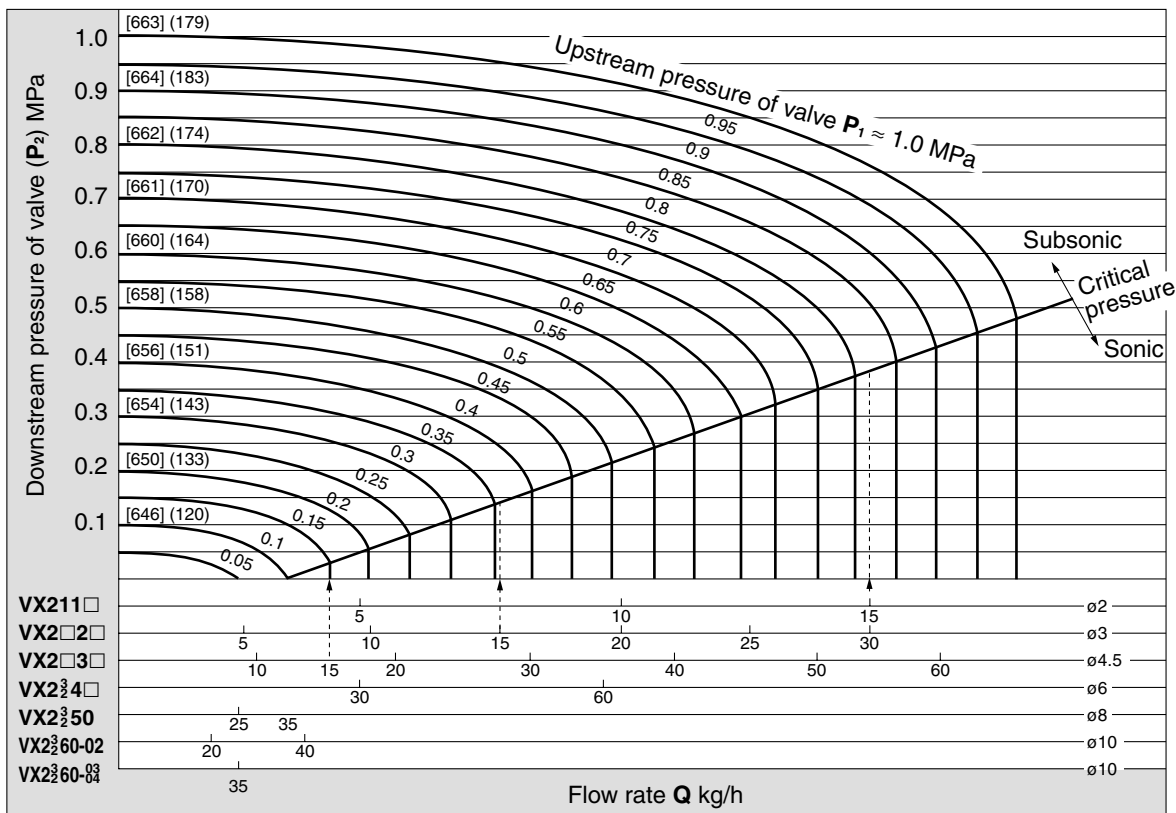
How to read the graph

The sonic range pressure to generate a flow rate of 500 l/min (ANR) is

$P_1 \approx 0.14$ MPa for a ø6 orifice (VX2 $\frac{3}{4}$ □) and

$P_1 \approx 0.3$ MPa for a ø4.5 orifice (VX2 □3 □).

For Saturated Steam



Figures inside [] indicate the saturated steam holding heat (kcal/kg). Figures inside () indicate the saturation temperature (°C).

How to read the graph

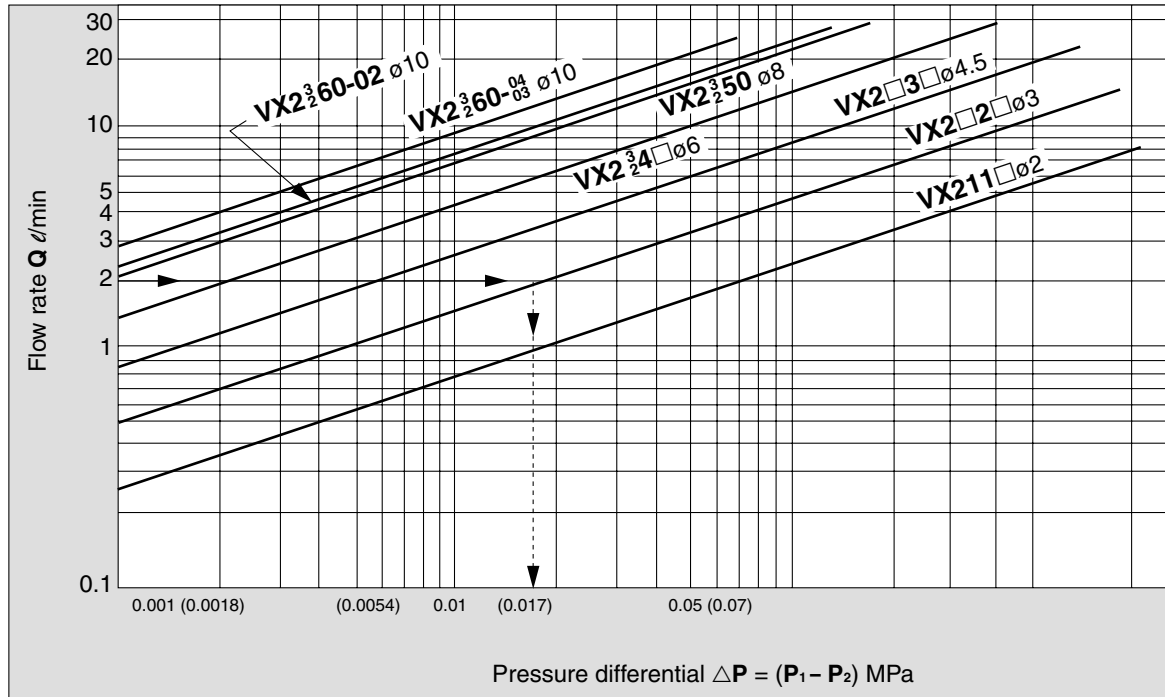
The sonic range pressure to generate a flow rate of 15 kg/h is

$P_1 \approx 0.15$ MPa for ø4.5 orifice (VX2 □3 □S), $P_1 \approx 0.37$ MPa for ø3 orifice (VX2 □2 □S), and

$P_1 \approx 0.82$ MPa for ø2 orifice (VX211 □S). The holding heat slightly differs depending on the pressure P_1 , but at 15 kg/h it is approximately 9700 kcal/h.

Flow Characteristics

For Water



How to read the graph

When a water flow of 2 l/min is generated, $\Delta P \approx 0.017$ MPa for a valve with $\phi 3$ orifice (VX212□, 222□, 232□).

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, with the valve closed or open. 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 opened.

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 be less than 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, $W = V \cdot A \cdot \cos\theta$. For DC, $W = V \cdot A$.

(Note) $\cos\theta$ shows power factor. $\cos\theta = 0.6$

2. Surge voltage

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

3. Enclosure

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

IP65: Dust-tight, Low jetproof type

"Low jetproof type" means that no water intrudes inside the equipment that could hinder it 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.

Others

1. Material

NBR: Nitrile rubber

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

EPDM: Ethylene propylene rubber

PTFE: Polytetrafluoroethylene resin – Trade names: Teflon®, Polyflon®, etc.

2. Oil-free treatment

The degreasing and washing of wetted parts.

3. Passage symbol

In the JIS symbol (□□□[⊕]) IN and OUT are in a blocked condition (⊕), but actually in the case of reverse pressure (OUT>IN), there is a limit to the blocking.


(◇) is used to indicate that blocking of reverse pressure is not possible.





Series VX21/22/23

Safety Instructions

The following safety instructions are intended to prevent a hazardous situation and/or equipment damage. These instructions indicate the level of potential hazard by all safety practices, including labels of "**Caution**", "**Warning**" or "**Danger**". To ensure safety, please observe ISO 4414 ^{Note 1}), JIS B 8370 ^{Note 2}).

 **Caution:** Operator error could result in injury or equipment damage.

 **Warning:** Operator error could result in serious injury or loss of life.

 **Danger :** In extreme conditions, there is a possible result of serious injury or loss of life.

Note 1) ISO 4414: Pneumatic fluid power – General rules relating to systems

Note 2) JIS B 8370: General Rules for Pneumatic Equipment

Warning

1. The compatibility of equipment is the responsibility of the person who designs the system or decides its specifications.

Since the products specified here are used in various operating conditions, their compatibility with a specific system must be based on specifications, post analysis and/or tests to meet a specific requirement. The expected performance and safety assurance will be the responsibility of the person who has determined the compatibility of the system. This person should continuously review the suitability of all items specified, referring to the latest catalogue information and taking into consideration the possibility of equipment failure when configuring a system. Be particularly careful in determining the compatibility with the fluid to be used.

2. Only trained personnel should operate machinery and equipment.

The fluid can be dangerous if handled incorrectly. Assembly, handling or maintenance of the system should be performed by trained and experienced operators.

3. Do not service machinery/equipment or attempt to remove components until the safety is confirmed.

1. Inspection and maintenance of machinery/equipment should only be performed once measures to prevent falling or runaway of the driven object have been confirmed. Measures to prevent danger from a fluid should also be confirmed.

2. When equipment is to be removed, confirm the safety processes mentioned above, release the fluid pressure and be certain there is no danger from fluid leakage or fluid remaining in the system.

3. Carefully restart the machinery, confirming that safety measures are being implemented.

4. Contact SMC if the product is to be used in any of the following conditions:

1. Conditions and environments beyond the given specifications, or if product is used outdoors.

2. With fluids whose application causes concern due to the type of fluid or additives, etc.

3. An application which has the possibility of having a negative effect on people, property, and therefore requires special safety analysis.



2 Port Solenoid Valve for Fluid Control

Precautions 1

Be sure to read this before handling.

For detailed precautions on each series, refer to the main text.

Design

Warning

1. Cannot be used as an emergency shutoff valve, etc.

The valves presented in this catalogue 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 energisation

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

3. This solenoid valve cannot be used for explosion proof applications.

4. Maintenance space

The installation should allow sufficient space for maintenance activities.

5. Liquid rings

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

6. 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.

7. 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.

8. When the conduit type is used as equivalent to an IP65 enclosure, install a wiring conduit, etc.

9. When an impact, such as water hammer, etc., caused by the rapid pressure fluctuation is applied, the solenoid valve may be damaged. Please pay an attention to this.

Selection

Warning

1. Confirm the specifications.

Give careful consideration to the operating conditions such as the application, fluid and environment, and use within the operating ranges specified in this catalogue.

2. Fluid

1) Type of fluid

Before using a fluid, confirm whether it is compatible with the materials from each model by referring to the fluids listed in this catalogue. 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,

Confirm the specification for leakage in the interior and/or exterior area.

Selection

Warning

3) Corrosive gas

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

4) Use an oil-free specification when oily particles must not enter the fluid passage.

5) Applicable fluid on the list may not be used depending on the operating condition. Just because the compatibility list shows the general case, still give adequate confirmation when selecting a model.

3. Fluid quality

The use of a fluid which contains foreign matter 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 80 to 100 mesh.

When used to supply water to boilers, substances such as calcium and magnesium which generate hard scale and sludge are included. 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.

4. Air quality

1) Use clean air.

Do not use compressed air which includes chemicals, synthetic oils containing organic solvents, salt or corrosive gases, etc., as it can cause damage or malfunction.

2) Install air filters.

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

3) Install an air dryer or after cooler, etc.

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

4) If excessive carbon powder is generated, eliminate it by installing mist separators on the upstream side of the 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 SMC's "Best Pneumatics" catalogue for further details on compressed air quality.

5. Ambient environment

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

6. Countermeasures against static electricity

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

7. For the low particle generation specification, please contact SMC.



2 Port Solenoid Valve for Fluid Control

Precautions 2

Be sure to read this before handling.

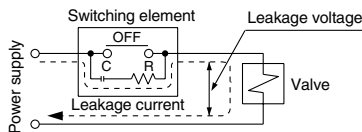
For detailed precautions on each series, refer to the main text.

Selection

⚠ Caution

1. Leakage voltage

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/Class B built-in full-wave rectifier coil: 10% or less of rated voltage

AC/Class B/H coil: 20% or less of rated voltage

DC coil: 2% or less of rated voltage

2. Low temperature operation

1. The valve can be used in an ambient temperature of between -10 to -20°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 or 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.

Mounting

⚠ Warning

1. 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.

3. Be sure not to position the coil downwards.

When mounting a valve with its coil positioned downwards, foreign objects in the fluid will adhere to the iron core leading to a malfunction.

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

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

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 labelled on the product should not be erased, removed or covered up.

Piping

⚠ Caution

1. Preparation before piping

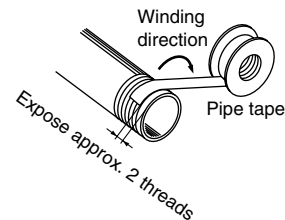
Before piping is connected, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil and other debris from inside the pipe.

Install piping so that it does not apply pulling, pressing, bending or other forces on the valve body.

2. Wrapping of pipe tape

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

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



3. Avoid connecting ground lines to piping, as this may cause electric corrosion of the system.

4. Always tighten threads with the proper tightening torque.

When attaching fittings to valves, tighten with the proper tightening torque shown below.

Tightening Torque for Piping

Connection threads	Proper tightening torque N·m
Rc 1/8	7 to 9
Rc 1/4	12 to 14
Rc 3/8	22 to 24
Rc 1/2	28 to 30

5. Connection of piping to products

When connecting piping to a product, refer to its instruction manual to avoid mistakes regarding the supply port, etc.

6. Steam generated in a boiler contains a large amount of drainage.

Be sure to operate it with a drain trap installed.

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



2 Port Solenoid Valve for Fluid Control

Precautions 3

Be sure to read this before handling.

For detailed precautions on each series, refer to the main text.

Wiring

⚠ Caution

- As a rule, use electrical wire with a cross sectional area of 0.5 to 1.25 mm² for wiring. Furthermore, do not allow excessive force to be applied to the lines.
- Use electrical circuits which do not generate chattering in their contacts.
- 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.
- When a surge from the solenoid affects the electrical circuitry, install a surge voltage suppressor, etc., in parallel with the solenoid. Or, adopt the 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 contact SMC.)

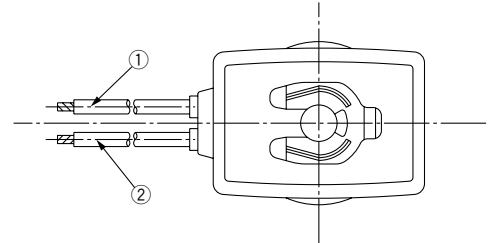
Electrical Connections

⚠ Caution

Grommet

Class H coil: AWG18 Insulator O.D. 2.2 mm

Class B coil: AWG20 Insulator O.D. 2.5 mm

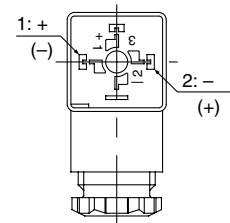


Rated voltage	Lead wire colour	
	①	②
DC (Class B only)	Black	Red
100 VAC	Blue	Blue
200 VAC	Red	Red
Other AC	Gray	Gray

* There is no polarity. (For the power saving type, there is polarity.)

DIN terminal (Class B only)

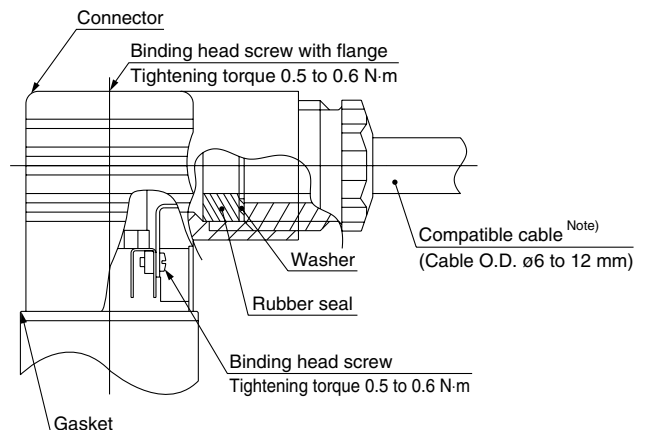
Since internal connections are as shown below for the DIN terminal, make connections to the power supply accordingly.



Terminal no.	1	2
DIN terminal	+ (-)	- (+)

* There is no polarity.

- Use compatible heavy duty cords with cable O.D. of $\phi 6$ to 12 mm.
- Use the tightening torques below for each section.



Note) For an outside cable diameter of $\phi 9$ to 12 mm, remove the internal parts of the rubber seal before using.



2 Port Solenoid Valve for Fluid Control Precautions 4

Be sure to read this before handling.

For detailed precautions on each series, refer to the main text.

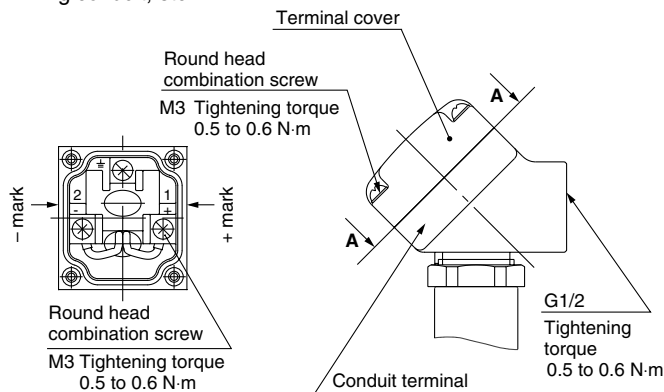
Electrical Connections

Caution

Conduit terminal

In the case of the 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.



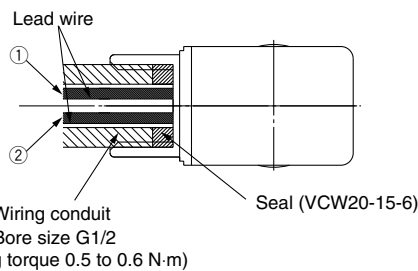
View A-A

(Internal connection diagram)

Conduit

When used as an IP65 equivalent, use seal (part no. VCW20-15-6) to install the wiring conduit. Also, use the tightening torque below for the conduit.

Class H coil: AWG18 Insulator O.D. 2.2 mm
Class B coil: AWG20 Insulator O.D. 2.5 mm



Rated voltage	Lead wire colour	
	①	②
DC	Black	Red
100 VAC	Blue	Blue
200 VAC	Red	Red
Other AC	Gray	Gray

* There is no polarity for DC. (For the power saving type, there is polarity.)

Description	Part no.
Seal	VCW20-15-6

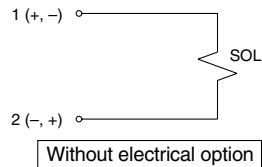
Note) Please order separately.

Electrical Circuits

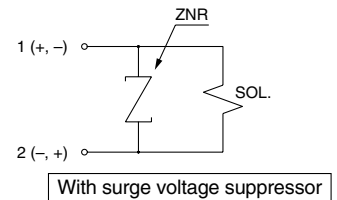
Caution

DC circuit

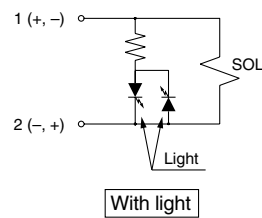
Grommet, Conduit,
Conduit terminal,
DIN type



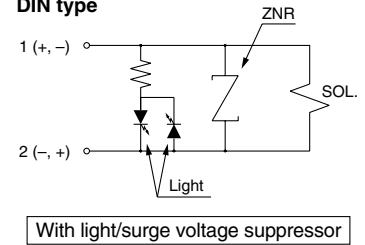
Grommet, Conduit terminal,
DIN type



Conduit terminal,
DIN type



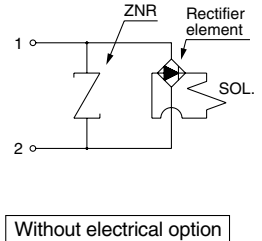
Conduit terminal,
DIN type



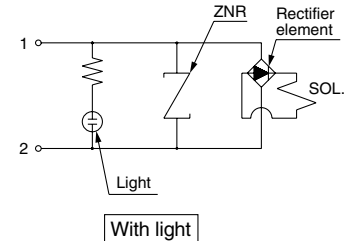
[AC, Class B (Built-in full wave rectifier type) Circuit]

* For AC/Class B coil, the standard product is equipped with a surge voltage suppressor.

Grommet, Conduit,
Conduit terminal,
DIN type

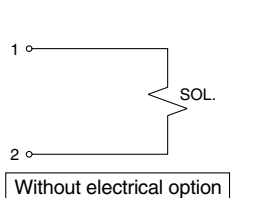


Conduit terminal,
DIN type

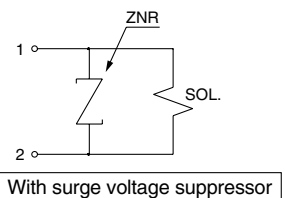


[AC, Class B/H Circuit]

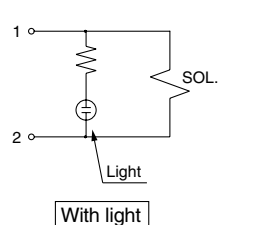
Grommet, Conduit,
Conduit terminal



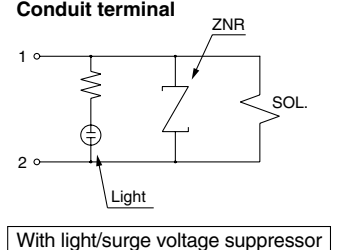
Grommet,
Conduit terminal



Conduit terminal



Conduit terminal





2 Port Solenoid Valve for Fluid Control Precautions 5

Be sure to read this before handling.

For detailed precautions on each series, refer to the main text.

Operating Environment

⚠ Warning

1. Do not use the valves in an atmosphere having corrosive gases, chemicals, salt water, water steam, or where there is direct contact with any of these.
2. Do not use in explosive atmospheres.
3. Do not use in locations subject to vibration or impact.
4. Do not use in locations where radiated heat will be received from nearby heat sources.
5. Employ suitable protective measures in locations where there is contact with water droplets, oil or welding spatter, etc.

Lubrication

⚠ Caution

1. This solenoid valve can be operated without lubrication.

If a lubricant is used in the system, use turbine oil Class 1, ISO VG32 (with no additive). But do not lubricate a valve with EPDM seal.

Refer to the table of brand name of lubricants compliant with Class 1 turbine oil (with no additive), ISO VG32.

Class 1 Turbine Oil (with no additive), ISO VG32

Classification of viscosity (cst) (40°C)	Viscosity according to ISO Grade	32
Idemitsu Kosan Co.,Ltd.		Turbine oil P-32
Nippon Oil Corp.		Turbine oil 32
Cosmo Oil Co.,Ltd.		Cosmo turbine 32
Japan Energy Corp.		Kyodo turbine 32
Kygnus Oil Co.		Turbine oil 32
Kyushu Oil Co.		Stork turbine 32
Nippon Oil Corp.		Mitsubishi turbine 32
Showa Shell Sekiyu K.K.		Turbine 32
Tonen General Sekiyu K.K.		General R turbine 32
Fuji Kosan Co.,Ltd.		Fucoal turbine 32

Please contact SMC regarding Class 2 turbine oil (with additives), ISO VG32.

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 every six months.

Maintenance

⚠ 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 with lubrication, never forget to lubricate continuously.

3. Storage

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

4. Exhaust the drain from an air filter periodically.

Operating Precautions

⚠ Warning

1. Valves will reach high temperatures when used with high temperature fluids. Use caution, as there is a danger of being burned if the valve is directly touched.



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