

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

VX

2

Series **VX21/22/23**

Solenoid valves for various fluids used in a wide variety of

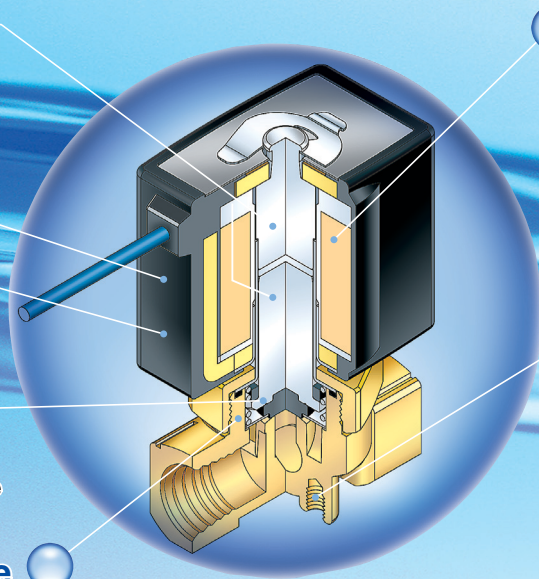
Improved corrosion resistance
Special magnetic material adopted

Enclosure: IP65

Flame resistance UL94V-0 conformed
Flame resistant mold coil material

Low-noise construction
Special construction enables to reduce the 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**

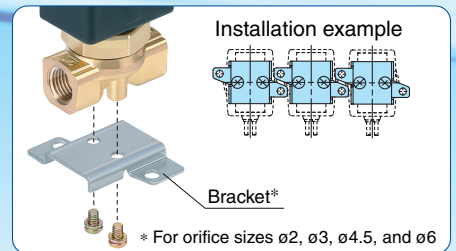
VX22: 8 w → **7 w**

VX23: 11.5 w → **10.5 w**

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

With mounting threads on the bottom

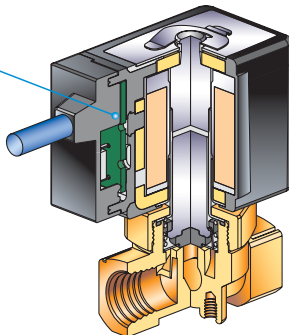
A dedicated bracket is available.



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.

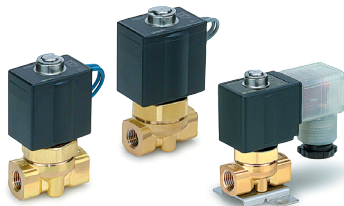
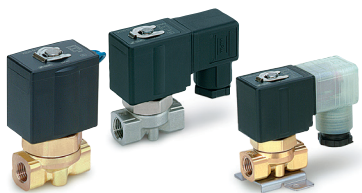
Low-noise construction

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.)

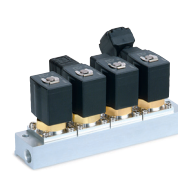
Model	Orifice size						Port size	Material	
	2 mm ϕ	3 mm ϕ	4.5 mm ϕ	6 mm ϕ	8 mm ϕ	10 mm ϕ		Body	Seal
VX21	●	●	●	—	—	—	1/8, 1/4	Brass (C37) Stainless steel	NBR FKM EPDM PTFE
VX22	—	●	●	●	●	●	1/4, 3/8 1/2		
VX23	—	●	●	●	●	●	1/4, 3/8 1/2		

Normally Open (N.O.)

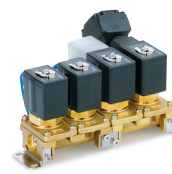
Model	Orifice size				Port size	Material	
	2 mm ϕ	3 mm ϕ	4.5 mm ϕ	6 mm ϕ		Body	Seal
VX21	●	●	●	—	1/8, 1/4	Brass (C37) Stainless steel	NBR FKM EPDM PTFE
VX22	—	●	●	●	1/4, 3/8		
VX23	—	●	●	●	1/4, 3/8		

Manifold

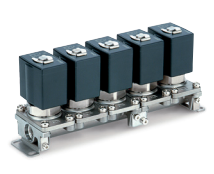
Model	Orifice size				Port size (Common SUP type)		Material		
	2 mm ϕ	3 mm ϕ	4.5 mm ϕ	6 mm ϕ	IN port	OUT port	Body	Base	Seal
VX21	●	●	●	—	3/8	1/8 1/4	Aluminum	Aluminum	NBR
VX22	—	●	●	●			Brass (C37)	Brass (C37)	FKM
VX23	—	●	●	●			Stainless steel	Stainless steel	EPDM PTFE



Base material: Aluminum



Base material: Brass (C37)



Base material: Stainless steel

Features 1

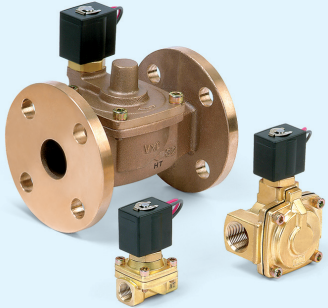


applications — New **VX** Series variations

Pilot Operated 2 Port

New **VXD21/22/23**

For Air, Water, Oil

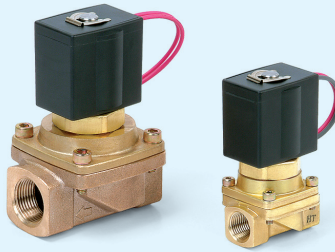


Valve type	Port size	Orifice size mmØ
N.C./N.O.	1/4 to 1 32 A to 50 A	10 to 50

Pilot Operated 2 Port for Zero Differential Pressure

VXZ22/23

For Air, Vacuum, Water, Oil

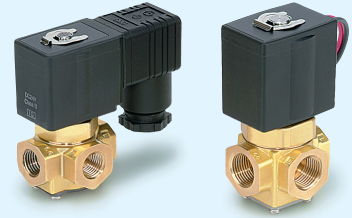


Valve type	Port size	Orifice size mmØ
N.C./N.O.	1/4 to 1	10 to 25

Direct Operated 3 Port

New **VX31/32/33**

For Air, Vacuum, Water, Steam, Oil

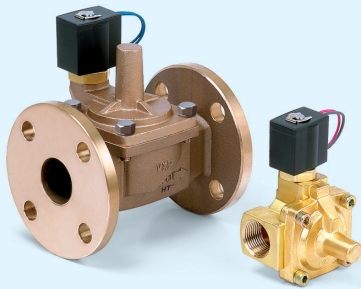


Valve type	Port size	Orifice size mmØ
N.C./N.O. COM.	1/8 to 3/8	1.5 to 4

Pilot Operated 2 Port

VXP21/22/23

For Steam (Air, Water, Oil)

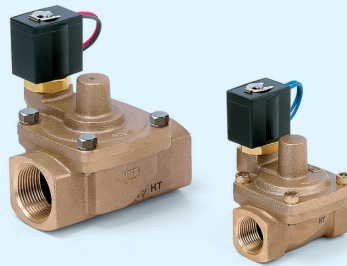


Valve type	Port size	Orifice size mmØ
N.C./N.O.	1/4 to 2 32 A to 50 A	10 to 50

Water Hammer Relief, Pilot Operated 2 Port

VXR21/22/23

For Water, Oil

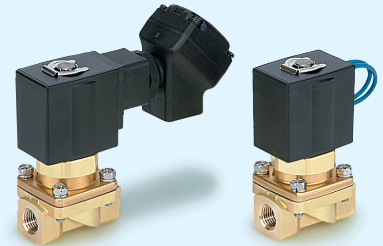


Valve type	Port size	Orifice size mmØ
N.C./N.O.	1/2 to 2	20 to 50

Pilot Operated 2 Port for High Pressure

VXH22

For Air, Water, Oil

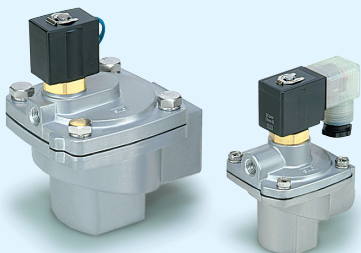


Valve type	Port size	Orifice size mmØ
N.C.	1/4 to 1/2	10

2 Port for Dust Collector (Solenoid type, Air Operated type)

VXF21/22, VXF21/22

For Air

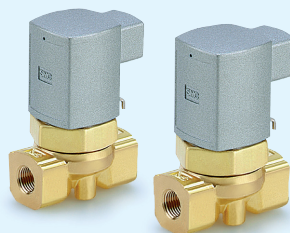


Valve type	Port size	Orifice size mmØ
N.C.	3/4 to 1 1/2	20 to 40

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

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 (C37), 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	—	3/8

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

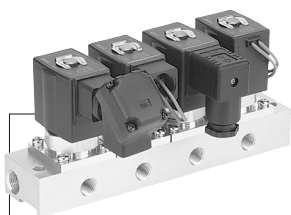
For Air

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

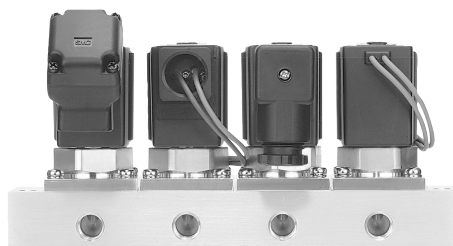
100 VAC, 200 VAC, 110 VAC,
220 VAC, 240 VAC, 230 VAC,
48 VAC, 24 VDC, 12 VDC

Material

Body — Aluminum, Brass (C37), Stainless steel
Base — Aluminum, Brass (C37), 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		Dusttight, 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
		AC (Class B coil/H coil)		20% 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 energized apparent power, since a rectifying circuit is used in the AC (Class B coil, built-in full-wave rectifier type).

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

AC Specification

Model	Frequency (Hz)	Apparent power (VA)		Temperature rise (C) ^{Note)}
		Inrush	Energized	
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 20C 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 energized apparent power, since a rectifying circuit is used in the AC (Class B coil, built-in full-wave rectifier type).

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

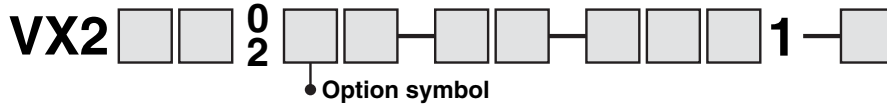
AC Specification

Model	Frequency (Hz)	Apparent power (VA)		Temperature rise (C) ^{Note)}
		Inrush	Energized	
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 20C and when the rated voltage is applied.

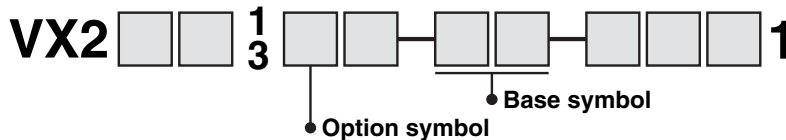
Applicable Fluid Check List

All Options (Single Unit)



Fluid and application	Option symbol	Seal material	Body/Shading coil material ^{Note 6)}	Coil insulation type ^{Note 4)}	Note
Air	Nil	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	Nil	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)



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

Note 1) The leakage amount (10⁻⁶ 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 dynamic 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 dynamic viscosity is higher than water or when the OFF response is prioritized.

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

Note 5) The nuts (non-wetted parts) are nickel-plated on the C37 material.

Note 6) There is no shading coil attached to the DC spec. or AC 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 select the VCA series when using air because it is 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) by 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.

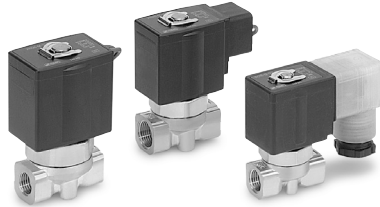
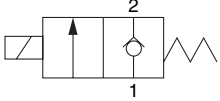
For Air / Single Unit

(Inert gas, Non-leak, Medium vacuum)

Model/Valve Specifications

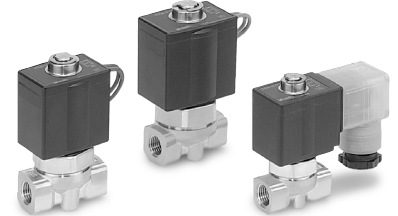
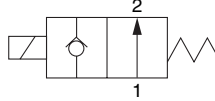
N.C.

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
		VX2120-02	0.6	1.2	0.45	0.33		
		VX2130-02	0.2	2.3	0.46	0.61		
	3	VX2220-02	1.5	1.2	0.45	0.33		620
		VX2320-02	3.0	300				
		VX2230-02	0.2	2.3	0.46	0.61		470
	4.5	VX2230-02	0.35	2.3	0.46	0.61		620
		VX2330-02	0.9	470				
		VX2240-02	0.15	4.1	0.30	1.10		620
	6	VX2340-02	0.35	4.1	0.30	1.10		560
		VX2250-02	0.08	6.4	0.30	1.60		700
		VX2350-02	0.2	6.4	0.30	1.60		560
8	VX2260-02	0.03	8.8	0.30	2.00	700		
	VX2360-02	0.07	8.8	0.30	2.00	560		
	10	VX2220-03	1.5	1.2	0.45	0.33	470	
VX2320-03		3.0	1.2	0.45	0.33	620		
VX2230-03		0.35	2.3	0.46	0.61	470		
3/8 (10A)	4.5	VX2330-03	0.9	2.3	0.46	0.61	620	
		VX2240-03	0.15	4.1	0.30	1.10	470	
		VX2340-03	0.35	4.1	0.30	1.10	620	
6	VX2250-03	0.08	6.4	0.30	1.60	560		
	VX2350-03	0.2	6.4	0.30	1.60	700		
	VX2260-03	0.03	11	0.30	2.20	560		
10	VX2360-03	0.07	11	0.30	2.20	700		
	VX2260-04	0.03	11	0.30	2.20	560		
	VX2360-04	0.07	11	0.30	2.20	700		

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 us beforehand.

Ambient and Fluid Temperature

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

Note) Dew point temperature: -10C 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	470
		VX2122-02	0.7	1.2	0.45	0.33		
		VX2222-02	1.0	1.2	0.45	0.33		
	3	VX2322-02	1.6	300				
		VX2132-02	0.3	2.3	0.46	0.61		470
		VX2232-02	0.45	2.3	0.46	0.61		620
	4.5	VX2332-02	0.8	470				
		VX2242-02	0.25	4.1	0.30	1.10		620
		VX2342-02	0.45	4.1	0.30	1.10		500
	3	VX2222-03	1.0	1.2	0.45	0.33		500
		VX2322-03	1.6	1.2	0.45	0.33		660
		VX2232-03	0.45	2.3	0.46	0.61		500
3/8 (10)	4.5	VX2332-03	0.8	2.3	0.46	0.61	660	
		VX2242-03	0.25	4.1	0.30	1.10	500	
		VX2342-03	0.45	4.1	0.30	1.10	660	

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.

Nil	—
Z	Oil-free spec.

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

Thread type

Nil	Rc
T	NPTF
F	G
N	NPT

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.

Bracket

Nil	None
B	With bracket

* VX021N-12A and VX022N-12A are packed in the same container as the main body.
* Refer to the table (4) if a bracket is ordered separately.

Built-in full-wave rectifier type

Electrical entry

G -Grommet
GS-With grommet surge voltage suppressor

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

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.)

* DIN type is available with class B only.

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 select the VCA series when using air because it is 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) by 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.

Dimensions → page 24 (Single unit)

Table (3) Rated Voltage – Electrical Option

Rated voltage		Class B			
		S	L	Z	
AC/DC	Voltage symbol	Voltage	With surge voltage suppressor	With light	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 surge voltage suppressor is integrated into the AC/Class B, as a 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	

Series VVX21/22/23

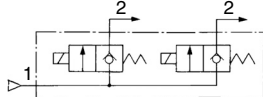
For Air/Manifold

(Inert gas, Non-leak, Medium vacuum)

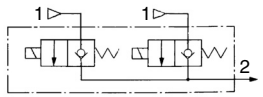
Solenoid Valve for Manifold/Valve Specifications

N.C.

Passage symbol



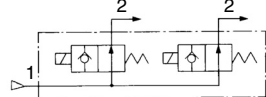
Common SUP type



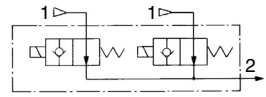
Individual SUP type

N.O.

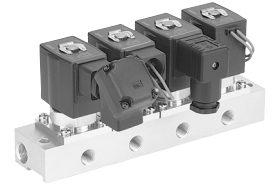
Passage symbol



Common SUP type



Individual SUP type



⚠ When the fluid is air.

When you operate the VX series (AC spec) by 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 us beforehand.

Normally Open (N.O.)

Orifice size (mm)	Model	Max. operating pressure differential (MPa)	Flow characteristics			Max. system pressure (MPa)
			C[dm ³ /(s·bar)]	b	Cv	
2	VX2113-00	1.5	0.59	0.48	0.18	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		
Nil, R	V	-20 to 60
-10 ^{Note)} to 60	-10 ^{Note)} to 60	



Note) Dew point temperature: -10C 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 •

Nil	—
Z	Oil-free spec.

Select nil 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 only.

How to Order Manifold Bases

VVX21
VVX22
VVX23

1 [] [] [] - 07 - 1

Number of manifolds

02	2 stations
⋮	⋮
10	10 stations

Thread type

Nil	Rc
T	NPTF
F	G
N	NPT

Port size (Out port)

1	Rc 1/8
2	Rc 1/4

* All IN ports are Rc 3/8.

Manifold base

Blanking plate part no.

For VX21: X011-001

For VX22/23: VX011-006

Seal material

Nil	NBR
F	FKM

Suffix

Nil	—
Z	Oil-free spec.

Base

Nil	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

Station - 1 - 2 - 3 - 4 - 5 - n

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

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

* Option "S", "Z" are not available as surge voltage suppressor is integrated into the AC/Class B, as a 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
Nil		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 on the C37 material.

⚠ When the fluid is air.

When you operate the VX series (AC spec) by 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

AC/DC	Voltage symbol	Rated voltage	Class B		
			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 surge voltage suppressor is integrated into the AC/Class B, as a standard.

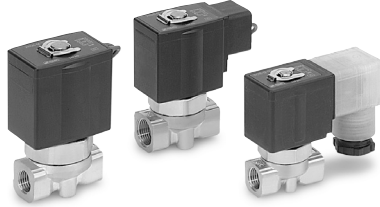
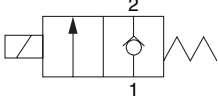
Dimensions → page 26 (Manifold)

For Water /Single Unit

Model/Valve Specifications

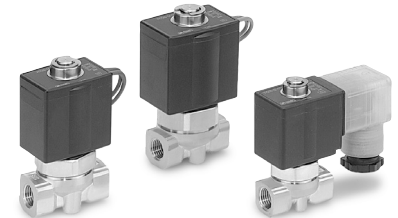
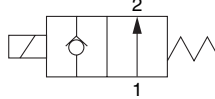
N.C.

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	2.0	1.5	4.1	0.17	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	
		VX2120-02	0.9	0.5	7.9	0.33		
		VX2220-02	1.7	1.5				
	VX2320-02	2.5	3.0					
	3	VX2130-02	0.4	0.2	15.0	0.61		
		VX2230-02	0.6	0.35				
		VX2330-02	0.85	0.9				
	4.5	VX2240-02	0.35	0.15	26.0	1.10		
		VX2340-02	0.55	0.3				
		VX2250-02	0.13	0.08				
	6	VX2350-02	0.17	0.2	38.0	1.60		
		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	1.0	
		VX2320-03	2.5	3.0	15.0	0.61		
		VX2230-03	0.6	0.35				
	4.5	VX2330-03	0.85	0.9				26.0
		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	VX2260-04	0.08	0.03	53.0	2.20			
	VX2360-04	0.1	0.07					
	VX2360-04	0.1	0.07					
1/2 (15A)	10	VX2360-04	0.1	0.07	53.0	2.20	700	

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 (mmø)	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	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	
		VX2122-02	0.45	7.9	0.33		
		VX2222-02	0.8				
	3	VX2322-02	1.2				15.0
		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	15.0		0.61
			VX2232-03	0.3			
4.5		VX2332-03	0.6	26.0		1.10	
		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		
Nil, 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)

AC VX 21 2 0 [] [] - 01 [] - 1 G R 1 - []
DC VX 21 2 0 [] [] - 01 [] - 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

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

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

Nil	—
Z	Oil-free spec.

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

Nil	Rc
T	NPTF
F	G
N	NPT

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

Nil	None
B	With bracket

* VX021N-12A and VX022N-12A are packed in the same container as the main body.
* 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

G -Grommet	C-Conduit
GS-With grommet surge voltage suppressor	
T -With conduit terminal	D -DIN terminal
TS-With conduit terminal and surge voltage suppressor	DS -DIN terminal with surge voltage suppressor
TL -With conduit terminal and light	DL -DIN terminal with light
TZ -With conduit terminal, surge voltage suppressor and 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 only.

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

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

Model	Solenoid valve (Port size)			Orifice symbol (Diameter)					
	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.)

Model	Solenoid valve (Port size)			Orifice symbol (Diameter)			
	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	AC/DC	Voltage symbol	Voltage	Class B			Class H		
				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, as a standard.

Table (2) Solenoid Valve Option

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

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

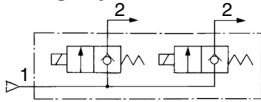
For Water /Manifold

Solenoid Valve for Manifold/Valve Specifications



N.C.

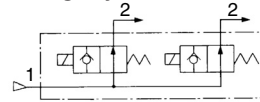
Passage symbol



Common SUP type

N.O.

Passage symbol



Common SUP type

Normally Closed (N.C.)

Orifice size (mm)	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 (mm)	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		
Nil, G, L	E, P	-20 to 60
1 to 60	1 to 99	

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)

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.

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		

Suffix

Nil	—
Z	Oil-free spec.

Select nil because the solenoid valve option "L" is the oil-free treatment. Class B oil-free AC 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.

Full-wave rectifier

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

How to Order Manifold Bases

VVX21
VVX22
VVX23

1 **C** **07** **1**

Port size (OUT port)

1	Rc 1/8
2	Rc 1/4

* All IN ports are Rc 3/8.

Manifold base

Thread type

Nil	Rc
T	NPTF
F	G
N	NPT

Number of manifolds

02	2 stations
:	:
10	10 stations

Suffix

Nil	—
Z	Oil-free spec.

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

Blanking plate part no.

For VX21: VVX21-3A

For VX22: VVX22-3A

For VX23: VVX23-3A

Seal material

Nil	NBR
F	FKM
E	EPDM

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 for solenoid valves, etc. to be mounted.

* VVX21-3A 1 set

① ② ③ ④ ⑤ ⑥

Enter the product's part number in order, counting the 1st station from the left in the manifold arrangement, when viewing the individual port 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
Nil	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 surge voltage suppressor is integrated into the AC/Class B, 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 dynamic 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.

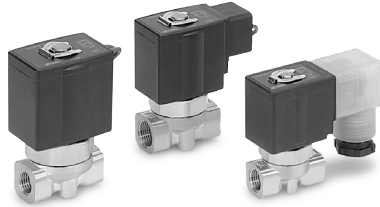
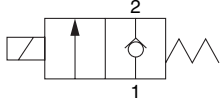
Select the DC spec. or AC spec. built-in full-wave rectifier type when the dynamic viscosity is higher than water or when the OFF response is prioritized.

For Oil /Single Unit

Model/Valve Specifications

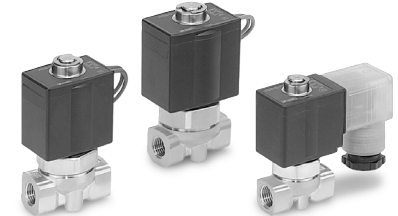
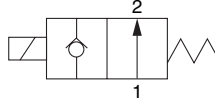
N.C.

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 (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				
	3	VX2320-02	1.7	2.0	15	0.61		470
		VX2130-02	0.2	0.15				300
		VX2230-02	0.35	0.3				470
	4.5	VX2330-02	0.55	0.85	26	1.10		620
		VX2240-02	0.2	0.1				470
		VX2340-02	0.35	0.3				620
	6	VX2250-02	0.1	0.08	38	1.60		560
		VX2350-02	0.14	0.2				700
		VX2260-02	0.05	0.03				560
8	VX2360-02	0.08	0.07	46	1.90	700		
	VX2220-03	1.2	1.2			7.9	0.33	470
	VX2320-03	1.7	2.0					620
4.5	VX2230-03	0.35	0.3	15	0.61			470
	VX2330-03	0.55	0.85			620		
	VX2240-03	0.2	0.1			470		
6	VX2340-03	0.35	0.3	26	1.10	620		
	VX2250-03	0.1	0.08			38	1.60	560
	VX2350-03	0.14	0.2					700
8	VX2260-03	0.05	0.03	53	2.20			560
	VX2360-03	0.08	0.07			700		
	10	VX2260-03	0.05			0.03	53	2.20
VX2360-03		0.08	0.07	700				
VX2260-04		0.05	0.03	53	2.20	560		
VX2360-04	0.08	0.07	700					

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	Av x 10 ⁻⁶ m ²		
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				
	3	VX2322-02	1.0	15	0.61		500
		VX2132-02	0.2				660
		VX2232-02	0.3				320
	4.5	VX2232-02	0.6	26	1.10		500
		VX2332-02	0.6				660
		VX2242-02	0.15				500
	6	VX2342-02	0.35	7.9	0.33		660
		VX2222-03	0.7				500
		VX2322-03	1.0				660
3/8 (10)	3	VX2232-03	0.3	15	0.61	500	
		VX2332-03	0.6			660	
		VX2242-03	0.15			500	
6	VX2342-03	0.35	26	1.10	660		

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	-20 to 60
-5 Note) to 60	-5 Note) to 120	

Note) Dynamic 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.

Nil	—
Z	Oil-free spec.

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

Suffix

Nil	—
Z	Oil-free spec.

Thread type

Nil	Rc
T	NPTF
F	G
N	NPT

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

Nil	None
B	With bracket

* VX021N-12A and VX022N-12A are packed in the same container as the main body.
* 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 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 surge voltage suppressor is integrated into the AC/Class B, as a 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	

The additives contained in oil are different depending on the type and manufacturers, so the durability of the seal materials will vary. For details, please consult with SMC.

Table (4) Bracket Part No.

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

Dimensions → page 24 (Single unit)

⚠ When the fluid is oil.

The dynamic 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.

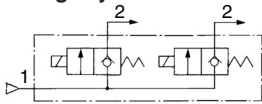
Select the DC spec. or AC spec. built-in full-wave rectifier type when the dynamic viscosity is higher than water or when the OFF response is prioritized.

For Oil/Manifold

Solenoid Valve for Manifold/Valve Specifications

N.C.

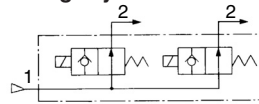
Passage symbol



Common SUP type

N.O.

Passage symbol



Common SUP type



Normally Closed (N.C.)

Orifice size (mm)	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 (mm)	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) Dynamic 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

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

Valve/Body configuration

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

Suffix

Nil	—
Z	Oil-free spec.

Class B oil-free AC 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

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

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

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	Rc 1/8
2	Rc 1/4

* All IN ports are Rc 3/8.

Thread type

Nil	Rc
T	NPTF
F	G
N	NPT

Suffix

Nil	—
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

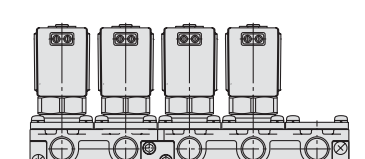
Seal material: FKM

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 "*" is the symbol for mounting.
* VX2111A-1G1 4 sets Add an "*" in front of the part numbers
* VVX21-3A-F 1 set for solenoid valves, etc. to be mounted.

① — ② — ③ — ④ — ⑤ — ⑥



Enter the product's part number in order, counting the 1st station from the left in the manifold arrangement, when viewing the individual port 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			

The additives contained in oil are different depending on the type and manufacturers, so the durability of the seal materials will vary. For details, please consult with SMC.

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

AC/ DC	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 surge voltage suppressor is integrated into the AC/Class B, as a standard.

Dimensions → page 27 (Manifold)

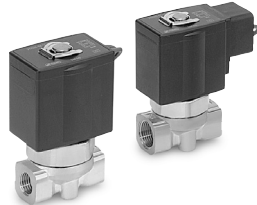
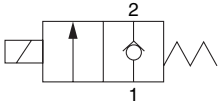
Series VX21/22/23

For Steam /Single Unit

Model/Valve Specifications

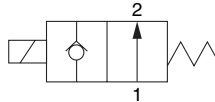
N.C.

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	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						
	4.5	VX2230-02	0.75	15	0.61		470		
		VX2330-02	1.0				620		
		VX2240-02	0.4				470		
3/8 (10A)	6	VX2340-02	0.5	26	1.10		620		
	8	VX2250-02	0.15	38	1.60		560		
		VX2350-02	0.2				700		
	10	VX2260-02	0.08	46	1.90	560			
		VX2360-02	0.1			700			
	1/2 (15A)	3	VX2220-03	1.0	7.9	0.33	470		
4.5		VX2230-03	0.75	15	0.61	470			
		VX2330-03	1.0			620			
6		VX2240-03	0.4	26	1.10	470			
		VX2340-03	0.5			620			
8		VX2250-03	0.15	38	1.60	560			
	VX2350-03	0.2	700						
10	VX2260-03	0.08	53	2.20	560				
	VX2360-03	0.1			700				
1/2 (15A)	10	VX2260-04	0.08	53	2.20	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	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			500	
		VX2222-02	1.0					320	
	4.5	VX2132-02	0.3	15	0.61		500		
		VX2332-02	0.8				660		
	6	VX2242-02	0.25	26	1.10		500		
VX2342-02		0.45	660						
3/8 (10)	3	VX2222-03	1.0	7.9	0.33		1.0	500	
	4.5	VX2232-03	0.45	15	0.61				660
		VX2332-03	0.8			660			
	6	VX2242-03	0.25	26	1.10	500			
		VX2342-03	0.45			660			
	10	VX2262-03	0.08	53	2.20	500			
VX2362-03		0.1	660						

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	
183	-20 to 60

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)

AC

VX

21

2

0

S

01

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/Body configuration

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

Suffix

Nil	—
Z	Oil-free spec.

Thread type

Nil	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

Nil	None
B	With bracket

* VX021N-12A and VX022N-12A are packed in the same container as the main body.
* 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 rated voltage.

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

Model	Solenoid valve (Port size)			Orifice symbol (Diameter)					
	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.)

Model	Solenoid valve (Port size)			Orifice symbol (Diameter)			
	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			
		S	L	Z	
AC	Voltage symbol	Voltage	With surge voltage suppressor	With light	With light/surge voltage suppressor
	1	100 V	●	●	●
	2	200 V	●	●	●
	3	110 V	●	●	●
	4	220 V	●	●	●
	7	240 V	●	—	—
DC	8	48 V	●	—	—
	J	230 V	●	—	—
	5	24 V	DC spec. is not available.		
6	12 V	DC spec. is not available.			

Table (4) Bracket Part No.

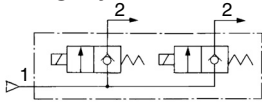
Model	Part no.
VX21 ¹ / ₃ 0	VX021N-12A
VX22 ² / ₃ 0	VX022N-12A
VX23 ² / ₄ 0	
VX22 ⁵ / ₆ 0	VX023N-12A-L
VX23 ⁵ / ₆ 0	

For Steam /Manifold

Solenoid Valve for Manifold/Valve Specifications

N.C.

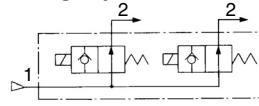
Passage symbol



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			
		0.5			



• 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			
		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 VX21 23 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.

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

Suffix •

Nil	—
Z	Oil-free spec.

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.

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 rated voltage.

How to Order Manifold Bases

VVX21
VVX22 **1** **CP** **07** **1**
VVX23

Port size (OUT port)

1	Rc 1/8
2	Rc 1/4

* All IN ports are Rc 3/8.

Thread type

Nil	Rc
T	NPTF
F	G
N	NPT

Number of manifolds

02	2 stations
⋮	⋮
10	10 stations

Suffix

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

Enter the product's part number in order, counting the 1st station from the left in the manifold arrangement, when viewing the individual port 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
S	CP	Brass (C37)/Cu	PTFE	H
Q	SP	Stainless steel/Ag		

Table (3) Rated Voltage Electrical Option

AC/DC	Rated voltage		Class H		
	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	J	230 V	●	—	—
	5	24 V	DC spec. is not available.		
	6	12 V	DC spec. is not available.		

Dimensions → page 27 (Manifold)

Energy Saving Type Series VX21/22/23

For Air, Water

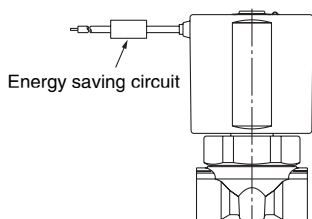
- Substantially reduced power consumption while holding due to power saving circuit
- Substantially reduced heat generation by a continuously energized solenoid coil (temperature increase of 10C or less)

Solenoid Coil Electrical Specifications

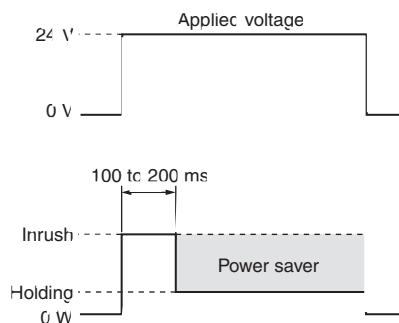
Model	VX21	VX22	VX23	
Rated voltage (V)	24 DC <small>Note)</small>			
Power consumption (W)	Inrush	3	4	5
	Holding	0.8	0.8	0.8

(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	$Av \times 10^{-6} \text{ m}^2$	$Cv \text{ converted}$	$C[\text{dm}^3/(\text{s}\cdot\text{bar})]$	b	
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	
		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						
		VX2250-02	0.03						38.0
	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	$Av \times 10^{-6} \text{ m}^2$	$Cv \text{ converted}$	$C[\text{dm}^3/(\text{s}\cdot\text{bar})]$	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	1.0	
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		
	Nil, 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

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

Nil	—
Z	Oil-free spec.

Select nil 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

Nil	Rc
T	NPTF
F	G
N	NPT

Rated voltage

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

Bracket

Nil	None
B	With bracket

* VX021N-12A and VX022N-12A are packed in the same container as the main body.
* 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 (2) Solenoid Valve Option

Option symbol	Seal material	Body material	Coil insulation type	Operating fluid	
Nil	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					

Table (3) Bracket Part No.

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

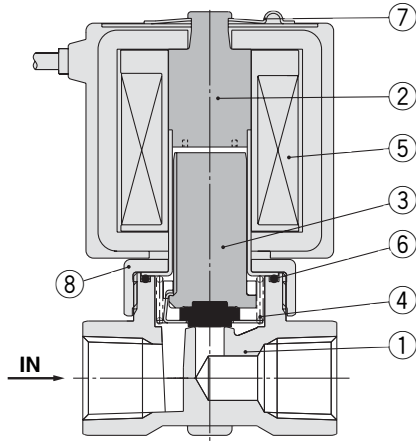
Series VX21/22/23

For Air, Water, Oil, Steam

Construction Single Unit

Normally closed (N.C.)

Body material Brass (C37), Stainless steel



Component Parts

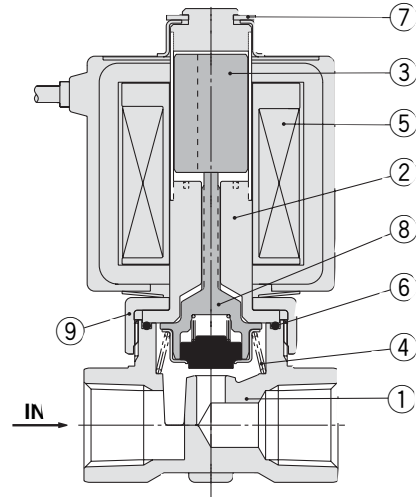
No.	Description	Material	
		Body material brass (C37) specification	Body material stainless steel specification
1	Body	Brass (C37)	Stainless steel
2	Tube assembly ^{Note)}	Stainless steel, Cu	Stainless steel, Ag
3	Armature assembly	(NBR, FKM, EPDM, PTFE) Stainless steel, PPS	
4	Return spring	Stainless steel	
5	Solenoid coil		
6	O-ring	(NBR, FKM, EPDM, PTFE)	
7	Clip	SK	
8	Nut	Brass (C37)	Brass (C37), Ni plated

The materials in parentheses are the seal materials.

Note) Cu and Ag are inapplicable to the DC spec and to the AC spec with built-in full-wave rectifier.

Normally open (N.O.)

Body material: Brass (C37), Stainless steel



Component Parts

No.	Description	Material	
		Body material brass (C37) specification	Body material stainless steel specification
	Body	Brass (C37)	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 (C37)	Brass (C37), Ni plated

The materials in parentheses are the seal materials.

Note) Cu and Ag are inapplicable to the DC spec and to the AC spec with built-in full-wave rectifier.

Construction Manifold

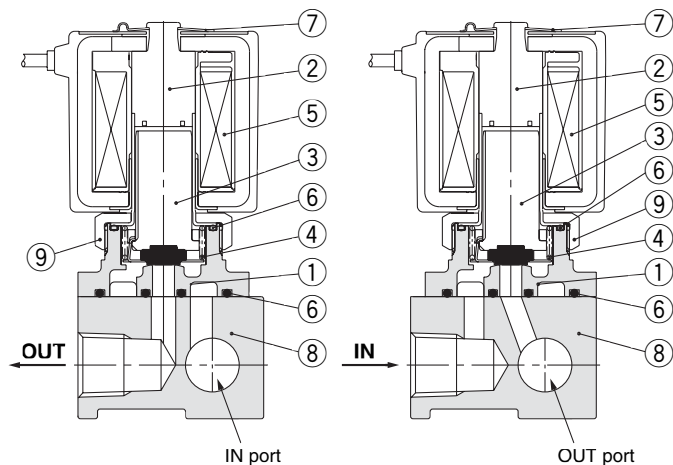
Normally closed (N.C.)

Base material Aluminum

Fluid: Air

Common SUP type

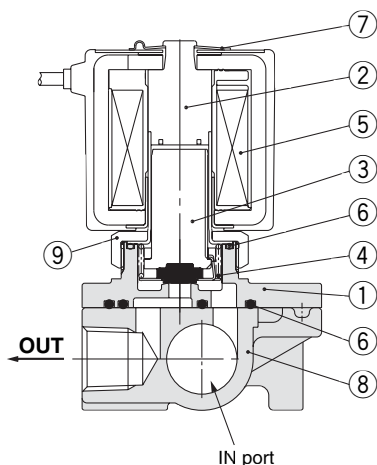
Individual SUP type



Base material Brass (C37), Stainless steel

Fluid: Water Oil, Steam

Common SUP type



Component Parts

No.	Description	Material		
		Base material aluminum specification	Base material brass (C37) specification	Base material stainless steel specification
1	Body	Aluminum	Brass (C37)	Stainless steel
2	Tube assembly <small>Note)</small>	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 (C37)	Stainless steel
9	Nut	Brass (C37) (Ni plated)	Brass (C37)	Brass (C37), Ni plated

The materials in parentheses are the seal materials
 Note) Cu and Ag are inapplicable to the DC spec and to the AC spec with built-in full-wave rectifier.

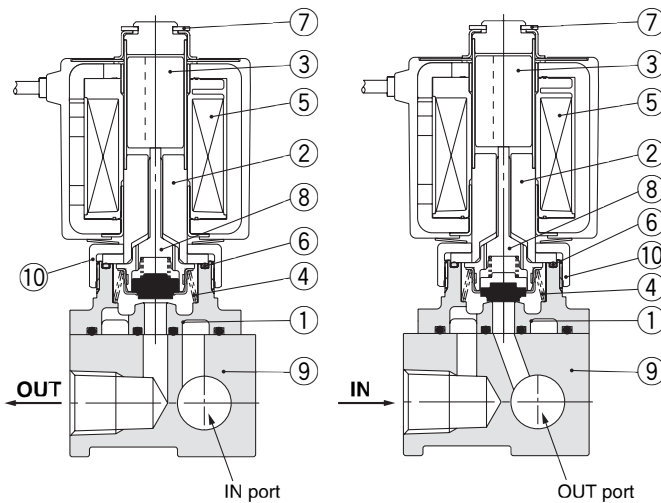
Normally open (N.O.)

Base material: Aluminum

Fluid: Air

Common SUP type

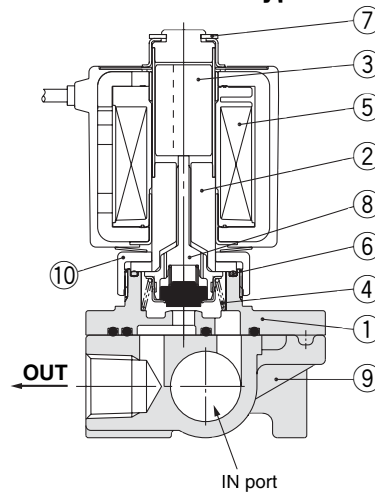
Individual SUP type



Base material: Brass (C37), Stainless steel

Fluid: Water Oil, Steam

Common SUP type



Component Parts

No.	Description	Material		
		Base material aluminum specification	Base material brass (C37) specification	Base material stainless steel specification
1	Body	Aluminum	Brass (C37)	Stainless steel
2	Tube assembly <small>Note)</small>	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 (C37)	Stainless steel
10	Nut	Brass (C37) (Ni plated)	Brass (C37)	Brass (C37), Ni plated

The materials in parentheses are the seal materials.
 Note) Cu and Ag are inapplicable to the DC spec and to the AC spec with built-in full-wave rectifier.

Specifications

For Air

For Water

For Oil

For Steam

Energy Saving Type

Construction

Dimensions

Series VX21/22/23

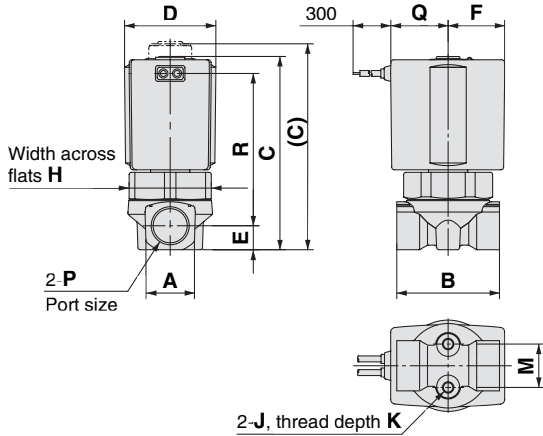
For Air, Water, Oil, Steam

Dimensions Single Unit/Body Material Brass (C37), Stainless Steel

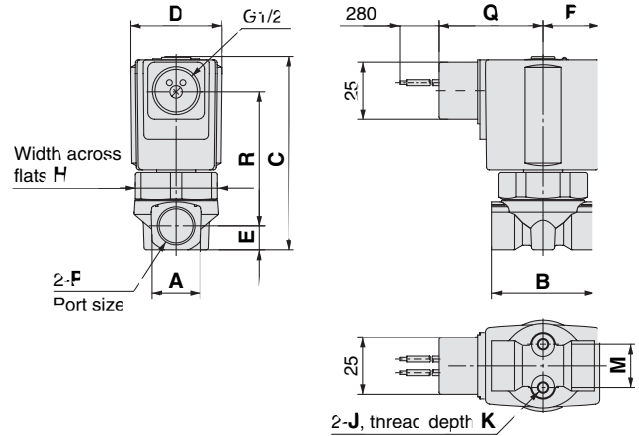
Normally closed (N.C.): VX21□0/VX22□0/VX23□0

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

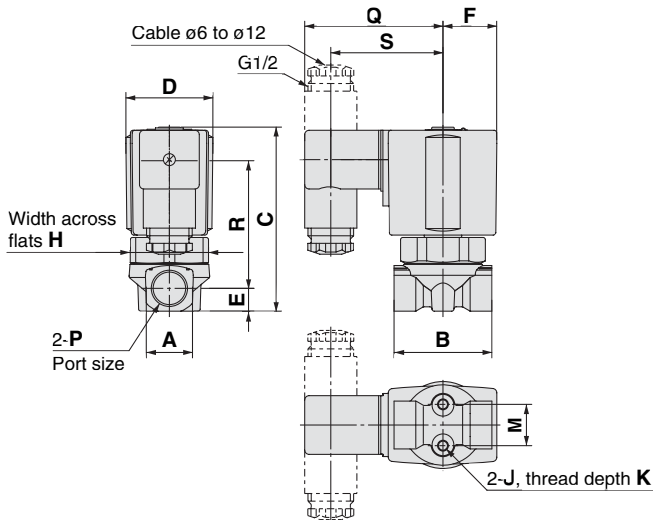
Grommet: G



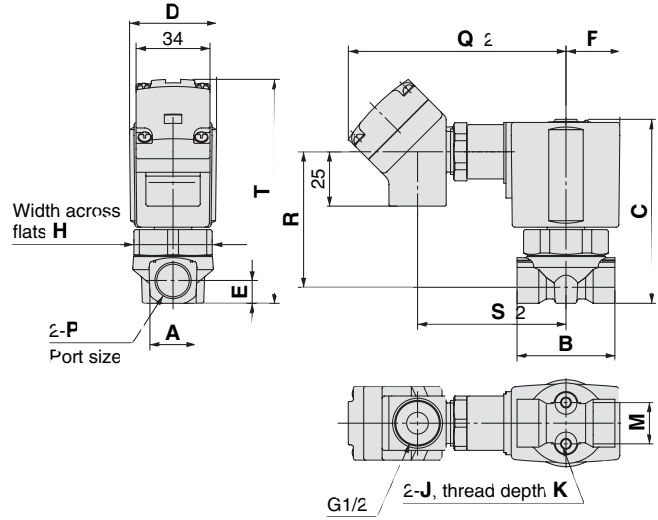
Conduit: C



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
VX23□0	VX23□2	ø3, ø4.5, ø6	1/4, 3/8	22	45	85.5 (93)	40	10.5			M5	8	19
VX23□0	—	ø8, ø10	1/4, 3/8, 1/2	30	50	92	—	14	25	36	M5	8	23

(mm)

Model		Orifice size	Port size P	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							
N.C.	N.O.			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
VX23□0	—	ø8, ø10	1/4, 3/8, 1/2	—	63	—	55.5	—	55	—	—	55.5	—	101.5	33	59	51.5	54	68.5	55	56.5	103.5	54	72.5	100
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	—	61	—	—	—	61.5	—	107.5	36	65	54	60	71	61	59	106	60	75

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 (C37), Stainless Steel

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

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

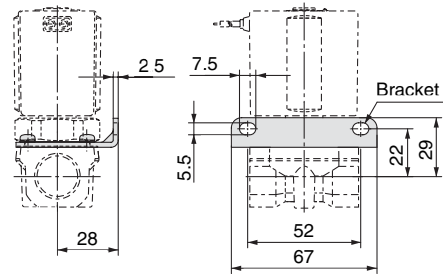
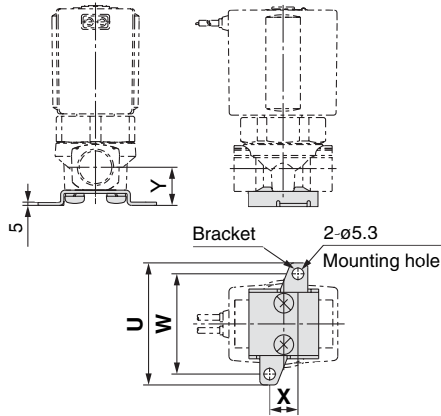
Specifications with bracket

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

(Packed in the same container)

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

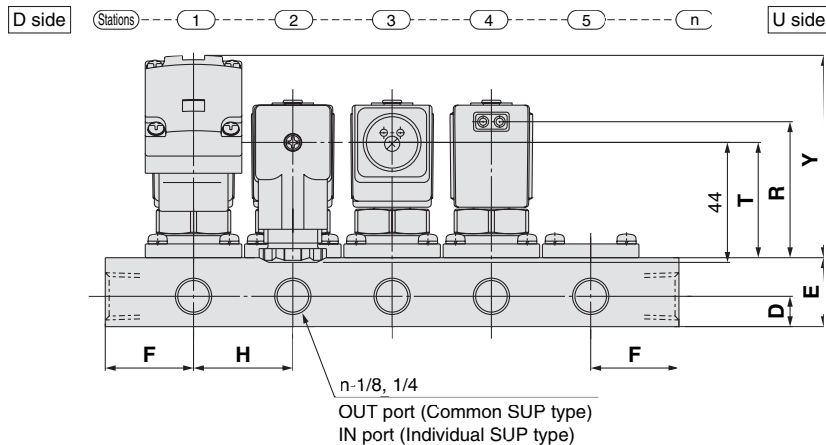
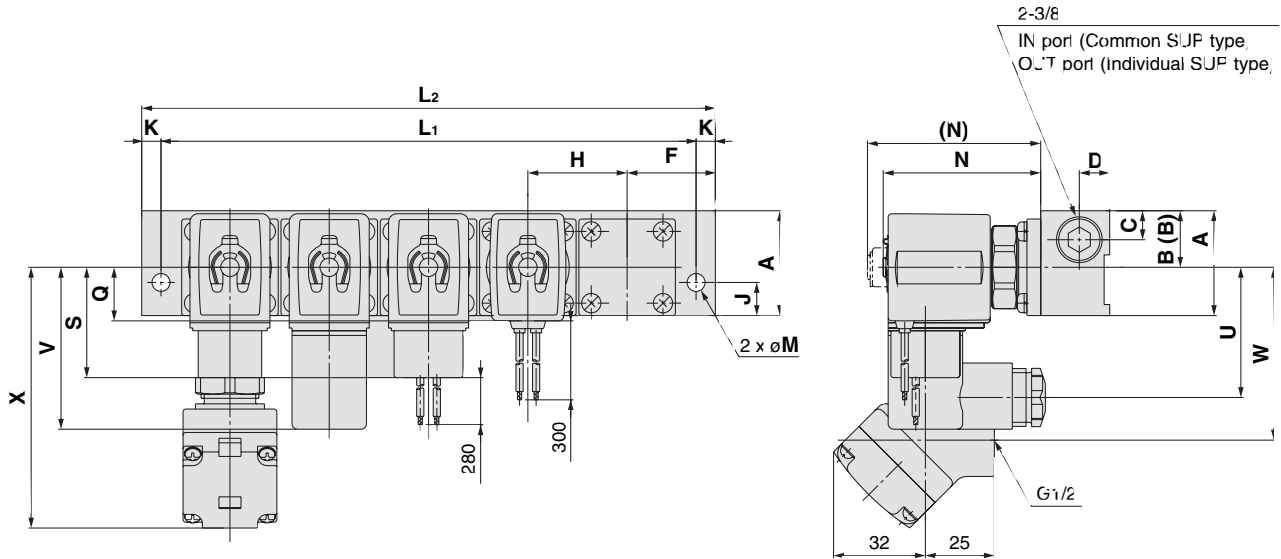
Dimensions

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
	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.

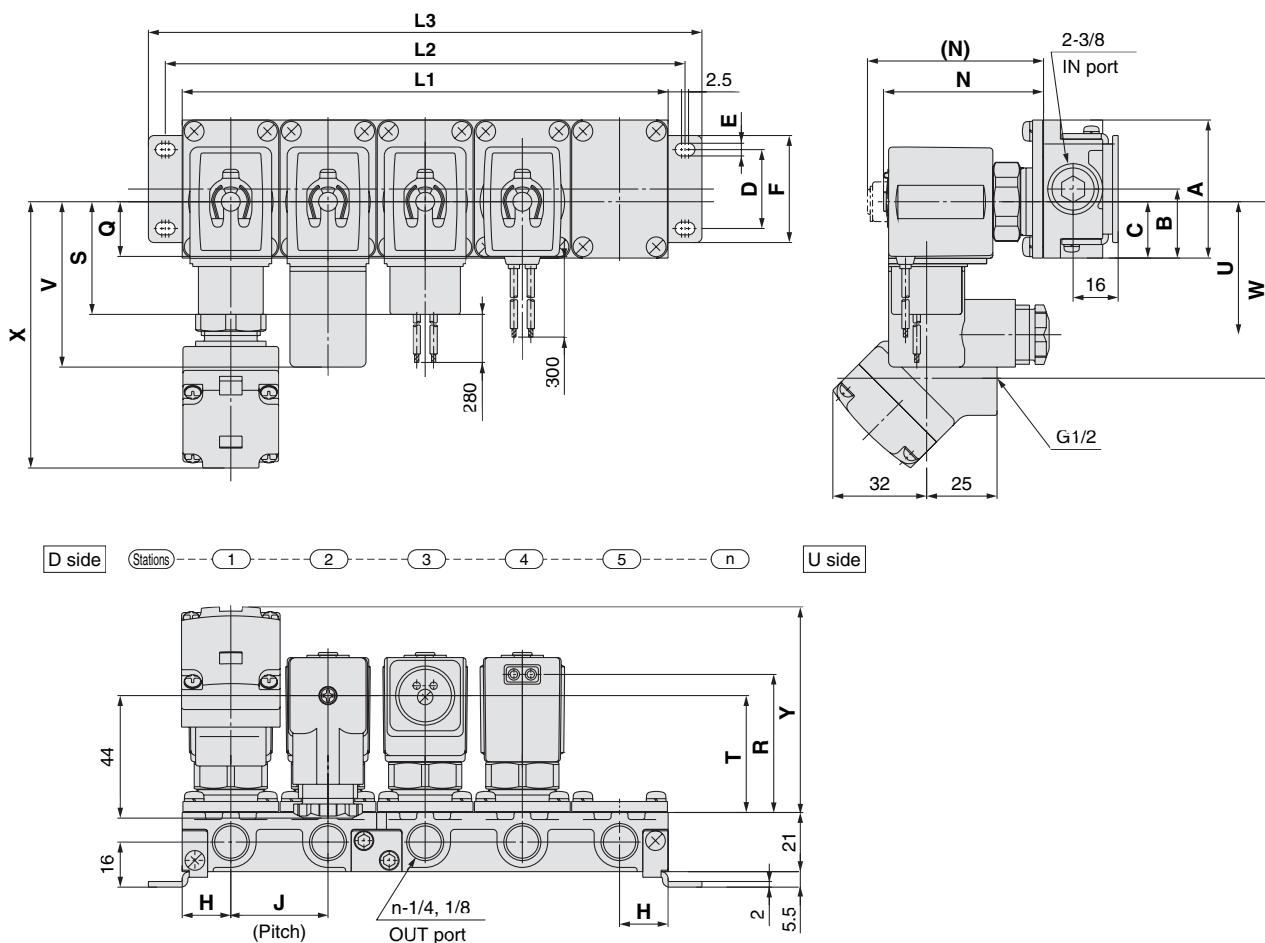
Note 2) Add 1.5 mm to "R" "T" and "Y" dimensions for the N.O. spec.

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

For Water, Oil, Steam

Dimensions Manifold/Base Material Brass (C37), 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
Nil	N.C.
2	N.O.

Rated voltage (Note)

Symbol	Rated voltage
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

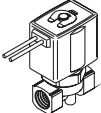
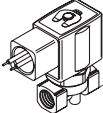
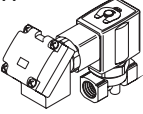
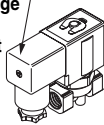
Coil insulation type (Note)

Symbol	Insulation type
Nil	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

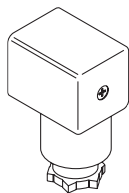
<p>G -Grommet</p> <p>GS-With grommet surge voltage suppressor</p> 	<p>C-Conduit</p> 
<p>T -With conduit terminal</p> <p>TS-With conduit terminal and surge voltage suppressor</p> <p>TL -With conduit terminal and light</p> <p>TZ -With conduit terminal, surge voltage suppressor and light</p> 	<p>D -DIN 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 only.</p> 

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

Rated voltage

Symbol	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□□

Rated voltage (Note)

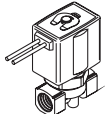
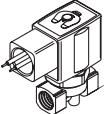
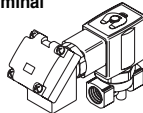
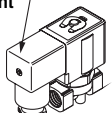
Symbol	Rated voltage
1	100 VAC 50/60 Hz
2	200 VAC 50/60 Hz
3	110 VAC 50/60 Hz
4	220 VAC 50/60 Hz
7	240 VAC 50/60 Hz
8	48 VAC 50/60 Hz
J	230 VAC 50/60 Hz

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

Valve

Symbol	Valve
Nil	N.C.
2	N.O.

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, as a standard

Table (1) Rated Voltage Electrical Option

AC/DC	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 surge voltage suppressor is integrated into the AC/Class B as a standard

* Replacement of solenoid coils

• DC and AC coils cannot be interchanged in order to change the voltage

• DC and AC (built-in full-wave rectifier type) coils can be interchanged in order to change the voltage.

• All DC coil voltages are interchangeable

• All AC coil voltages are interchangeable.

● 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**

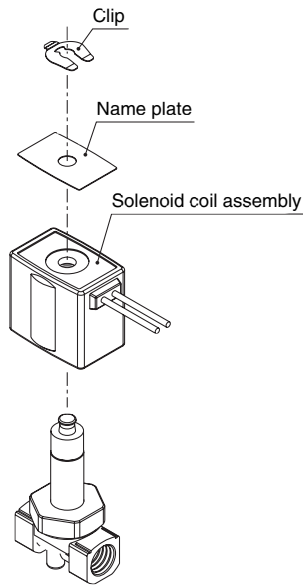
For VX23: **VX023N-10**

● 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 in 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
Process fluid control equipment	Av	—	ANSI/(NFPA)T3.21.3: 1990
	—	Cv	IEC60534-2-3: 1997 JIS B 2005: 1995 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 upstream absolute pressure and the density in a standard condition.

Critical pressure ratio b : Pressure ratio (downstream pressure/upstream pressure) which will turn to a choked flow when the value is smaller than this ratio.

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

Subsonic flow : Flow greater than the critical pressure ratio

Standard condition : Air in a temperature state of 20C, 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)], dm³ (Cubic decimeter) of SI unit are 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"

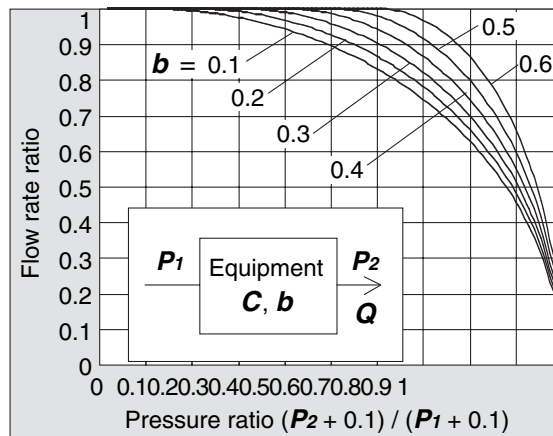
Example)

Obtain the air flow rate for **P₁** = 0.4 [MPa], **P₂** = 0.3 [MPa], **t** = 20 [C] when a solenoid valve is performed in **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 (4NR)]

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

Based on Graph (1), it is going to be 0.7 if it is read by the pressure ratio as 0.8 and the flow ratio to be **b** = 0.3.
Hence, flow rate = Max. flow x flow ratio = 600 x 0.7 = 420 [dm³/min (4NR)]



Graph (1) Flow characteristics

(4) Test method

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

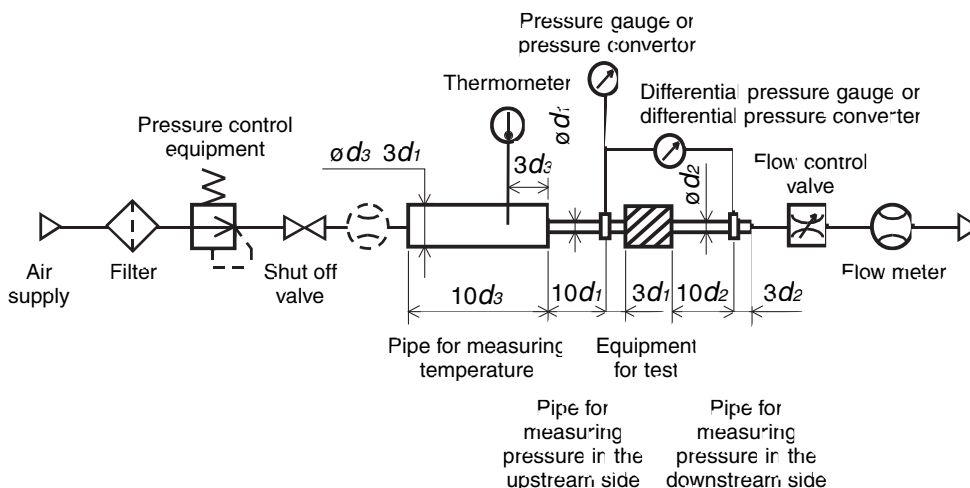


Fig. (1) Test circuit based on ISO 6358, JIS B 8390

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

(3) Formula for flow rate

When

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

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

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 decimeter) of SI unit are 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 the unknown equipment. In the formula (2) by the sonic conductance C , it is the same formula as when $b = 0.5$.

(4) Test method

Attach a test equipment with the test circuit shown in Fig. (2) in order to discharge air into the atmosphere until the pressure inside the air tank goes down to 0.25 MPa (0.2 MPa) from an air tank filled with the compressed air at a certain pressure level (0.5 MPa) which does not go below 0.6 MPa. At this time, measure the discharging time and the residual pressure inside the air tank which had been left until it turned to be the normal values to determine the effective area S , using the following formula. The volume of an air tank should be selected within the specified range by corresponding to the effective area of an equipment for test. In the case of JIS B 8373, 8374, 8375, 8379, 8381, the pressure values are in parentheses and the coefficient of the 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]

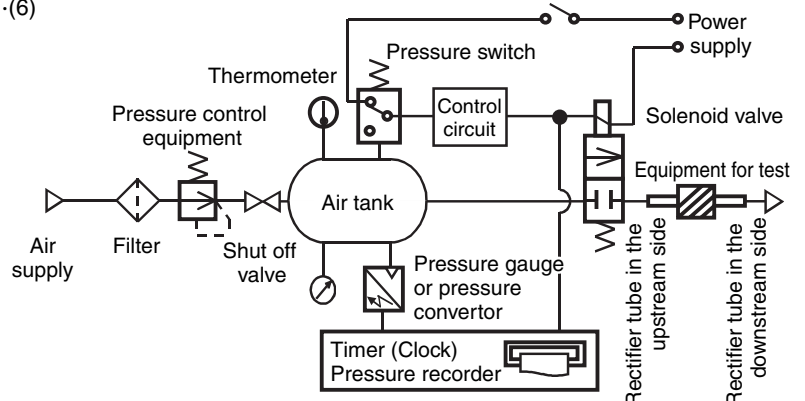


Fig. (2) Test circuit based on JIS B 8390

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

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

- P 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]: $P_2 = P_1 - P$
- Q Flow rate [dm^3/s standard condition]
- P_a Atmospheric pressure [bar absolute]
- T_1 Test conditions of the upstream absolute temperature [K]

is $< P_1 + P_a = 6.5 \text{ bar absolute}$, $T_1 = 297.5 \text{ K}$, 0.07 bar $P \leq 14 \text{ bar}$

This is the same concept as effective area A which ISO6358 stipulates as being applicable only when the pressure drop is smaller than the upstream pressure and the compression of air does not become a problem

3. Process fluid control equipment

(1) Conformed standard

IEC60534-2-3: 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: Value of the clean water flow rate represented by m^3/s which runs through a valve (equipment for test) when the pressure difference is 1 Pa. It is calculated using the following formula.

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

- Av Flow coefficient [m^2]
- Q Flow rate [m^3/s]
- P Pressure difference [Pa]
- ρ Density of fluid [kg/m^3]

(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:

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

- Q Flow rate [ℓ/min]
- Av Flow coefficient [m^2]
- P Pressure difference [MPa]
- G Relative density [water = 1]

In the case of saturated aqueous vapor:

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

- Q Flow rate [kg/h]
- Av Flow coefficient [m^2]
- P Pressure difference [MPa]
- P_1 Relative density [MPa]: $P = P_1 - P_2$
- P_2 Relative density [MPa]

Solenoid Valve Flow Characteristics

Conversion of flow coefficient:

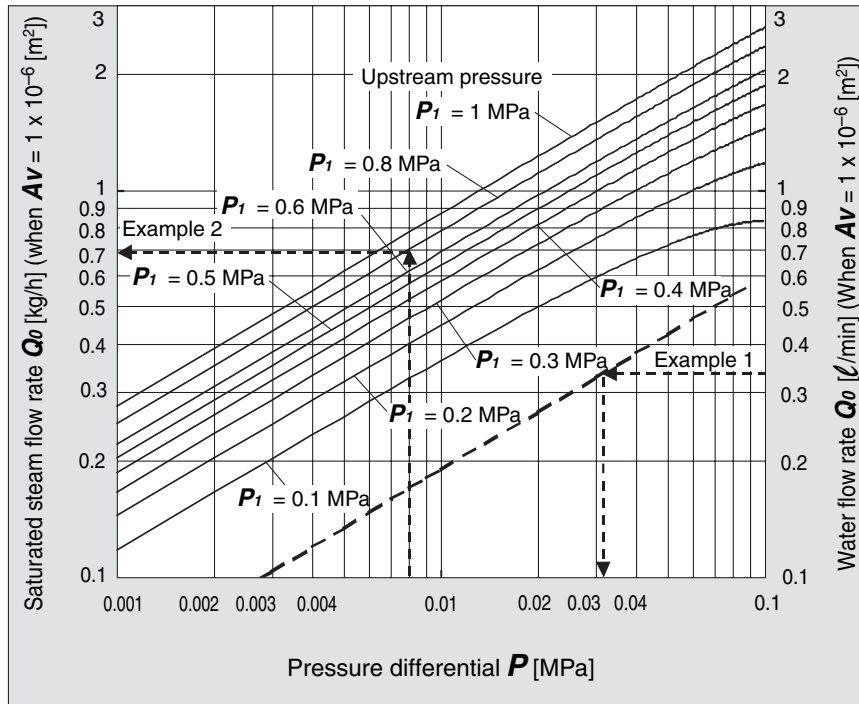
$$Av = 28 \times 10^{-6} Kv = 24 \times 10^{-6} Cv \dots\dots\dots (1)$$

Here,

Kv factor Value of the clean water flow rate represented by m³/h which runs through a valve at 5 to 40C, when the pressure difference is 1 bar.

Cv factor (Reference values). Figures representing the flow rate of clean water by US gal/min which runs through a valve at 60F, when the pressure difference is 1 lb/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 water 15 [l/min] runs through a solenoid valve with an $Av = 45 \times 10^{-6} [m^2]$
 Since $Q0 = 15/45 = 0.33 [l/min]$, according to Graph (2), if reading P when $Q0$ is 0.33 it will be 0.031 [MPa]

Example 2)

Obtain the saturated steam flow rate when $P1 = 0.8 [MPa]$, $P = 0.008 [MPa]$ with a solenoid valve with an $Av = 1.5 \times 10^{-6} [m^2]$
 According to Graph (2), if reading $Q0$ when $P1$ is 0.8 and P is 0.008, it is 0.7 [kg/h] Hence, the flow rate $Q = 0.7 \times 1.5 = 1.05 [kg/h]$

(4) Test method

Attach a test equipment with the test circuit shown in Fig. (3) Next, pour water at 5 to 40C, then 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 4×10^4 .

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

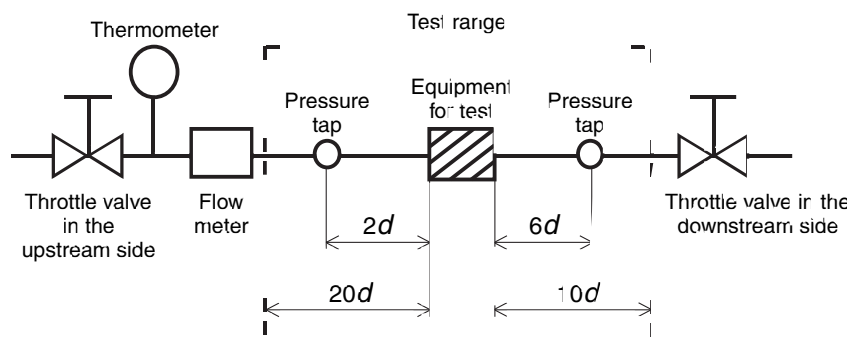
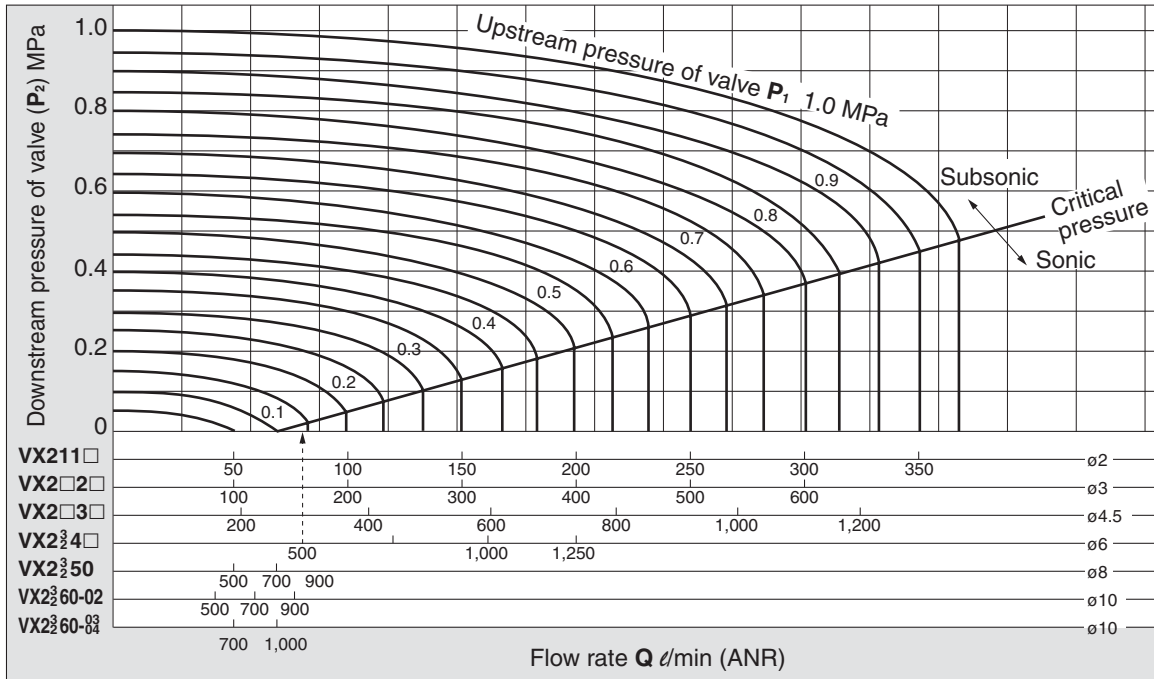


Fig. (3) Test circuit based on IEC60534-2-3, JIS B 2005

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



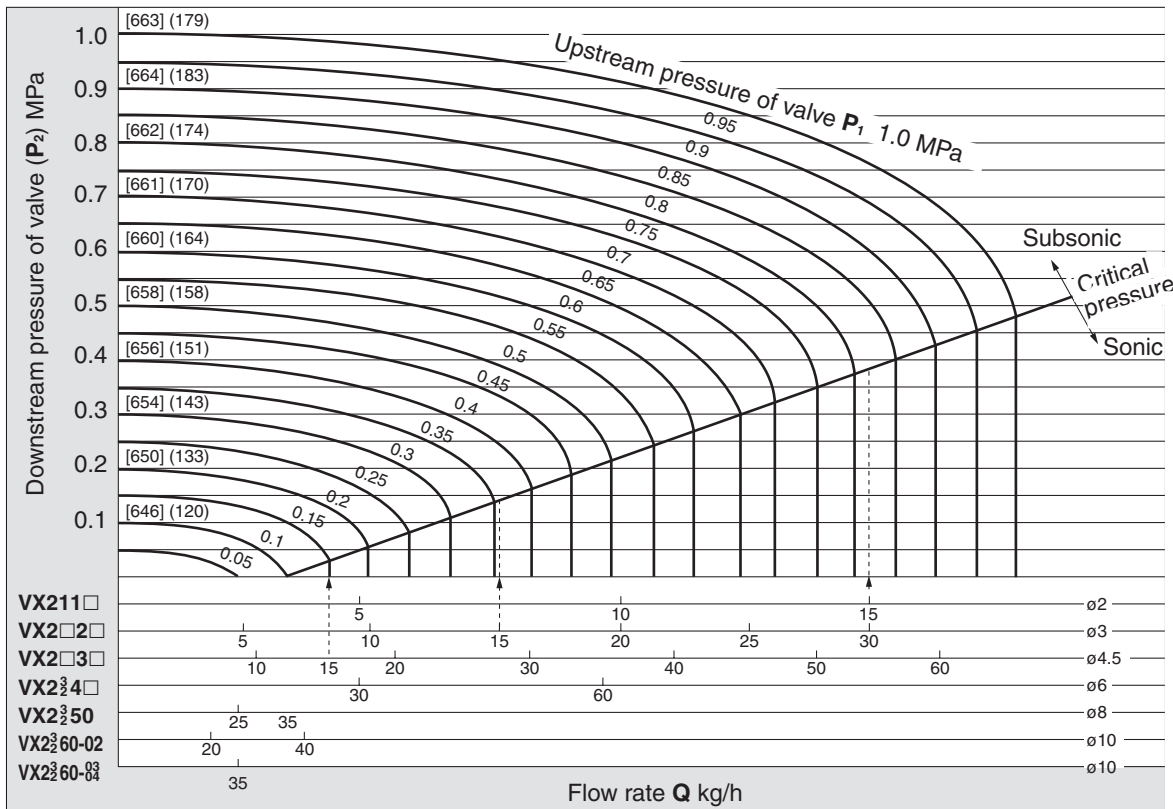
How to read the graph

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

P_1 0.14 MPa for a ø6 orifice (VX2 3/4 □) and

P_1 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

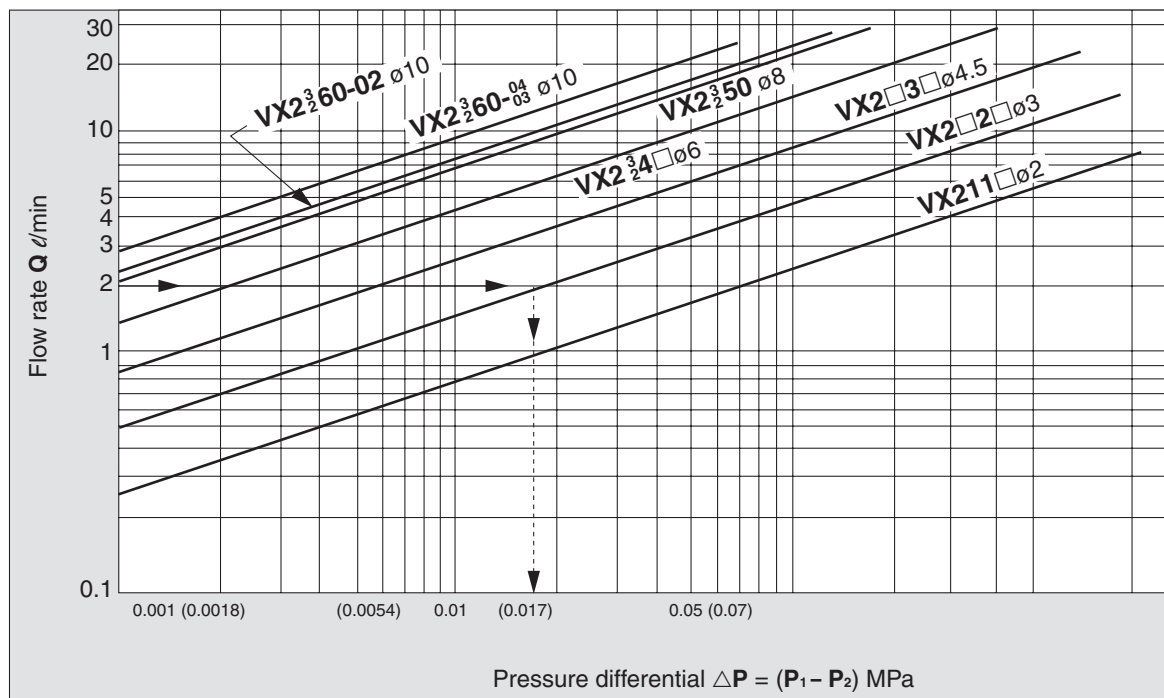
The sonic range pressure to generate a flow rate of 15 kg/h is

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

P_1 0.82 MPa for ø2 orifice (VX211 □). 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, ΔP 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. Proof 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 Degree of protection

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

IP65: Dusttight, Low jetproof type

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

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 $\begin{matrix} \text{IN} \\ \text{OUT} \end{matrix}$, IN and OUT are in a blocked condition () but actually in the case of reverse pressure ()

() 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 catalog 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 catalog are not designed for safety applications such as an emergency shutoff valve. If the valves are used in this type of system, other reliable safety assurance measures should also be adopted.

2. Extended periods of continuous energization

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

3. 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. Give an attention to it.

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 catalog.

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 catalog. Use a fluid with a dynamic viscosity of 50 mm²/s or less. If there is something you do not know, please contact us.

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 any oily particle must not enter the passage.

5) Applicable fluid on the list may not be used depending on the operating condition. Give adequate confirmation, and then determine a model, just because the compatibility list shows the general case.

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 valves at 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 at the upstream side of valves.

If excessive carbon powder is generated by the compressor, it may adhere to the inside of the valves and cause a malfunction.

Refer to SMC's Best Pneumatics 2004 Vol. 14 catalog 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, confirm us separately.



2 Port Solenoid Valve for Fluid Control Precautions 2

Be sure to read this before handling.

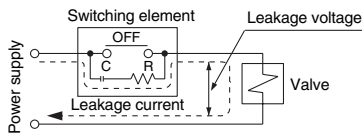
For detailed precautions on each series, refer to the main text.

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

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

Piping

⚠ Caution

1. Preparation before piping

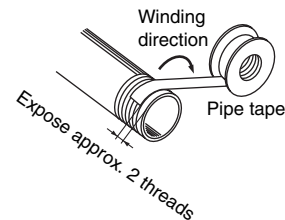
Before piping is connected, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil and other debris from inside the pipe.

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

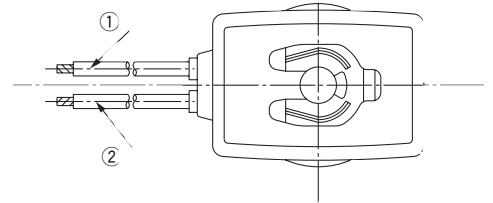
- 1 As a rule, use electrical wire with a cross sectional area of 0.5 to 1.25 mm² for wiring. Furthermore, do not allow excessive force to be applied to the lines.
2. Use electrical circuits which do not generate chattering in their contacts.
3. Use voltage which is within 10% of the rated voltage. In cases with a DC power supply where importance is placed on responsiveness, stay within 5% of the rated value. The voltage drop is the value in the lead wire section connecting the coil.
4. When a surge from the solenoid affects the electrical circuitry install a surge voltage suppressor etc., in parallel with the solenoid. Or, adopt an option that comes with the surge voltage protection circuit. (However a surge voltage occurs even if the surge voltage protection circuit is used. For details, please consult with us.)

Electrical Connections

⚠ Caution

Grommet

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

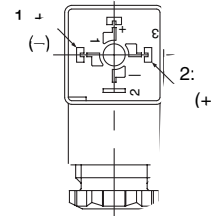


Rated voltage	Lead wire color	
	①	②
DC (Class B only)	Black	Red
100 VAC	Blue	Blue
200 VAC	Red	Red
Other AC	Gray	Gray

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

DIN terminal (Class B only)

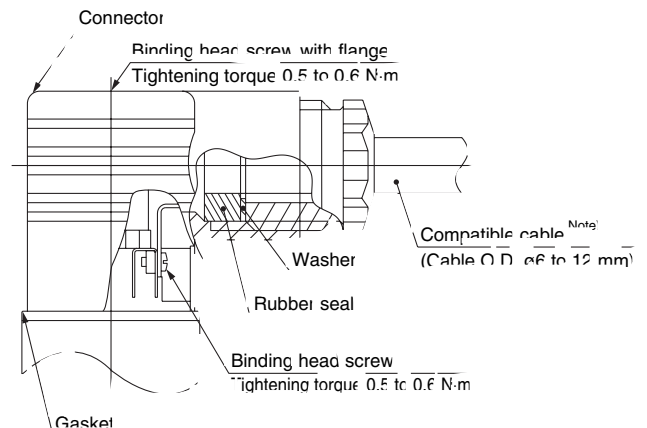
Since internal connections are as shown below for the DIN terminal, make connections to the power supply accordingly.



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

* There is no polarity.

- Use compatible heavy duty cords with cable O.D. of ø6 to 12 mm
- Use the tightening torques below for each section.



Note) For an outside cable diameter of ø6 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.

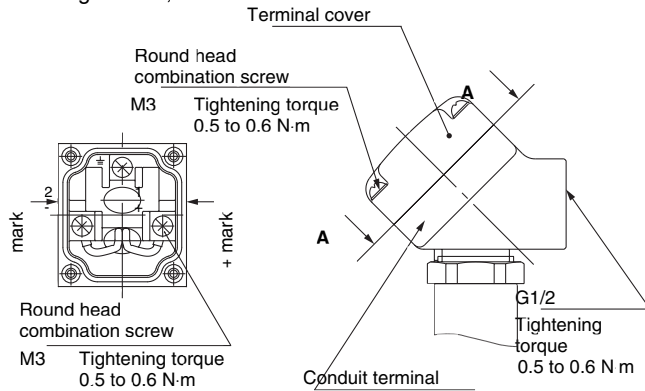
Electrical Connections

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.



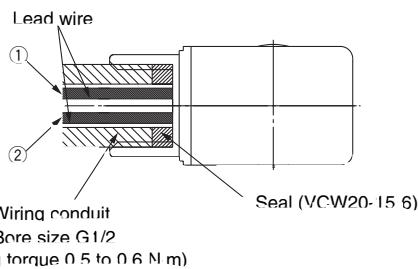
View A-A

(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 color	
	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

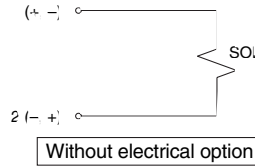
Note) Please order separately.

Electrical Circuits

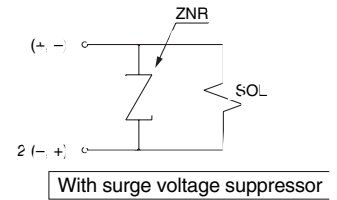
Caution

DC circuit

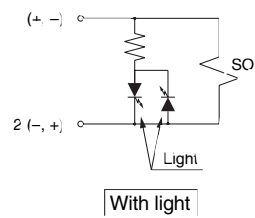
Grommet, Conduit terminal, Conduit terminal, DIN type



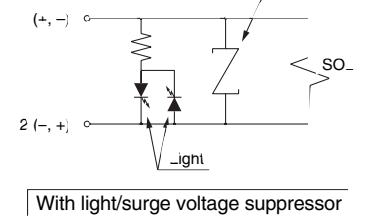
Grommet, Conduit terminal, DIN type



Conduit terminal, DIN type



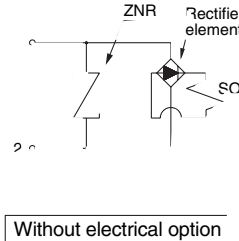
Conduit terminal, DIN type



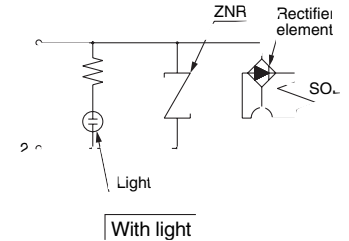
[AC, Class B (Built-in full wave rectifier type) Circuit]

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

Grommet, Conduit terminal, Conduit terminal, DIN type

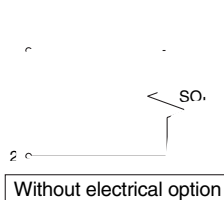


Conduit terminal, DIN type

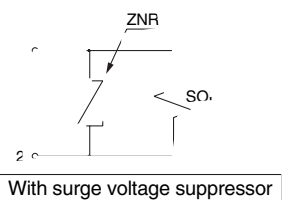


[AC, Class B/H Circuit]

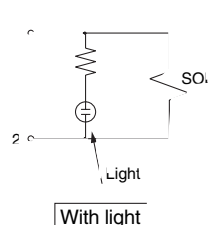
Grommet, Conduit terminal, Conduit terminal



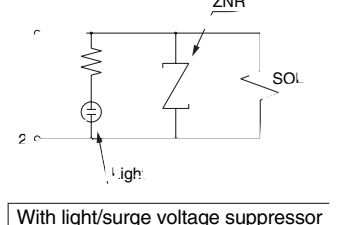
Grommet, Conduit terminal



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) (40C)	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 a half year.

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 after lubricating, 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.

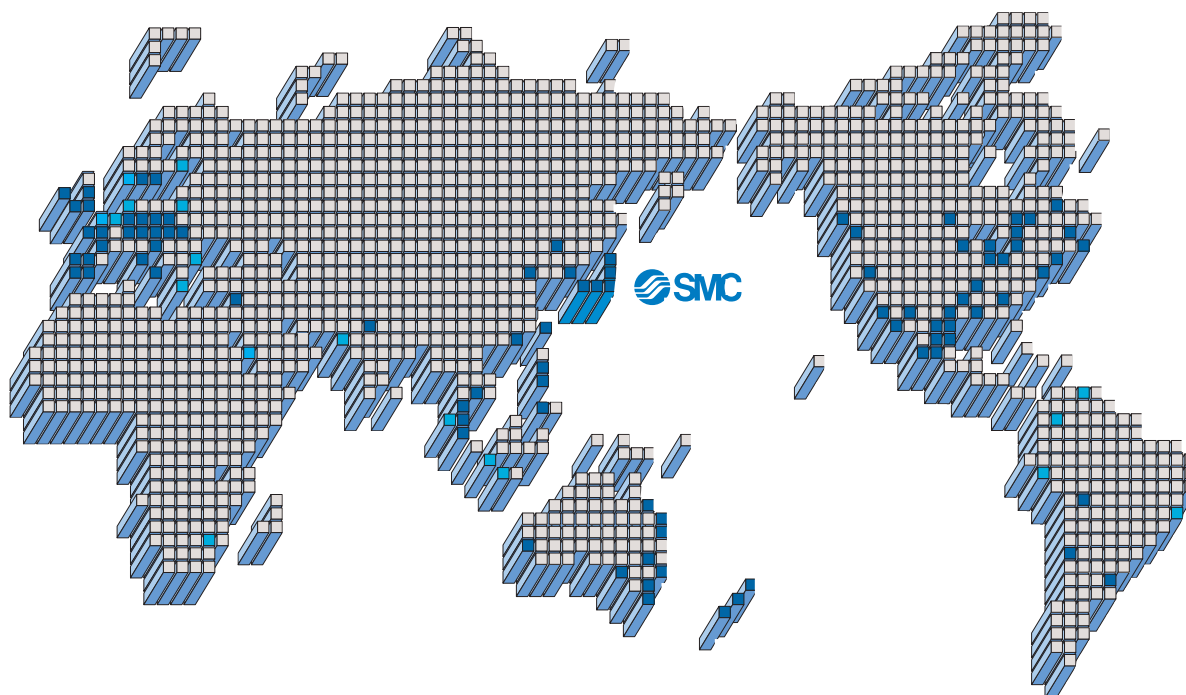
Operating Precautions

Warning

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



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