

# Direct Operated 2 Port Solenoid Valve

For Water, Oil, Steam, Air

**New Series VX21/22/23**

Reduction of  
power consumption  
(DC specification)

6 W → **4.5 w**

8 W → **7 w**

11.5 W → **10.5 w**

Low power consumption type:

**0.8 w**  
(Held at 24 VDC)



**New VX Series now on sale!**

# Solenoid valves for various fluids used in a wide variety of

## Improvement of corrosion resistance

Special magnetic material adopted

## Enclosure: Equivalent to IP65

## Flame resistance UL94V-0 conformed

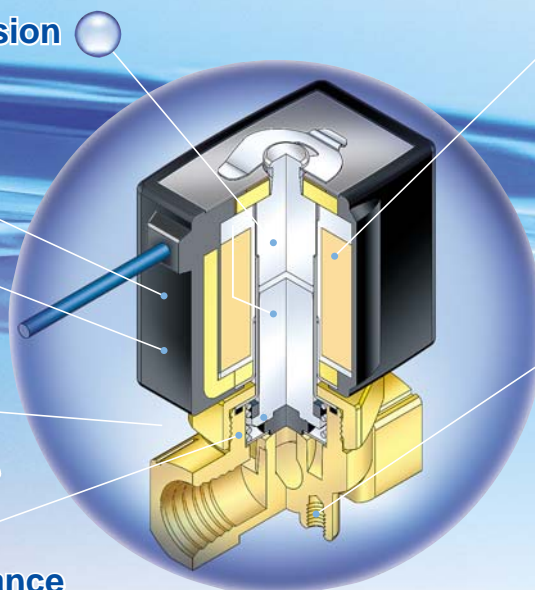
Flame resistant mold coil material

## Low noise construction

Special construction enables to reduce the metal noise. (DC specification)

## Improvement of maintenance performance

Maintenance is performed easily due to the threaded assembly.



## Reduction of power consumption (DC specification)

VX21: 6 W → **4.5 W**

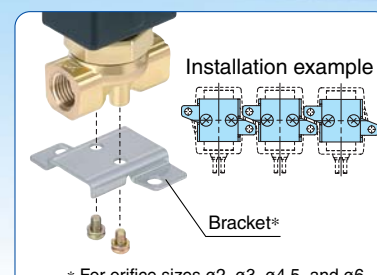
VX22: 8 W → **7 W**

VX23: 11.5 W → **10.5 W**

Low power consumption type: **0.8 W** (Held at 24 VDC)

## With mounting threads on the bottom

A dedicated bracket is available.



\* For orifice sizes ø2, ø3, ø4.5, and ø6

## Direct Operated 2 Port Solenoid Valve

For Water, Oil, Steam, Air

**New Series VX21/22/23**



### Normally Closed (N.C.)

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

### Normally Open (N.O.)

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



### Manifold

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



# applications—**New VX Series variations**

## Pilot Operated 2 Port

### 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

### VX31/32/33

For Air, Vacuum, Water, Steam, Oil



Valve type	Port size	Orifice size mmø
N.C./N.O. C.O.	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, VXFA21/22

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

# Solenoid Valves Flow Characteristics

## (How to indicate flow characteristics)

### 1. Indication of flow characteristics

Indication of the flow characteristics in specifications for equipment such as solenoid valve, etc. is depending on "Table (1)".

**Table (1) Indication of Flow Characteristics**

Corresponding equipment	Indication by international standard	Other indications	Standards conforming to
Equipment for pneumatics	$C, b$	—	ISO 6358: 1989 JIS B 8390: 2000
	—	$S$	JIS B 8390: 2000 Equipment: JIS B 8373, 8374, 8375, 8379, 8381
		$C_v$	ANSI/(NFPA)T3.21.3: 1990
Equipment for controlling process fluids	$A_v$	—	IEC60534-2-3: 1997 JIS B 2005: 1995
	—	$C_v$	Equipment: JIS B 8471, 8472, 8473

### 2. Equipment for pneumatics

#### 2.1 Indication according to the international standards

(1) Standards conforming to

**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

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

Sonic conductance  $C$  : Values which divide 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 the standard condition.

Critical pressure ratio  $b$  : It is the pressure ratio which will turn to the choke flow (downstream pressure/upstream pressure) when it is smaller than this values. (critical pressure ratio)

Choked flow : It is 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. (choked flow)

Subsonic flow : Flow greater than the critical pressure ratio

Standard condition : Air in a temperature state of 20°C, absolute pressure 0.1 MPa (= 100 kPa = 1 bar), relative humidity 65%.

It is stipulated by adding the abbreviation (ANR) after the unit depicting air volume.  
(standard reference atmosphere)

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

(3) Formula of flow rate

It can be indicated by the practical unit 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 [dm<sup>3</sup>/min (ANR)], dm<sup>3</sup> (Cubic decimeter) of SI unit are also allowed to described by ℓ (liter). 1 dm<sup>3</sup> = 1 ℓ.

$C$  : Sonic conductance [ $\text{dm}^3/(\text{s}\cdot\text{bar})$ ]

$b$  : Critical pressure ratio [—]

$P_1$  : Upstream pressure [MPa]

$P_2$  : Downstream pressure [MPa]

$t$  : Temperature [ $^{\circ}\text{C}$ ]

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

Flow characteristics curve is indicated in the Graph (1) For details, please use SMC's "Energy Saving Program".

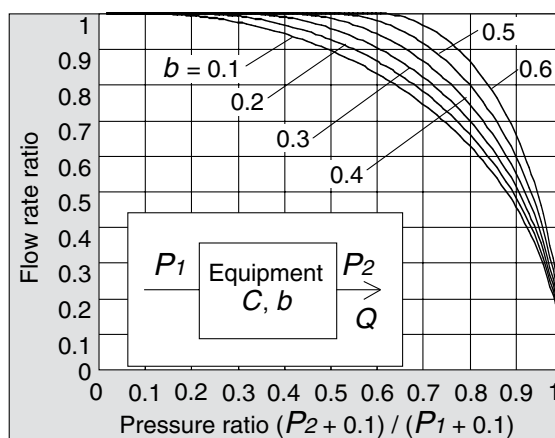
Example)

Obtain the air flow rate for  $P_1 = 0.4$  [MPa],  $P_2 = 0.3$  [MPa],  $t = 20$  [ $^{\circ}\text{C}$ ] when a solenoid valve is performed in  $C = 2$  [ $\text{dm}^3/(\text{s}\cdot\text{bar})$ ] and  $b = 0.3$ .

According to formula 1, the maximum flow rate =  $600 \times 2 \times (0.4 + 0.1) \times \sqrt{\frac{293}{273 + 20}} = 600$  [ $\text{dm}^3/\text{min}$  (ANR)]

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

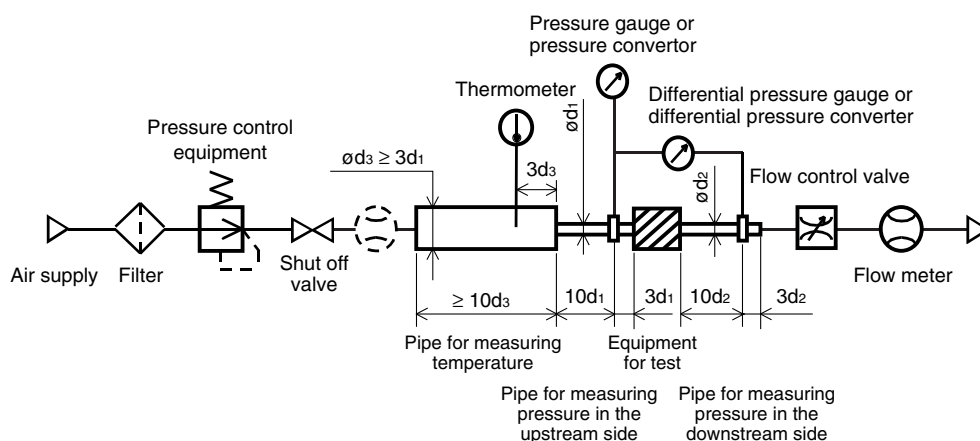
Based on the Graph (1), it is going to be 0.7 if it is read by the pressure ratio as 0.8 and the flow ratio to be  $b = 0.3$ .  
Hence, flow rate = Max. flow x flow ratio =  $600 \times 0.7 = 420$  [ $\text{dm}^3/\text{min}$  (ANR)]



**Graph (1) Flow characteristics line**

#### (4) Test method

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



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

# Solenoid Valves Flow Characteristics

## (How to indicate flow characteristics)

### 2.2 Effective area $S$

(1) Standards conforming to

**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  $S$ : is 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  $C$  (effective area).

(3) Formula of flow rate

When

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

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

When

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

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

Conversion with sonic conductance  $C$ :

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

$Q$  : Air flow rate [dm<sup>3</sup>/min (ANR)], dm<sup>3</sup> (cubic decimeter) of SI unit is good to be described by  $\ell$  (liter), too. 1 dm<sup>3</sup> = 1  $\ell$

$S$  : Effective area [mm<sup>2</sup>]

$P_1$  : 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 by sonic conductance  $C$  (2), it is the same formula when  $b = 0.5$ .

(4) Test method

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

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

$S$  : Effective area [mm<sup>2</sup>]

$V$  : Air tank capacity [dm<sup>3</sup>]

$t$  : 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]

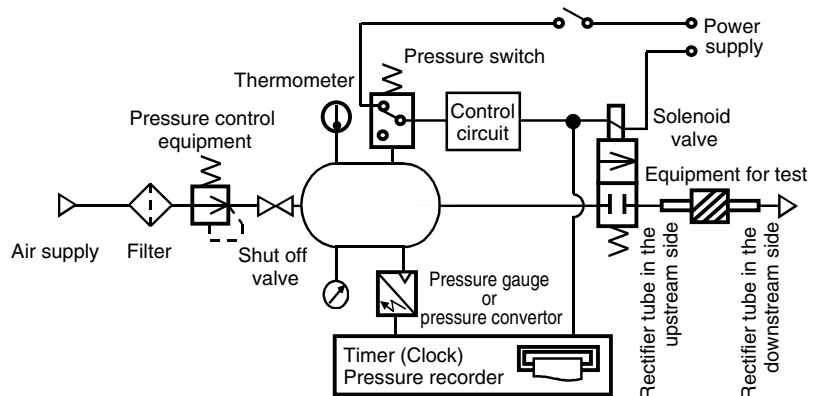


Fig. (2) Test circuit based on JIS B 8390

## 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.

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

$\Delta P$  : 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]:  $P_2 = P_1 - \Delta P$

$Q$  : Flow rate [dm<sup>3</sup>/s standard condition]

$P_a$  : Atmospheric pressure [bar absolute]

$T_1$  : Test conditions of the upstream absolute temperature [K]

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

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. Equipment for process fluids

(1) Standards conforming to

**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: Regulator 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<sup>3</sup>/s which runs through a valve (equipment for test) when the pressure difference is 1 Pa. It is calculated using the following formula.

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

$Av$  : Flow coefficient [m<sup>2</sup>]

$Q$  : Flow rate [m<sup>3</sup>/s]

$\Delta P$  : Pressure difference [Pa]

$\rho$  : Density of fluid [kg/m<sup>3</sup>]

(3) Formula of flow rate

It is described by the known unit. Also, the flow characteristics line shown in the Graph (2).

In the case of liquid:

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

$Q$  : Flow rate [ℓ/min]

$Av$  : Flow coefficient [m<sup>2</sup>]

$\Delta P$  : Pressure difference [MPa]

$G$  : Relative density [water = 1]

In the case of saturated aqueous vapor:

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

$Q$  : Flow rate [kg/h]

$Av$  : Flow coefficient [m<sup>2</sup>]

$\Delta P$  : Pressure difference [MPa]

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

$P_2$  : Downstream pressure [MPa]

# Solenoid Valves Flow Characteristics

## (How to indicate flow characteristics)

Conversion of flow coefficient:

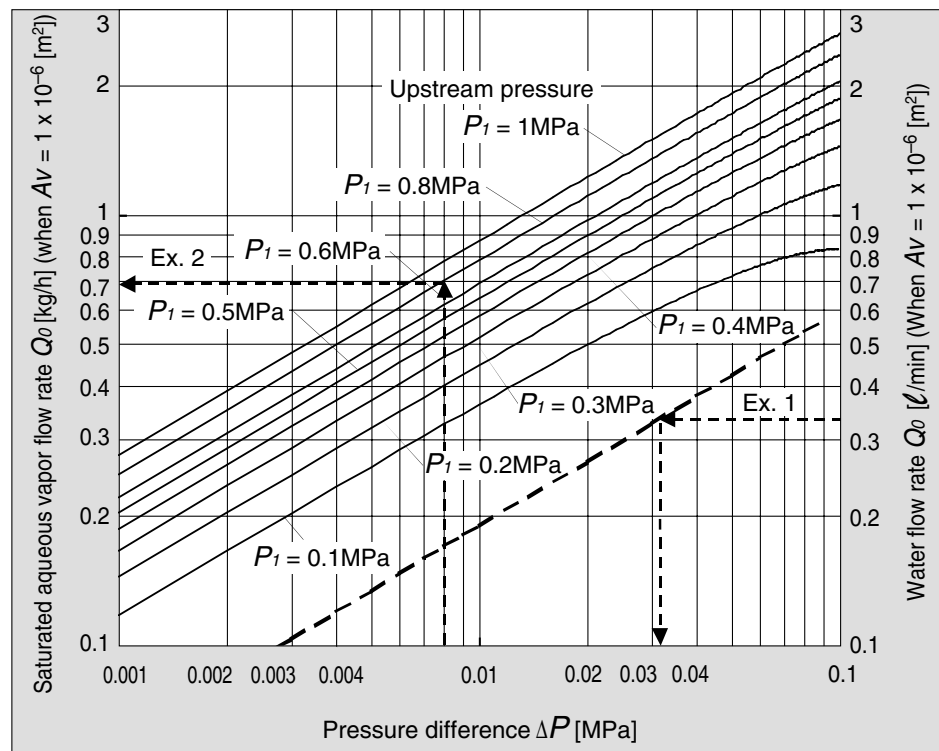
$$Av = 28 \times 10^{-6} Kv = 24 \times 10^{-6} Cv \dots\dots\dots(11)$$

Here,

**Kv factor:** Value of the clean water flow rate represented by the  $m^3/h$  which runs through the valve at 5 to 40°C, when the pressure difference is 1 bar.

**Cv factor (Reference values):** It is the figures representing the flow rate of clean water by US gal/min which runs through the valve at 60°F, when the pressure difference is 1 lbf/in<sup>2</sup> (psi).

Values of pneumatic **Kv** are different from **Cv** because the testing method is different from each other.



**Graph (2) Flow characteristics line**

Example 1)

Obtain the pressure difference when water 15 [l/min] runs through the solenoid valve with an  $Av = 45 \times 10^{-6} [m^2]$ . Since  $Q0 = 15/45 = 0.33 [l/min]$ , according to the Graph (2), if reading  $\Delta P$  when  $Q0$  is 0.33, it will be 0.031 [MPa].

Example 2)

Obtain the flow rate of saturated aqueous vapor when  $P1 = 0.8 [MPa]$ ,  $\Delta P = 0.008 [MPa]$  with a solenoid valve with an  $Av = 1.5 \times 10^{-6} [m^2]$ .

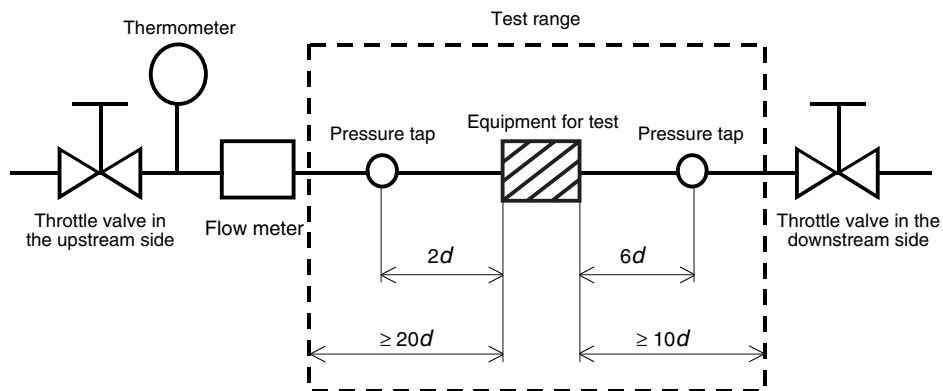
According to the Graph (2), if reading  $Q0$  when  $P1$  is 0.8 and  $\Delta P$  is 0.008, it is 0.7 [kg/h]. Hence, the flow rate  $Q = 0.7 \times 1.5 = 1.05 [kg/h]$ .



(4) Test method

By attaching the equipment for testing with the test circuit shown in Fig. (3) and running water at 5 to 40°C, 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  $4 \times 10^4$ .

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

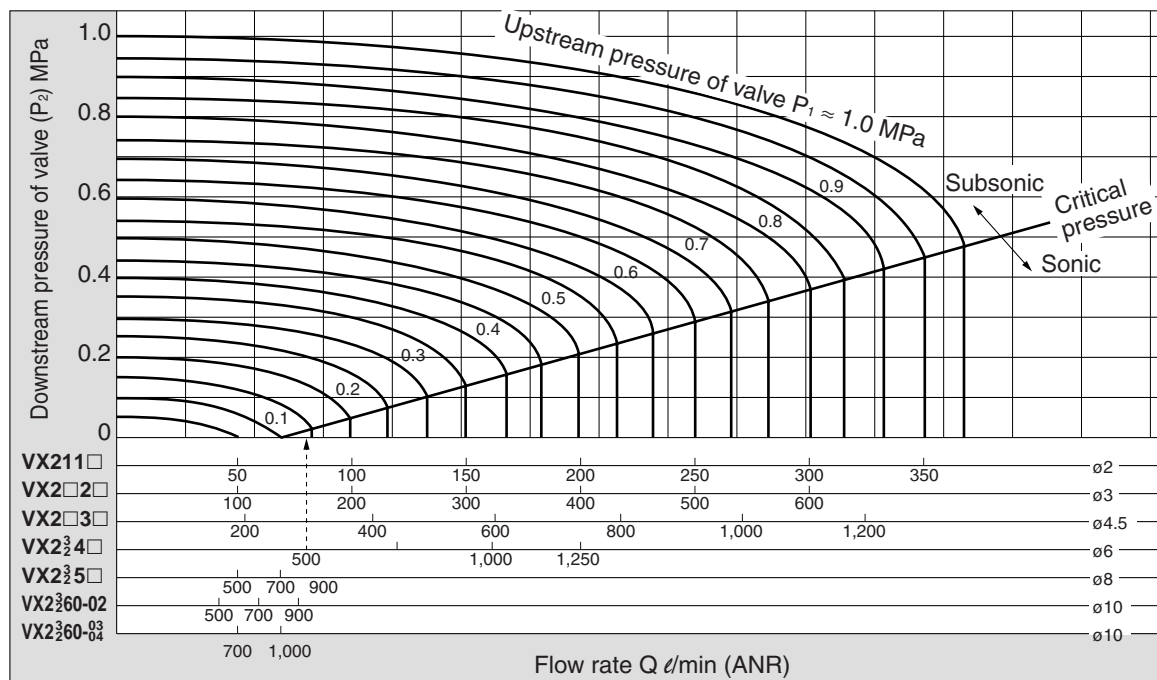


**Fig. (3) Test circuit based on IEC60534-2-3, JIS B 2005**

# Flow Characteristics

Note) Use this graph as a guide. In the case of obtaining an accurate flow rate, refer to front matter pages 1 to 6.

## For Air



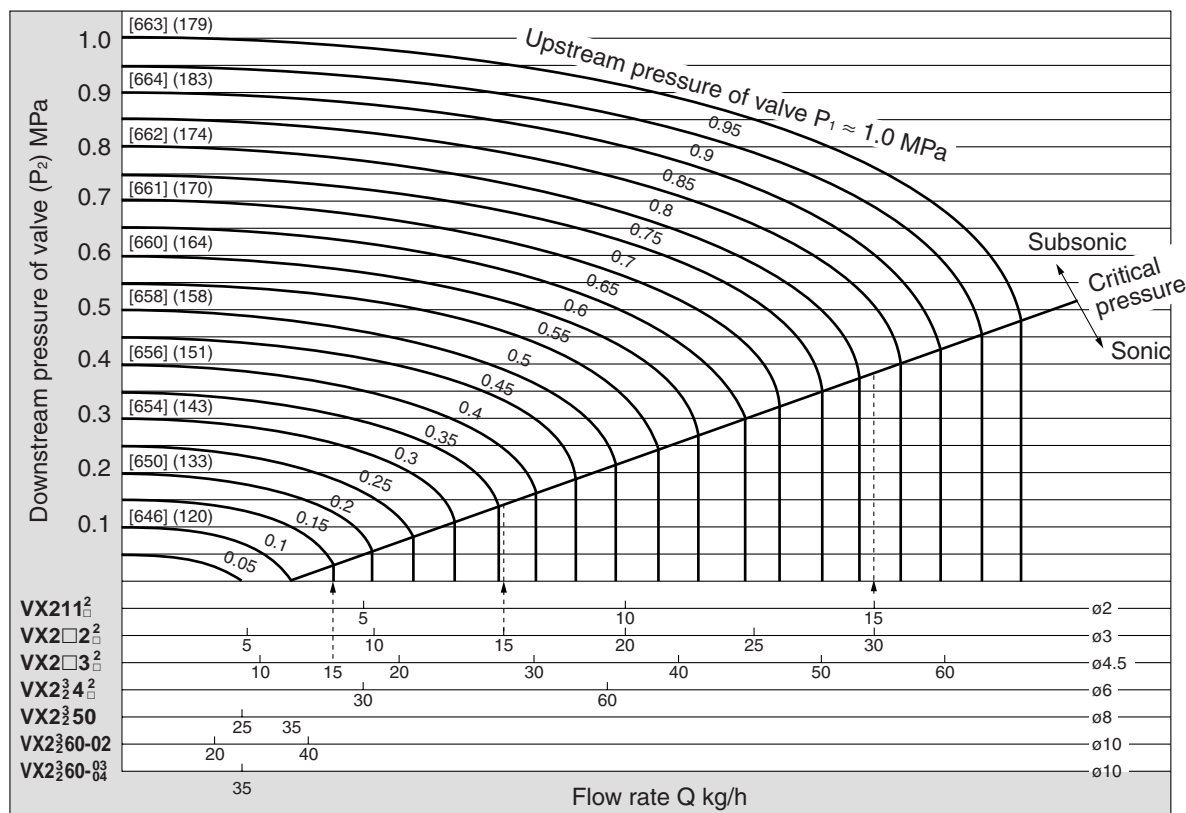
## How to read the graph

The sonic range pressure to generate a flow rate of 500  $\text{d/min}$  (ANR) is

$P_1 \approx 0.14$  MPa for a  $\phi 6$  orifice (VX2 $\frac{3}{2}$ 4□), and

$P_1 \approx 0.3$  MPa for a  $\phi 4.5$  orifice (VX2□3□).

## For Saturated Steam



Figures inside [ ] indicate the saturated steam holding heat (kcal/kg). Figures inside ( ) indicate the saturation temperature ( $^{\circ}\text{C}$ ).

## How to read the graph

The sonic range pressure to generate a flow rate of 15  $\text{kg/h}$  is

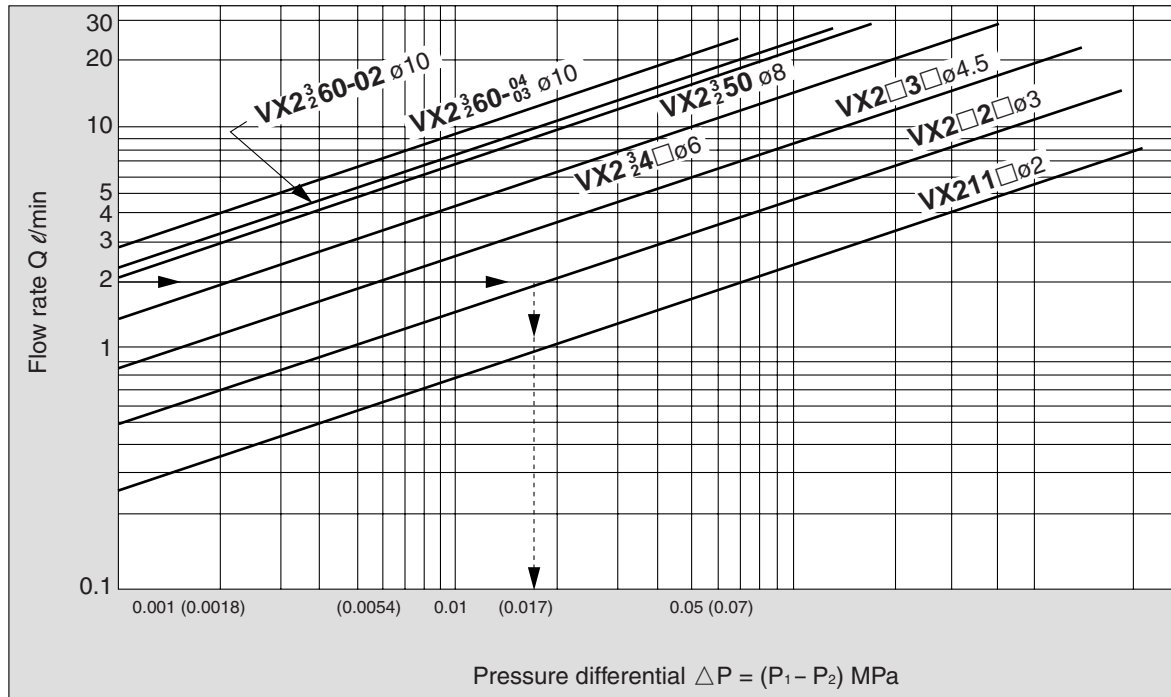
$P_1 \approx 0.15$  MPa for  $\phi 4.5$  orifice (VX2□3□S),  $P_1 \approx 0.37$  MPa for  $\phi 3$  orifice (VX2□2□S), and

$P_1 \approx 0.82$  MPa for  $\phi 2$  orifice (VX211□S). The holding heat differs somewhat depending on the pressure  $P_1$ , but at 15  $\text{kg/h}$  it is approximately 9700 kcal/h.

# Flow Characteristics

Note) Use this graph as a guide. In the case of obtaining an accurate flow rate, refer to front matter pages 1 to 6.

## For Water

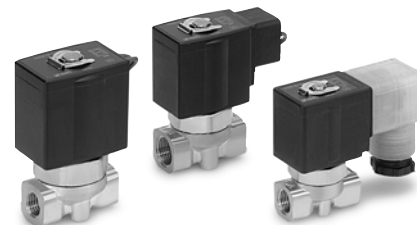


### How to read the graph

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

# Applicable Fluid Check List

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



### All Options (Single Unit)


Option symbol	Seal material	Body, Shading coil material	Coil insulation type	Note
Nil	NBR	Brass/Copper	B	—
A	FKM			
B	EPDM			
C	PTFE			
D	FKM			
E	EPDM			
G	NBR	Stainless steel/Silver	B	High corrosive spec., Oil-free
H	FKM			
J	EPDM			
K	PTFE			
L <sup>Note 1)</sup>	FKM			
M <sup>Note 1)</sup>	FKM		H	Non-leak, Oil-free
N	FKM			—
P	EPDM			
Q	PTFE			
S	PTFE	Brass/Copper	Steam (Max. 183°C)	
V <sup>Note 1)</sup>	FKM		B	Non-leak, Oil-free

Note 1) "L", "M", "V" options are for non-lube treatment.

Note 2) Contact SMC regarding manifold type.

### Fluid Name and Option

Fluid (Application)	Option symbol and body material	
	Brass	Stainless steel
Ethyl alcohol	B	J
Caustic soda (25% ≥)	—	J
Gas oil	A	H
Silicon oil	A	H
Steam system (Steam) (Max. 183°C)	S	Q
Steam system (Condensation) (Max. 99°C)	E	P
Medium vacuum (up to 0.1 Pa.abs)	V	M
Perchloroethylene	A	H
Helium	V	M
Non-leak (10 <sup>-6</sup> Pa·m <sup>3</sup> /s)	V	M
Heated water (Max. 99°C)	E	P

 Note 1) The leakage amount (10<sup>-6</sup> Pa·m<sup>3</sup>/s) of "V", "M" options are values when differential pressure is 0.1 MPa.

Note 2) If using for other fluids, contact SMC.

# 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 downstream pressure is 0 MPa, this becomes the maximum operating pressure.

### 2. Minimum operating pressure differential

The minimum pressure differential (difference between the inlet pressure and the 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 unit must be less than the maximum operating pressure differential.)

### 4. Proof pressure

The pressure which must be withstood without a drop in performance after returning to the operating pressure range. (value under the prescribed conditions)

## Electrical Terminology

### 1. Apparent power (VA)

Volt-ampere is the product of voltage (V) and current (A). Power dissipation (W): For AC,  $W = V/A \cos\theta$ . For DC,  $W = V/A$ . (Note)  $\cos\theta$  shows power factor.  $\cos\theta = 0.6$

### 2. Surge voltage

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

### 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 discharging water for 3 minutes in the prescribed manner. Take appropriate protection measures, since a device is not usable in an environment where a water drop is splashed.

## Others

### 1. Material

NBR: Nitrile rubber

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



EPDM: Ethylene propylene rubber


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

### 2. Oil-free treatment

The degreasing and washing of wetted parts.

### 3. Passage symbol

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

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



# Direct Operated 2 Port Solenoid Valve

## Series VX21/22/23

For Water, Oil, Steam, Air



### Single Unit

#### ■ Valve

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

#### ■ Solenoid Coil

Coil: Class B, Class H

#### ■ Rated Voltage

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

#### ■ Material

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

#### ■ Electrical Entry

- Grommet
- Conduit
- DIN terminal
- Conduit terminal

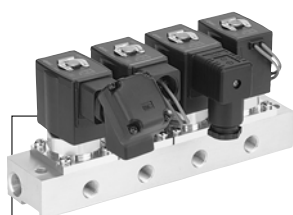


#### Normally Closed (N.C.)

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

#### 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, 3/8	1/4, 3/8



### Manifold

#### ■ Valve

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

#### ■ Base

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

#### ■ Solenoid Coil

Coil: Class B, Class H

#### ■ Rated Voltage

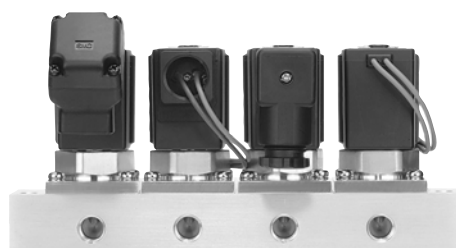
100 VAC, 200 VAC, 110 VAC,  
220 VAC, 240 VAC, 230 VAC,  
48 VAC, 24 VDC, 12 VDC

#### ■ Material

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

#### ■ Electrical Entry

- Grommet
- Conduit
- DIN terminal
- Conduit terminal



#### Manifold

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

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

**For Water, Oil, Steam, Air**

## Standard Specifications

Valve specifications	Valve construction		Direct operated poppet	
	Withstand pressure	MPa	5.0	
	Body material		Brass, Stainless steel	
	Seal material		NBR, FKM, EPDM, PTFE	
	Enclosure		Dusttight, Low jetproof (equivalent to IP65)*	
	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	±20% or less of rated voltage	
		DC	±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°) <small>Note)</small>
VX21	4.5	45
VX22	7	45
VX23	10.5	60

#### AC Specification

Model	Frequency (Hz)	Apparent power (VA)		Temperature rise (C°) <small>Note)</small>
		Inrush	Holding	
VX21	50	19	9	45
	60	16	7	40
VX22	50	43	19	55
	60	35	16	50
VX23	50	62	30	65
	60	52	25	60

Note) The values are for an ambient temperature of 20°C and at the rated voltage.

### • How to order solenoid coil assembly

**VX02** 1 **N** - 1 **G** -   -   -  

**Series**

1	VX21□□
2	VX22□□
3	VX23□□

**Rated voltage** Note 1)

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

**Valve/Material**

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

**Coil insulation type** Note 1)

Nil	Class B
H *	Class H

\* DIN terminal or DC not available.

**Electrical entry**

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

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

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

### Normally Open (N.O.)

#### DC Specification

Model	Power consumption (W)	Temperature rise (C°) <small>Note)</small>
VX21	4.5	45
VX22	7	45
VX23	10.5	60

#### AC Specification

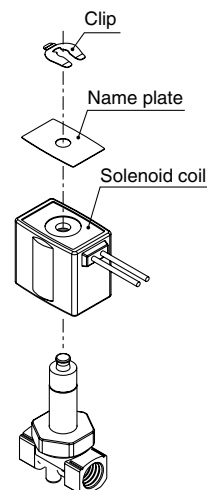
Model	Frequency (Hz)	Apparent power (VA)		Temperature rise (C°) <small>Note)</small>
		Inrush	Holding	
VX21	50	22	11	50
	60	18	8	45
VX22	50	46	20	55
	60	38	18	50
VX23	50	64	32	65
	60	54	27	60

Note) The values are for an ambient temperature of 20°C and at the of rated voltage.

### • 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

**Table (1) Rated Voltage – Electrical Option**

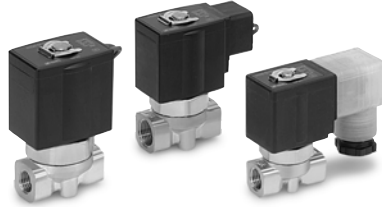
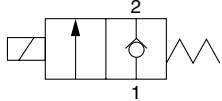
Rated voltage			Class B			Class H		
			S	L	Z	S	L	Z
AC	Voltage symbol	Voltage	With surge voltage suppressor	With light	With light and surge voltage suppressor	With surge voltage suppressor	With light	With light and surge voltage suppressor
	1	100 V	●	●	●	●	●	●
	2	200 V	●	●	●	●	●	●
	3	110 V	●	●	●	●	●	●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

## For Water /Single Unit

### Model/Valve Specifications

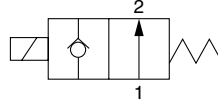
#### N.C.

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	Av x 10 <sup>-6</sup> m <sup>2</sup>	Cv converted		
1/8 (6A)	2	VX2110-01	2.0	1.5	4.1	0.17	3.0	300
	3	VX2120-01	0.9	0.5	7.9	0.33		
	4.5	VX2130-01	0.4	0.2	15.0	0.61		
1/4 (8A)	2	VX2110-02	2.0	1.5	4.1	0.17		470
		VX2120-02	0.9	0.5				
	3	VX2220-02	1.7	1.5	7.9	0.33		
		VX2320-02	2.5	3.0				620
		VX2130-02	0.4	0.2			15.0	300
	4.5	VX2230-02	0.6	0.35				470
		VX2330-02	0.85	0.9				620
	6	VX2240-02	0.35	0.15	26.0	1.10	26.0	470
		VX2340-02	0.55	0.3				620
		VX2250-02	0.13	0.08				560
3/8 (10A)	8	VX2350-02	0.17	0.2	38.0	1.60	38.0	700
		VX2260-02	0.08	0.03				560
	10	VX2360-02	0.1	0.07	46.0	1.90		700
		VX2220-03	1.7	1.5	7.9	0.33	7.9	470
	3	VX2320-03	2.5	3.0				620
		VX2230-03	0.6	0.35	15.0	0.61	15.0	470
	4.5	VX2330-03	0.85	0.9				620
		VX2240-03	0.35	0.15	26.0	1.10		470
	6	VX2340-03	0.55	0.3			26.0	620
		VX2250-03	0.13	0.08	38.0	1.60		560
1/2 (15A)	8	VX2350-03	0.17	0.2			38.0	700
		VX2260-03	0.08	0.03	53.0	2.20		560
	10	VX2360-03	0.1	0.07				700
		VX2220-04	0.08	0.03	53.0	2.20	53.0	560
	10	VX2360-04	0.1	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 front matter 10 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-DC		Av x 10 <sup>-6</sup> m <sup>2</sup>	Cv converted		
1/8 (6A)	2	VX2112-01	0.9		4.1	0.17	3.0	320
	3	VX2122-01	0.45		7.9	0.33		
	4.5	VX2132-01	0.2		15.0	0.61		
1/4 (8A)	2	VX2112-02	0.9		4.1	0.17		500
		VX2122-02	0.45					
	3	VX2222-02	0.8		7.9	0.33		660
		VX2322-02	1.2				15.0	320
		VX2132-02	0.2					500
	4.5	VX2232-02	0.3					660
		VX2332-02	0.6				26.0	500
	6	VX2242-02	0.15					660
		VX2342-02	0.35		26.0	1.10		500
3/8 (10)		VX2222-03	0.8		7.9	0.33	7.9	500
	3	VX2322-03	1.2					660
		VX2232-03	0.3		15.0	0.61	15.0	500
	4.5	VX2332-03	0.6					660
		VX2242-03	0.15					500
	6	VX2342-03	0.35		26.0	1.10	26.0	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 front matter 10 for details on the max. operating pressure differential and the max. system pressure.

### Operating Fluid and Ambient Temperature

Power source	Operating fluid temperature (°C)		Ambient temperature (°C)
	Solenoid valve option (symbol)		
	Nil, G, L	E, P	
AC	1 to 60	1 to 99	−20 to 60
DC	1 to 40	—	−20 to 40

Note) With no freezing

### Tightness of Valve (Leakage Rate)

Seal material	Leakage rate (With water pressure)
NBR, FKM, EPDM	0.1 cm <sup>3</sup> /min or less

## How to Order (Single Unit)

**Normally Closed (N.C.)** VX **21** **2** 0 **01** **1** **G** 1

**Normally Open (N.O.)** VX **21** **2** 2 **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.

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

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

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

**Suffix** •

Nil	—
Z	Oil-free specification

Select "Nil" because the solenoid valve option "L" is the oil-free treatment.

**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.

**Bracket**

Nil	None
B	With bracket

\* 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

**D** - DIN  
**DS** - DIN with surge voltage suppressor  
**DL** - DIN with light  
**DZ** - DIN with surge voltage suppressor and light  
**DO** - For DIN (without connector)

\* DIN type is available with class B insulation only.

**Connector**

Refer to page 2 for ordering coil only.

**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 (6mmø)
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	Note
Nil	NBR	Brass, Copper	B	—
G		Stainless steel, Silver		
E	EPDM	Brass, Copper	H	Heated water (AC only)
P		Stainless steel, Silver		
L	FKM	Stainless steel, Silver	B	High corrosive, Oil-free

Dimensions → page 22 (Single unit)

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

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

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

**Table (4) Bracket Part No.**

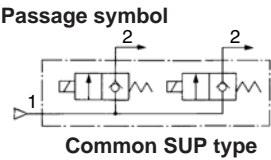
Model	Part no.
VX21 <sup>1</sup> / <sub>8</sub>	VX021N-12A
VX22 <sup>2</sup> / <sub>4</sub>	VX022N-12A
VX23 <sup>3</sup> / <sub>8</sub>	
VX22 <sup>5</sup> / <sub>8</sub>	VX023N-12A-L
VX23 <sup>5</sup> / <sub>8</sub>	

**For Water /Manifold**

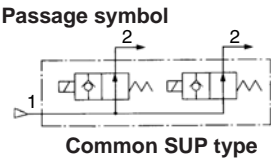
**Solenoid Valve for Manifold/Valve Specifications**



**N.C.**



**N.O.**



**Normally Closed (N.C.)**

Orifice size (mmø)	Model	Max. operating pressure differential (MPa)		Flow characteristics		Max. system pressure (MPa)
		AC	DC	Av x 10 <sup>-6</sup> m <sup>2</sup>	Cv converted	
2	VX2111	2.0	1.5	4.1	0.17	3.0
3	VX2121	0.9	0.5	7.9	0.33	
	VX2221	1.7	1.5			
	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 front matter 10 for details on the max. operating pressure differential and the max. system pressure.

**Normally Open (N.O.)**

Orifice size (mmø)	Model	Max. operating pressure differential (MPa)	Flow characteristics		Max. system pressure (MPa)
		AC·DC	Av x 10 <sup>-6</sup> m²	Cv converted	
2	VX2113	0.9	4.1	0.17	3.0
3	VX2123	0.45	7.9	0.33	
	VX2223	0.8			
	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 front matter 10 for details on the max. operating pressure differential and the max. system pressure.

**Operating Fluid and Ambient Temperature**

Power source	Operating fluid temperature (°C)		Ambient temperature (°C)
	Solenoid valve option (symbol)		
	Nil, G, L	E, P	
AC	1 to 60	1 to 99	−20 to 60
DC	1 to 40	—	−20 to 40



Note) With no freezing

**Tightness of Valve (Leakage Rate)**

Seal material	Leakage rate (With water pressure)
NBR, FKM, EPDM	0.1 cm <sup>3</sup> /min or less



## How to Order (Solenoid Valve for Manifold)

**Normally Closed (N.C.)** VX 21 2 1     - 1 G 1

**Normally Open (N.O.)** VX 21 2 3     - 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.

**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		

**Suffix** •

Nil	—
Z	Oil-free specification

Select "Nil" because the solenoid valve option "L" is the oil-free treatment.

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

 Refer to page 2 for ordering coil only.

**Electrical entry**

**G** - Grommet  
**GS** - With grommet surge voltage suppressor

**C** - Conduit

**D** - DIN  
**DS** - DIN with surge voltage suppressor  
**DL** - DIN with light voltage suppressor and light  
**DZ** - DIN with surge voltage suppressor and light  
**DO** - For DIN (without connector)

**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

\* DIN type is available with class B insulation only.

\* 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     C   - 07 - 1  
**VVX23**

**Port size (Out port)**

1	Rc1/8
2	Rc1/4

\* 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 specification

**Manifold base**

**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

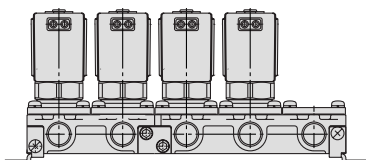
### How to Order Manifold Assemblies (Example)

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 (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 material	Seal material	Coil insulation type	Note
Nil	C	Brass	NBR	B	—
G	S	Stainless steel			
E	CE	Brass	EPDM	H	Heated water (AC only)
P	SE	Stainless steel			
L	SF	Stainless steel	FKM	B	High corrosive, Oil-free

Table (3) Rated Voltage – Electrical Option

Rated voltage			Class B			Class H		
AC/DC	Voltage symbol	Voltage	With surge voltage suppressor	With light	With light and surge voltage suppressor	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	●	●	●	DC spec. is not available.		
	6	12 V	●	—	—			

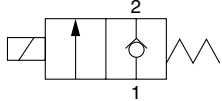
Dimensions → page 23 (manifold)

## For Oil /Single Unit

### Model/Valve Specifications

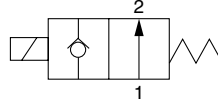
#### N.C.

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	Av x 10 <sup>-6</sup> m <sup>2</sup>	Cv converted			
1/8 (6A)	2	VX2110-01	1.5	1.5	4.1	0.17	3.0	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	VX2120-02	0.5	0.5	7.9	0.33			470
		VX2220-02	1.2	1.2					620
		VX2320-02	1.7	2.0				300	
	4.5	VX2130-02	0.2	0.15	15	0.61		470	
		VX2230-02	0.35	0.3				620	
		VX2330-02	0.55	0.85				470	
	6	VX2240-02	0.2	0.1	26	1.1		620	
		VX2340-02	0.35	0.3				560	
	8	VX2250-02	0.1	0.08	38	1.6		700	
		VX2350-02	0.14	0.2			560		
		10	VX2260-02	0.05			0.03	46	1.9
VX2360-02			0.08	0.07			470		
3/8 (10A)	3	VX2220-03	1.2	1.2	7.9	0.33	3.0	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	
	6	VX2240-03	0.2	0.1	26	1.1		470	
		VX2340-03	0.35	0.3				620	
	8	VX2250-03	0.1	0.08	38	1.6	1.0	560	
		VX2350-03	0.14	0.2				700	
	10	VX2260-03	0.05	0.03	53	2.2		560	
		VX2360-03	0.08	0.07				700	
	1/2 (15A)	10	VX2260-04	0.05	0.03	53		2.2	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 front matter 10 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-DC	Av x 10 <sup>-6</sup> m <sup>2</sup>	Cv converted												
1/8 (6A)	2	VX2112-01	0.8	4.1	0.17	3.0	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	320									
	3	VX2122-02	0.45	7.9	0.33				3.0	320							
		VX2222-02	0.7														
		VX2322-02	1.0														
	4.5	VX2132-02	0.2	15	0.61						3.0	320					
		VX2232-02	0.3														
		VX2332-02	0.6														
	6	VX2242-02	0.15	26	1.1								3.0	320			
		VX2342-02	0.35														
	3/8 (10)	3	VX2222-03	0.7	7.9										0.33	3.0	320
			VX2322-03	1.0													
		4.5	VX2232-03	0.3	15										0.61		
VX2332-03			0.6														
6		VX2242-03	0.15	26	1.1	3.0	320										
		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 front matter 10 for details on the max. operating pressure differential and the max. system pressure.

### Operating Fluid and Ambient Temperature

Power source	Operating fluid temperature (°C)		Ambient temperature (°C)
	Solenoid valve option (symbol)		
	A, H	D, N	
AC	-5 <sup>Note)</sup> to 60	-5 <sup>Note)</sup> to 120	-20 to 60
DC	-5 <sup>Note)</sup> to 40	—	-20 to 40

Note) Kinematic viscosity: 50 mm<sup>2</sup>/s or less

### Tightness of Valve (Leakage Rate)

Seal material	Leakage rate (With oil pressure)
FKM	0.1 cm <sup>3</sup> /min or less

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

**For Oil/Single Unit**

**Normally Closed (N.C.)** **VX** **21** **2** **0** **01** **1** **G** **1**

**Normally Open (N.O.)** **VX** **21** **2** **2** **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.

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

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

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

**Suffix** •

Nil	—
Z	Oil-free specification

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 2 for ordering coil only.

**Bracket**

Nil	None
B	With bracket

\* Refer to the table (4) if a bracket is ordered separately.

**Electrical entry**

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

**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 (2) Solenoid Valve Option**

Option symbol	Seal material	Body, Shading coil material	Coil insulation type
A	FKM	Brass, Copper	B
H		Stainless steel, Silver	
D		Brass, Copper	H
N		Stainless steel, Silver	

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.

Dimensions → page 22 (Single unit)

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

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

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

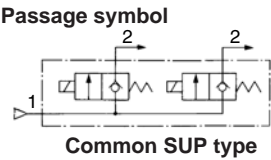
**Table (4) Bracket Part No.**

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

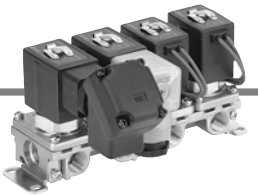
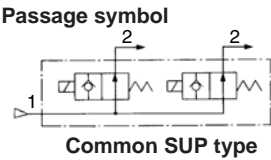
**For Oil/Manifold**

**Solenoid Valve for Manifold/Valve Specifications**

**N.C.**



**N.O.**



**Normally Closed (N.C.)**

Orifice size (mmø)	Model	Max. operating pressure differential (MPa)		Flow characteristics		Max. system pressure (MPa)
		AC	DC	Av x 10 <sup>-6</sup> m <sup>2</sup>	Cv converted	
2	VX2111	1.5	1.5	4.1	0.17	3.0
3	VX2121	0.5	0.5	7.9	0.33	
	VX2221	1.2	1.2			
	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	1.1	
	VX2341	0.35	0.3			



• Refer to “Glossary of Terms” on front matter 10 for details on the max. operating pressure differential and the max. system pressure.

**Normally Open (N.O.)**

Orifice size (mmø)	Model	Max. operating pressure differential (MPa)	Flow characteristics		Max. system pressure (MPa)
		AC·DC	Av x 10 <sup>-6</sup> m <sup>2</sup>	Cv converted	
2	VX2113	0.8	4.1	0.17	3.0
3	VX2123	0.45	7.9	0.33	
	VX2223	0.7			
	VX2323	1.0			
4.5	VX2133	0.2	15	0.61	
	VX2233	0.3			
	VX2333	0.6			
6	VX2243	0.15	26	1.1	
	VX2343	0.35			



• Refer to “Glossary of Terms” on front matter 10 for details on the max. operating pressure differential and the max. system pressure.

**Operating Fluid and Ambient Temperature**

Power source	Operating fluid temperature (°C)		Ambient temperature (°C)
	Solenoid valve option (symbol)		
	A, H	D, N	
AC	–5 <sup>Note)</sup> to 60	–5 <sup>Note)</sup> to 120	–20 to 60
DC	–5 <sup>Note)</sup> to 40	—	–20 to 40



Note) Kinematic viscosity: 50 mm<sup>2</sup>/s or less

**Tightness of Valve (Leakage Rate)**

Seal material	Leakage rate (With oil pressure)
FKM	0.1 cm <sup>3</sup> /min or less

## How to Order (Solenoid Valve for Manifold)

**Normally Closed (N.C.)** VX 21 2 1     — 1 G 1

**Normally Open (N.O.)** VX 21 2 3     — 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.

**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		

**Suffix** •

Nil	—
Z	Oil-free specification

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

Refer to page 2 for ordering coil only.

**Electrical entry**

**G** - Grommet  
**GS** - With grommet surge voltage suppressor

**C** - Conduit

**D** - DIN  
**DS** - DIN with surge voltage suppressor  
**DL** - DIN with light  
**DZ** - DIN with surge voltage suppressor and light  
**DO** - For DIN (without connector)

**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

\* DIN type is available with class B insulation only.

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

For Water

For Oil

For Steam

For Air

### How to Order Manifold Bases

VVX21  
VVX22 1   CF   — 07 — 1  
VVX23

**Port size (Out port)**

1	Rc1/8
2	Rc1/4

\* 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 specification

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

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.

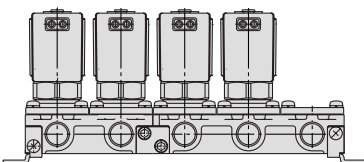
Example

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 material	Seal material	Coil insulation type	Note
A	CF	Brass	FKM	B	—
H	SF	Stainless steel		H	AC only
D	CF	Brass			
N	SF	Stainless steel			

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

Rated voltage		Class B			Class H		
		S	L	Z	S	L	Z
AC/DC	Voltage symbol	Voltage	With surge voltage suppressor	With light	With light and surge voltage suppressor	With surge voltage suppressor	With light
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	●	—			

Dimensions → page 23 (manifold)

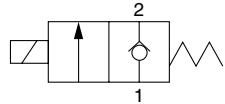


## For Steam/Single Unit

### Model/Valve Specifications

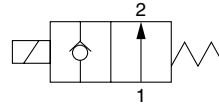
#### N.C.

Passage symbol



#### N.O.

Passage symbol



#### Normally Closed (N.C.)

Port size	Orifice size (mm)	Model	Max. operating pressure differential (MPa)	Flow characteristics		Max. system pressure (MPa)	Weight (g) <small>(Note)</small>
			AC	Av x 10 <sup>-6</sup> m <sup>2</sup>	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		
	4.5	VX2130-02	0.45	15	0.61		
		VX2230-02	0.75				
		VX2330-02	1.0				
	6	VX2240-02	0.4	26	1.1		
		VX2340-02	0.5				
	8	VX2250-02	0.15	38	1.6		
		VX2350-02	0.2				
	10	VX2260-02	0.08	46	1.9		
VX2360-02		0.1					
3/8 (10A)	3	VX2220-03	1.0	7.9	0.33	1.0	470
	4.5	VX2230-03	0.75	15	0.61		
		VX2330-03	1.0				
		VX2240-03	0.4				
	6	VX2340-03	0.5	26	1.1		
		VX2250-03	0.15				
	8	VX2350-03	0.2	38	1.6		
		VX2260-03	0.08				
	10	VX2360-03	0.1	53	2.2		
		VX2260-04	0.08				
1/2 (15A)	10	VX2360-04	0.1	53	2.2	560	
						700	



Note) Weight of grommet type. Add 60 g for conduit terminal type.  
• Refer to "Glossary of Terms" on front matter 10 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 <sup>-6</sup> m <sup>2</sup>	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					
	4.5	VX2132-02	0.3	15	0.61		320	
		VX2232-02	0.45				500	
		VX2332-02	0.8				660	
	6	VX2242-02	0.25	26	1.1		500	
		VX2342-02	0.45				660	
	3/8 (10)	3	VX2222-03	1.0	7.9	0.33	500	
		4.5	VX2232-03	0.45	15	0.61		
VX2332-03			0.8					
6			VX2242-03	0.25				26
		VX2342-03	0.45	660				



Note) Weight of grommet type. Add 60 g for conduit terminal type.  
• Refer to "Glossary of Terms" on front matter 10 for details on the max. operating pressure differential and the max. system pressure.

### Operating Fluid and Ambient Temperature

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

### Tightness of Valve (Leakage Rate)

Seal material	Leakage rate (With air pressure)
PTFE	300 cm <sup>3</sup> /min or less

## How to Order (Single Unit)

**Normally Closed (N.C.)** VX 21 2 0 [ ] [ ] - 01 [ ] - 1 G 1 - [ ]

**Normally Open (N.O.)** VX 21 2 2 [ ] [ ] - 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.

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

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

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

**Suffix** •

Nil	—
Z	Oil-free specification

**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 2 for ordering coil only.

**Bracket**

Nil	None
B	With bracket

\* 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

**For Water**  
**For Oil**  
**For Steam**  
**For Air**

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

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

**Normally Open (N.O.)**

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

**Table (2) Solenoid Valve Option**

Option symbol	Seal material	Body material	Coil insulation type
S	PTFE	Brass	H
Q		Stainless steel	

Solenoid coil: AC, Class H only

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

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

**Table (4) Bracket Part No.**

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

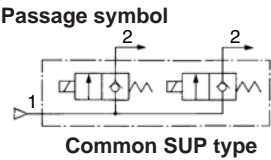
Dimensions → page 22 (Single unit)

**For Steam /Manifold**

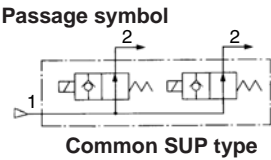
**Solenoid Valve for Manifold/Valve Specifications**



**N.C.**



**N.O.**



**Normally Closed (N.C.)**

Orifice size (mmø)	Model	Max. operating pressure differential (MPa)	Flow characteristics		Max. system pressure (MPa)
		AC	Av x 10 <sup>-6</sup> m <sup>2</sup>	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			
	VX2331	1.0			
6	VX2241	0.4	26	1.1	
	VX2341	0.5			



• Refer to “Glossary of Terms” on front matter 10 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 <sup>-6</sup> m <sup>2</sup>	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			
	VX2333	0.8			
6	VX2243	0.25	26	1.1	
	VX2343	0.45			



• Refer to “Glossary of Terms” on front matter 10 for details on the max. operating pressure differential and the max. system pressure.

**Operating Fluid and Ambient Temperature**

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

**Tightness of Valve (Leakage Rate)**

Seal material	Leakage rate (With air pressure)
PTFE	300 cm <sup>3</sup> /min or less

## How to Order (Solenoid Valve for Manifold)

**Normally Closed (N.C.)** VX 21 2 1       — 1 G 1

**Normally Open (N.O.)** VX 21 2 3       — 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 specification

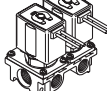
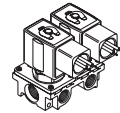
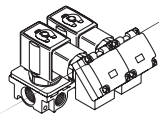
**Rated voltage** •

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 2 for ordering coil only.

### Electrical entry

<b>G</b> - Grommet <b>GS</b> - With grommet surge voltage suppressor 	<b>C</b> - Conduit 
<b>T</b> - With conduit terminal <b>TS</b> - With conduit terminal and surge voltage suppressor <b>TL</b> - With conduit terminal and light <b>TZ</b> - 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

**Port size (Out port)** •

1	Rc1/8
2	Rc1/4

\* 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 specification

**Manifold base** •

**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

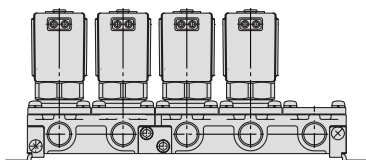
### How to Order Manifold Assemblies (Example)

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.  
\* VX211S-1G1.....4 sets    Add an “\*” in front of the part numbers  
\* VVX21-3A-P.....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	—	● (N.C.)	●	●
VX23	—	—	●	●

Table (2) Solenoid Valve Option

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

Table (3) Rated Voltage – Electrical Option

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

Dimensions → page 23 (manifold)

For Water

For Oil

For Steam

For Air

# Series VX21/22/23

## For Air /Single Unit

(Inert gas, Non-leak, Medium vacuum)

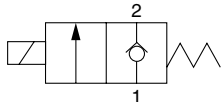
When the fluid is air.

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.)

### Model/Valve Specifications

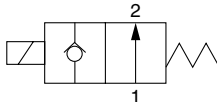
#### N.C.

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) (Note)	
			AC	DC	C <sub>d</sub> [dm <sup>3</sup> /(s·bar)]	b	C <sub>v</sub>			
1/8 (6A)	2	VX2110-01	2.0	1.5	0.59	0.48	0.18	3.0	300	
	3	VX2120-01	1.1	0.6	1.2	0.45	0.33			
	4.5	VX2130-01	0.45	0.2	2.4	0.44	0.61			
1/4 (8A)	2	VX2110-02	2.0	1.5	0.59	0.48	0.18	3.0	470 620 300 470 620 470	
	3	VX2120-02	1.1	0.6	1.2	0.45	0.33			
		VX2220-02	2.0	1.5						
		VX2320-02	3.0	3.0						
	4.5	VX2130-02	0.45	0.2	2.3	0.46	0.61			
		VX2230-02	0.75	0.35						
	6	VX2330-02	1.0	0.9	4.1	0.3	1.1			
		VX2240-02	0.4	0.15						
	1.0	8	VX2340-02	0.5	0.35	6.4	0.3	1.6		
			VX2250-02	0.15	0.08					
		10	VX2350-02	0.2	0.2	8.8	0.3	2.0		
			VX2260-02	0.08	0.03					
3		VX2360-02	0.1	0.07	1.2	0.45	0.33			
		VX2220-03	2.0	1.5						
3/8 (10A)	3	VX2320-03	3.0	3.0	1.2	0.45	0.61	3.0	470 620 470 620 470 620	
		VX2230-03	0.75	0.35						
	4.5	VX2330-03	1.0	0.9	4.1	0.3	1.1			
		VX2240-03	0.4	0.15						
	6	VX2340-03	0.5	0.35	6.4	0.3	1.6			
		VX2250-03	0.15	0.08						
	1.0	8	VX2350-03	0.2	0.2	11	0.3	2.2		
			VX2260-03	0.08	0.03					
		10	VX2360-03	0.1	0.07	11	0.3	2.2		
			VX2260-04	0.08	0.03					
	1/2 (15A)	10	VX2360-04	0.1	0.07	11	0.3	2.2	1.0	560 700



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 front matter 10 for details on the max. operating pressure differential and the max. system pressure.

#### Normally Open (N.O.)

Port size	Orifice size (mm)	Model	Max. operating pressure differential (MPa)	Flow characteristics			Max. system pressure (MPa)	Note) Weight (g)
				C <sub>d</sub> (dm <sup>3</sup> /(s·bar))	b	C <sub>v</sub>		
1/8 (6A)	2	VX2112-01	1.5	0.59	0.48	0.18	3.0	320
	3	VX2122-01	0.7	1.2	0.45	0.33		
	4.5	VX2132-01	0.3	2.3	0.46	0.61		
1/4 (8A)	2	VX2112-02	1.5	0.59	0.48	0.18	3.0	500
		VX2122-02	0.7					
	3	VX2222-02	1.0	1.2	0.45	0.33		
		VX2322-02	1.6				3.0	660
	4.5	VX2132-02	0.3					
		VX2232-02	0.45	2.3	0.46	0.61		
		VX2332-02	0.8				4.1	500
	6	VX2242-02	0.25	4.1	0.3	1.1		
		VX2342-02	0.45				1.0	660
	3	VX2222-03	1.0	1.2	0.45	0.33		
		VX2322-03	1.6				3.0	500
	4.5	VX2232-03	0.45	2.3	0.46	0.61		
3/8 (10)		VX2332-03	0.8					
	6	VX2242-03	0.25	4.1	0.3	1.1	1.0	500
		VX2342-03	0.45					



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 front matter 10 for details on the max. operating pressure differential and the max. system pressure.

### Operating Fluid and Ambient Temperature

Power source	Operating fluid temperature (°C)		Ambient temperature (°C)
	Solenoid valve option (symbol)		
	Nil, G	V, M	
AC	-10 <sup>Note)</sup> to 80	-10 <sup>Note)</sup> to 60	-20 to 60
DC	-10 <sup>Note)</sup> to 60	-10 <sup>Note)</sup> to 40	-20 to 40



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

### Tightness of Valve (Leakage Rate)

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



Note) Value on option "V", "M" (non-leak, medium vacuum)



## How to Order (Single Unit)

**Normally Closed (N.C.)** **VX** **21** **2** **0** **01** **1** **G** **1**

**Normally Open (N.O.)** **VX** **21** **2** **2** **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.

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

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

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

**Suffix** •

Nil	—
Z	Oil-free specification

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

**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.

**Bracket**

Nil	None
B	With bracket

\* 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

**D** - DIN  
**DS** - DIN with surge voltage suppressor  
**DL** - DIN with light  
**DZ** - DIN with surge voltage suppressor and light  
**DO** - For DIN (without connector)

\* DIN type is available with class B insulation only.

**Connector**

Refer to page 2 for ordering coil only.

**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 (2) Solenoid Valve Option**

Option symbol	Seal material	Body material	Coil insulation type	Note
Nil	NBR	Brass	B	—
G		Stainless steel		
V	FKM	Brass		
M		Stainless steel		

Non-leak (10<sup>-6</sup> Pam<sup>3</sup>/sec), Oil-free, Medium vacuum (0.1 Pa.abs)

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.)

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

Rated voltage			Class B		
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	●	—	—

**Table (4) Bracket Part No.**

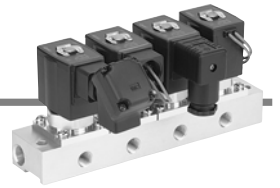
Model	Part no.
VX21 <sup>1</sup> / <sub>8</sub> 0	VX021N-12A
VX22 <sup>2</sup> / <sub>4</sub> 0	VX022N-12A
VX23 <sup>2</sup> / <sub>4</sub> 0	
VX22 <sup>5</sup> / <sub>8</sub> 0	VX023N-12A-L
VX23 <sup>5</sup> / <sub>8</sub> 0	

Dimensions → page 22 (Single unit)

## For Air/Manifold

(Inert gas, Non-leak, Medium vacuum)

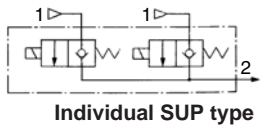
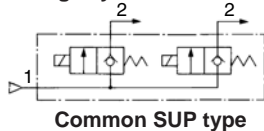
### Solenoid Valve for Manifold/Valve Specifications



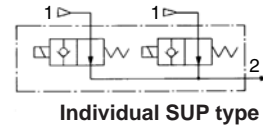
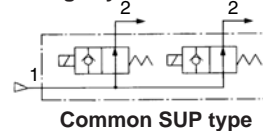
**N.C.**

**N.O.**

Passage symbol



Passage symbol



#### Normally Closed (N.C.)

Orifice size (mm)	Model	Max. operating pressure differential (MPa)		Flow characteristics			Max. system pressure (MPa)
		AC	DC	C <sub>d</sub> [dm <sup>3</sup> /(s·bar)]	b	C <sub>v</sub>	
2	VX2111-00	2.0	1.5	0.59	0.48	0.18	3.0
3	VX2121-00	1.1	0.6	1.2	0.45	0.33	
	VX2221-00	2.0	1.5				
	VX2321-00	3.0	3.0				
4.5	VX2131-00	0.45	0.2	2.3	0.46	0.61	
	VX2231-00	0.75	0.35				
	VX2331-00	1.0	0.9				
6	VX2241-00	0.4	0.15	4.1	0.3	1.1	
	VX2341-00	0.5	0.35				

• Refer to "Glossary of Terms" on front matter 10 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	C[dm³/(s·bar)]	b	Cv	
2	VX2113-00	1.5	0.59	0.48	0.18	3.0
3	VX2123-00	0.7	1.2	0.45	0.33	
	VX2223-00	1.0				
	VX2323-00	1.6				
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	0.3	1.1	
	VX2343-00	0.45				

• Refer to "Glossary of Terms" on front matter 10 for details on the max. operating pressure differential and the max. system pressure.

### Operating Fluid and Ambient Temperature

Power source	Operating fluid temperature (°C)		Ambient temperature (°C)
	Solenoid valve option (symbol)		
	-	V	
AC	-10 <sup>Note)</sup> to 80	-10 <sup>Note)</sup> to 60	-20 to 60
DC	-10 <sup>Note)</sup> to 60	-10 <sup>Note)</sup> to 40	-20 to 40

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

### Tightness of Valve (Leakage Rate)

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

Note) Value on option "V", "M" (non-leak, medium vacuum)

## How to Order (Solenoid Valve for Manifold)

**Normally Closed (N.C.)** VX 21 2 1     -00-1 G1

**Normally Open (N.O.)** VX 21 2 3     -00-1 G1

### 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 specification

Select "Nil" because the solenoid valve option "V" is the oil-free treatment.

### 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 2 for ordering coil only.

### Electrical entry

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

\* 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       -07-1  
VVX23

### Number of manifolds

02	2 stations
•	•
•	•
•	•
10	10 stations

### Thread type

Nil	Rc
T	NPTF
F	G
N	NPT

### Port size (Out port)

1	Rc1/8
2	Rc1/4

\* All IN ports are Rc 3/8.

### Manifold base

### Blanking plate part no.

For VX21: VX011-001    
For VX22/23: VX011-006  

### Seal material

Nil	NBR
F	FKM

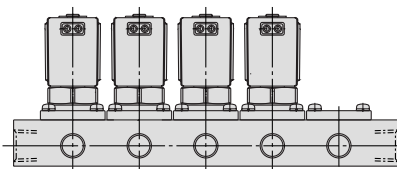
## How to Order Manifold Assemblies (Example)

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  
 \* VX011-001 ..... 1 set      for solenoid valves, etc. to be mounted.

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.

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	Aluminum	NBR	B	—
V		FKM		Non-leak specification

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.)

Table (3) Rated Voltage – Electrical Option

Rated voltage		Class B		
		S	L	Z
AC/DC	Voltage symbol	Voltage	With surge voltage suppressor	With light
	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	●	—

Dimensions → page 24 (manifold)

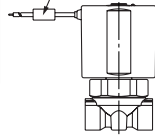
# Low Power Consumption Type Series VX21/22/23 For Water, Air

## Solenoid Coil Electricity Specifications

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

(Equivalent to IP40 enclosure)

Power saving circuit



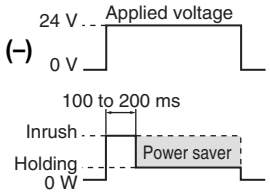
## Electric Circuit Diagram

With power saving circuit

(There is the polarity. Red (+), Black (-))

Energy saving type/

Electrical power waveform  
(Rated voltage 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 x 10 <sup>-6</sup> m <sup>2</sup>	Cv converted	C[dm <sup>3</sup> /[s·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	0.3	1.1	1.0
		VX2340-02	0.1						
	8	VX2250-02	0.03	38.0	1.60	6.4	0.3	1.6	
		VX2350-02	0.05						
	10	VX2360-02	0.02	46.0	1.90	8.8	0.3	2.0	

Port size	Orifice size (mm)	Model	Max. operating pressure differential (MPa)	Flow characteristics					Max. system pressure (MPa)
				DC	Av x 10 <sup>-6</sup> m <sup>2</sup>	Cv converted	C[dm <sup>3</sup> /(s·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	0.3	1.1	
		VX2340-03	0.1						
	8	VX2250-03	0.03	38.0	1.60	6.4	0.3	1.6	
		VX2350-03	0.05						
	10	VX2360-03	0.02	53.0	2.20	11	0.3	2.2	
1/2 (15A)	10	VX2360-04	0.02	53.0	2.20	11	0.3	2.2	1.0

## Operating Fluid and Ambient Temperature

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



Note) With no condensation

## Tightness of Valve (Leakage Rate)

Seal material	Leakage rate
NBR	0.1 cm <sup>3</sup> /min or less (With water pressure)
	1 cm <sup>3</sup> /min or less (Air)

## How to Order (Single Unit)

**Normally Closed (N.C.)** VX **21** **20** **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** (Refer to the table (1) shown below for availability.)

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

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

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

**Bracket** (Refer to the table (3) if bracket is separately ordered.)

**Electrical entry** (GY-Grommet (With power saving circuit))

Nil	None
B	With bracket

Nil	—
Z	Oil-free specification

Nil	Rc
T	NPTF
F	G
N	NPT

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

Table (1) Port/Orifice Size

### Normally Closed (N.C.)

Model	Solenoid valve (Port size)			Orifice symbol (diameter)					
	VX21	VX22	VX23	1 (2 mm)	2 (3 mm)	3 (4.5 mm)	4 (6 mm)	5 (8 mm)	6 (10 mm)
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	B	Water, Air
G		Stainless steel		

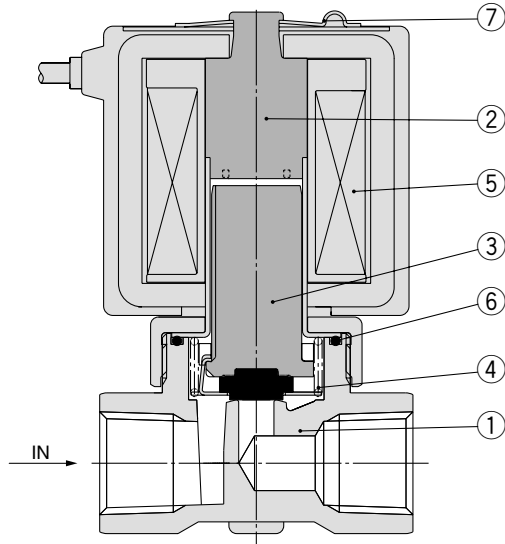
Table (3) Bracket Part No.

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

## Construction: Single Unit

### Normally closed (N.C.)

Body material: Brass, Stainless Steel



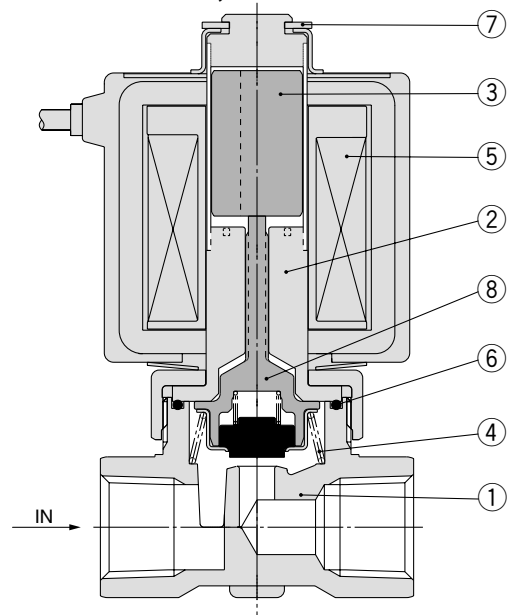
### Component Parts

No.	Description	Material	
		Body material Brass specification	Body material stainless steel specification
1	<b>Body</b>	Brass	Stainless steel
2	<b>Tube assembly</b>	Stainless steel, Copper	Stainless steel, Silver
3	<b>Armature assembly</b>	(NBR, FKM, EPDM, PTFE) Stainless steel, PPS	
4	<b>Return spring</b>	Stainless steel	
5	<b>Solenoid coil</b>	Class B/H molded	
6	<b>O-ring</b>	(NBR, FKM, EPDM, PTFE)	
7	<b>Clip</b>	SK	

The materials in parentheses are the seal materials.

### Normally open (N.O.)

Body material: Brass, Stainless Steel



### Component Parts

No.	Description	Material	
		Body material Brass specification	Body material stainless steel specification
1	<b>Body</b>	Brass	Stainless steel
2	<b>Tube assembly</b>	Stainless steel, Copper	Stainless steel, Silver
3	<b>Armature assembly</b>	Stainless steel	
4	<b>Return spring</b>	Stainless steel	
5	<b>Solenoid coil</b>	Class B/H molded	
6	<b>O-ring</b>	(NBR, FKM, EPDM, PTFE)	
7	<b>Clip</b>	SK	
8	<b>Push rod assembly</b>	(NBR, FKM, EPDM, PTFE) Stainless steel, PPS	

The materials in parentheses are the seal materials.

# Series VX21/22/23

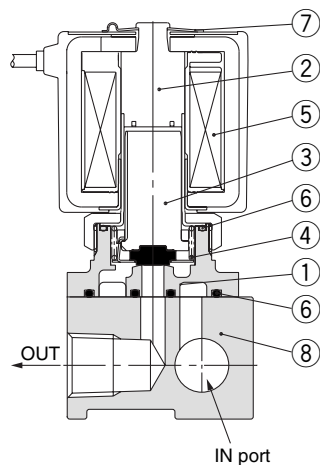
## Construction: Manifold

Normally closed (N.C.)

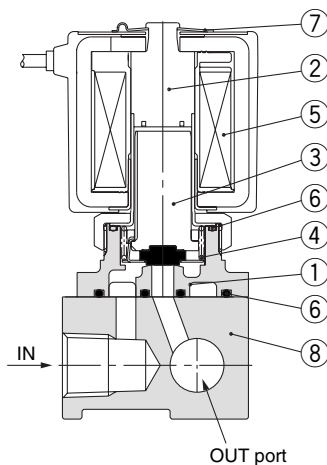
Base material: Aluminum

Fluid: Air

Common SUP type



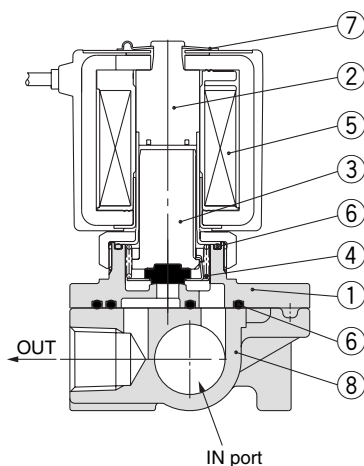
Individual SUP type



Base material: Brass, Stainless Steel

Fluid: Water, Oil, Steam

Common SUP type

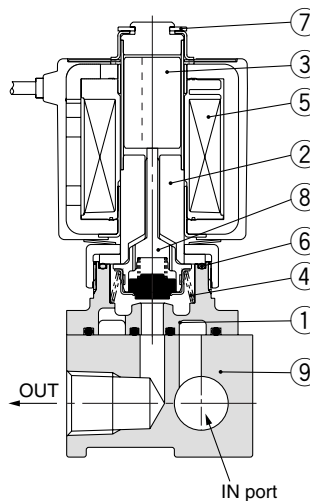


Normally open (N.O.)

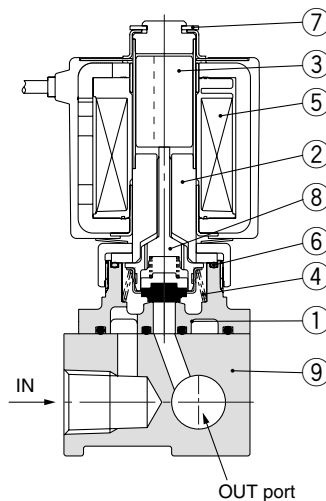
Base material: Aluminum

Fluid: Air

Common SUP type



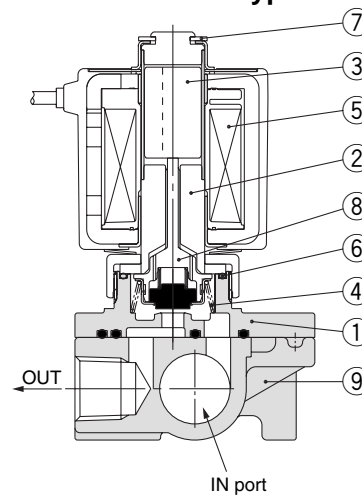
Individual SUP type



Base material: Brass, Stainless Steel

Fluid: Water, Oil, Steam

Common SUP type



## Component Parts

No.	Description	Material		
		Base material aluminum specification	Base material brass specification	Base material stainless steel specification
1	Body	Aluminum	Brass	Stainless steel
2	Tube assembly	Stainless steel, Copper		Stainless steel, Silver
3	Armature assembly	(NBR, FKM, EPDM, PTFE) Stainless steel, PPS		
4	Return spring	Stainless steel		
5	Solenoid coil	Class B/H molded		
6	O-ring	(NBR, FKM, EPDM, PTFE)		
7	Clip	SK		
8	Push rod assembly	Aluminum	Brass	Stainless steel

The materials in parentheses are the seal materials.

## Component Parts

No.	Description	Material		
		Base material aluminum specification	Base material brass specification	Base material stainless steel specification
1	Body	Aluminum	Brass	Stainless steel
2	Tube assembly	Stainless steel, Copper		Stainless steel, Silver
3	Armature assembly	Stainless steel		
4	Return spring	Stainless steel		
5	Solenoid coil	Class B/H molded		
6	O-ring	(NBR, FKM, EPDM, PTFE)		
7	Clip	SK		
8	Push rod assembly	(NBR, FKM, EPDM, PTFE) Stainless steel, PPS		
9	Base	Aluminum	Brass	Stainless steel

The materials in parentheses are the seal materials.

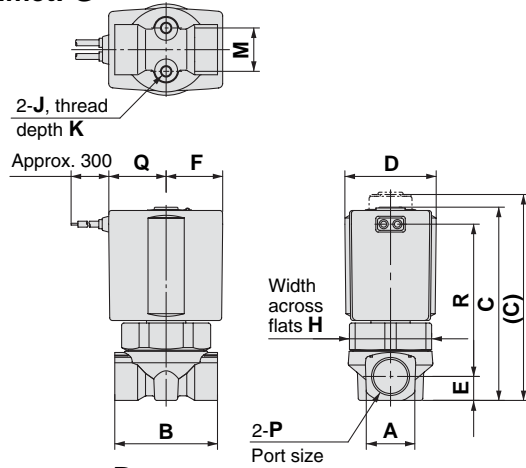


## Dimensions: Single Unit/Body Material: Brass, Stainless Steel

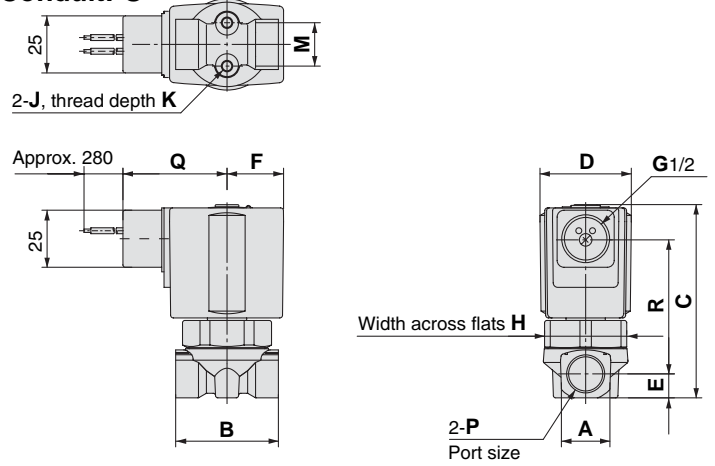
Normally closed (N.C.): VX21□0/VX22□0/VX23□0

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

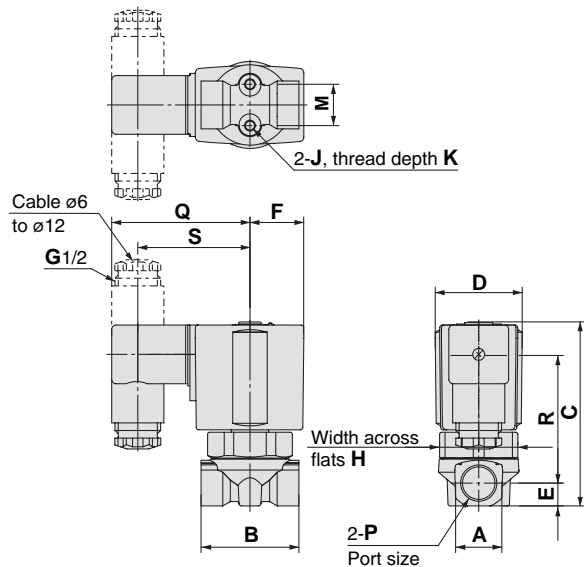
Grommet: G



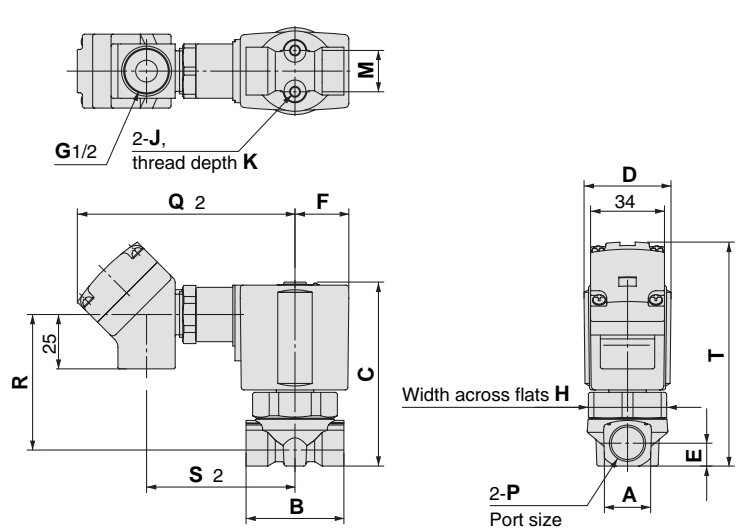
Conduit: C



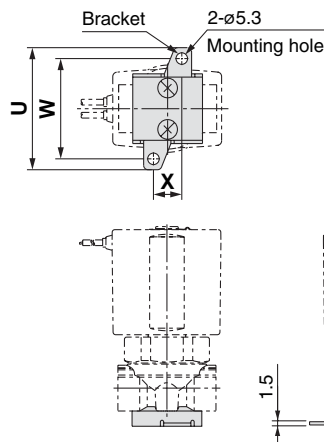
DIN terminal: D



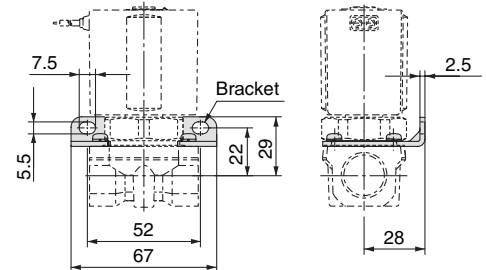
Conduit terminal: T



Specifications with bracket  
Orifice ø2, ø3, ø4.5, ø6



Orifice ø8, ø10



Model		Orifice size	Port size P	A	B	C		D	E	F	H	Mounting dimensions			Electrical entry												Bracket mounting			
															Grommet		Conduit		DIN terminal			Conduit terminal								
Normally closed	Normally open											J	K	M	Q	R	Q	R	Q	R	S	Q	R	S	T	U	W	X	Y	
VX21□0	VX21□2	2, ø3, ø4.5	1/8, 1/4	18	40	68	(76)	30	9	19.5	27	M4	6	12.8	19.5	50	40	42.5	58	42.5	46	95	42.5	62	85	46	36	11	15	
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	22.5	60	43	52	61	52	49	98	52	65	96.5	56	46	13	17.5	
VX22□0	—	ø8, ø10	1/4, 3/8, 1/2	30	50	85	—		14			M5	8	23		63		55		55		55	103.5		—	—	—	—		
VX23□0	VX23□2	ø3, ø4.5, ø6	1/4, 3/8	22	45	85	(93)	40	10.5	25	36	M5	8	19	25	66	46	58	63	58	52	101	58	68	103	56	46	13	17.5	
VX23□0	—	ø8, ø10	1/4, 3/8, 1/2	30	50	92	—		14			M5	8	23		69		61		61		61	111		—	—	—	—		

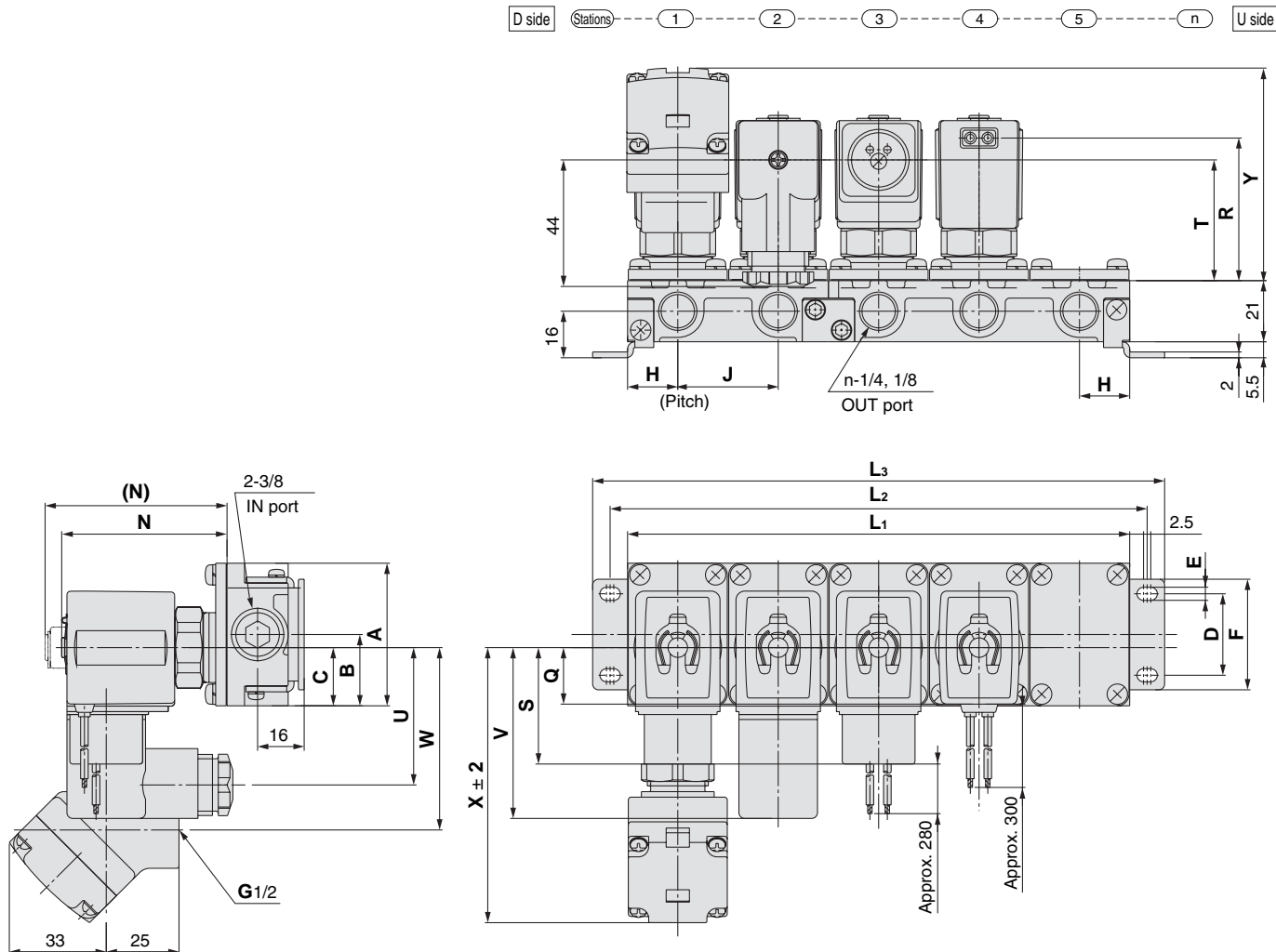
The figures in parentheses are the normally open type.

# Series VX21/22/23

For Water, Oil, Steam/Manifold

## Dimensions: Manifold/Base Material: Brass, Stainless Steel

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 <sub>1</sub>	69	103.5	138	172.5	207	241.5	276	310.5	345	
	L <sub>2</sub>	81	115.5	150	184.5	219	253.5	288	322.5	357	
	L <sub>3</sub>	93	127.5	162	196.5	231	265.5	300	334.5	369	
VVX22	L <sub>1</sub>	77	115.5	154	192.5	231	269.5	308	346.5	385	
	L <sub>2</sub>	89	127.5	166	204.5	243	281.5	320	358.5	397	
	L <sub>3</sub>	101	139.5	178	216.5	255	293.5	332	370.5	409	
VVX23	L <sub>1</sub>	83	124.5	166	207.5	249	290.5	332	373.5	415	
	L <sub>2</sub>	95	136.5	178	219.5	261	302.5	344	385.5	427	
	L <sub>3</sub>	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	

(mm)

Model	A	B	C	D	E	F	H	J	N	Electrical entry									
										Grommet		Conduit		DIN terminal		Conduit terminal			
										Q	R	S	T	U	V	W	X	Y	
VVX21	49	24.5	20	28	4.5	38	17.3	34.5	57 (65)	19.5	48	40	41.5	46	58	62	95	73	
VVX22	57	28.5	25.5	30	5.5	42	19.3	38.5	63.5 (72.5)	22.5	56	43	48	49	61	65	98	82	
VVX23	57	28.5	25.5	30	5.5	42	20.8	41.5	74 (82)	25	66.5	46	59	52	63	68	101	90.5	

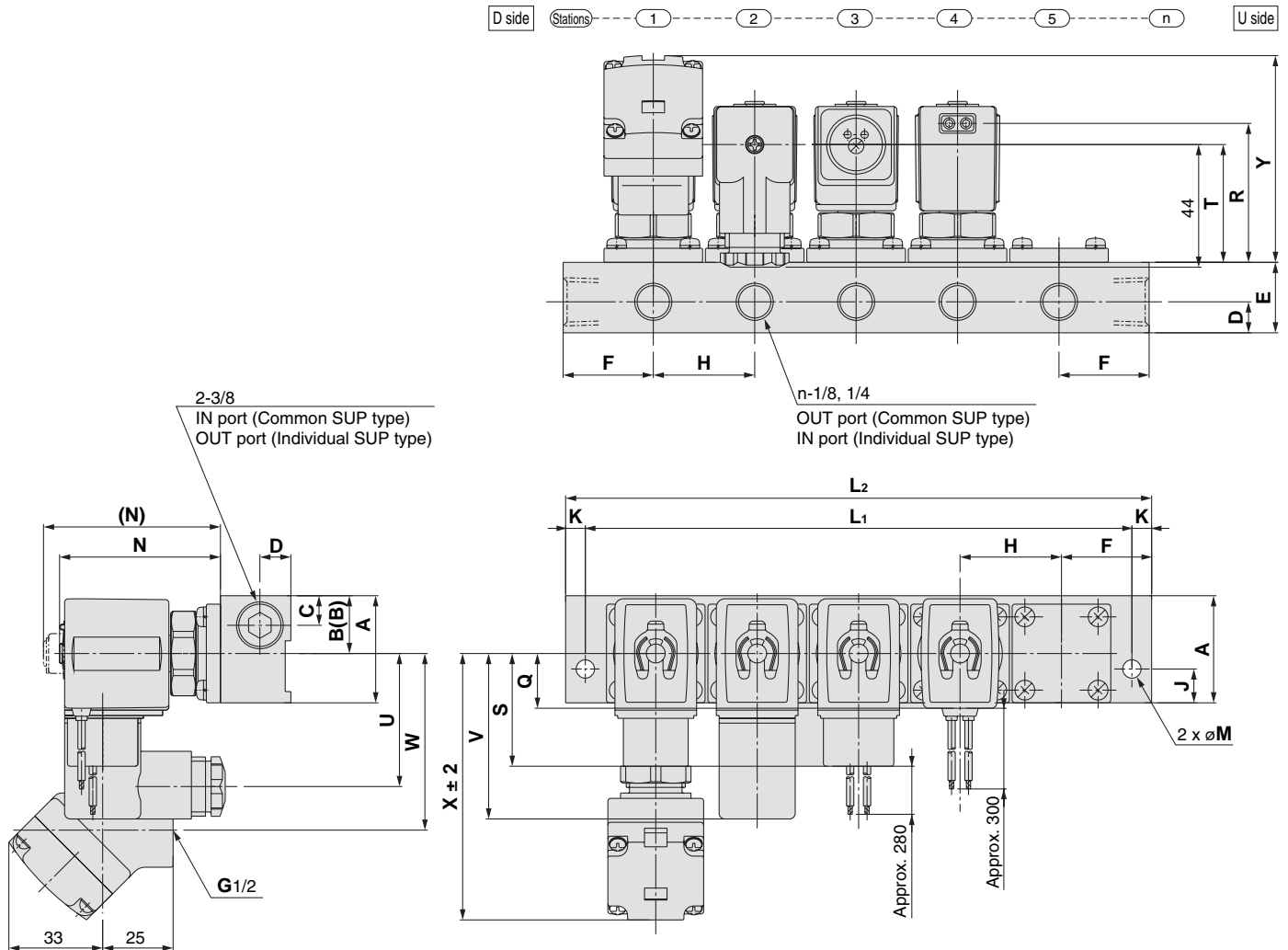
The figures in parentheses are the normally open type.

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

For Air/Manifold

## Dimensions: Manifold/Base Material: Aluminum

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



(mm)

Model	Dimension	n (stations)								
		2	3	4	5	6	7	8	9	10
VVX21	L <sub>1</sub>	86	122	158	194	230	266	302	338	374
	L <sub>2</sub>	100	136	172	208	244	280	316	352	388
VVX22	L <sub>1</sub>	108	154	200	246	292	338	384	430	476
	L <sub>2</sub>	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	Electrical entry								
													Grommet		Conduit		DIN terminal		Conduit terminal		
													Q	R	S	T	U	V	W	X	Y
VVX21	38	20.5	17.5	10.5	11	25	32	36	12	7	6.5	57 (65)	19.5	48	40	41.5	46	58	62	95	73
VVX22	49	26.5	22.5	13	13	30	40	46	15	9	8.5	66 (74)	22.5	58	43	51	49	61	65	98	82
VVX23	49	26.5	22.5	13	13	30	40	46	15	9	8.5	71 (79)	25	63	46	56	52	63	68	101	87


The figures in parentheses are the normally open type.





*Series VX*

# 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 <sup>Note 1)</sup>, JIS B 8370 <sup>Note 2)</sup>.

 **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, or animals, and therefore requires special safety analysis.



# 2 Port Solenoid Valve for Fluid Control/Precautions 1

Be sure to read 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 (removal of valve, etc.).

#### 5. Liquid rings

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

#### 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 mm<sup>2</sup>/s or less. If there is something you do not know, please contact us.

##### 2) Inflammable 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 5μm 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 catalog Vol. 14 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 before handling.

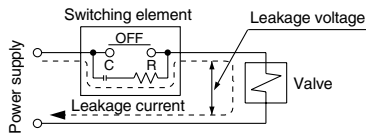
For detailed precautions on each series, refer to the main text.

## 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 coil: 20% or less of rated voltage  
DC coil: 2% or less of rated voltage

#### 2. Low temperature operation

1. The valve can be used in an ambient temperature of between  $-10$  to  $-20^{\circ}\text{C}$ , however take measures to prevent freezing or solidification of impurities, etc.
2. When using valves for water application in cold climates, take appropriate countermeasures to prevent the water from freezing in tubing after cutting the water supply from the pump, by draining the water, etc. When heating by steam, be careful not to expose the coil portion to steam. Installation of 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

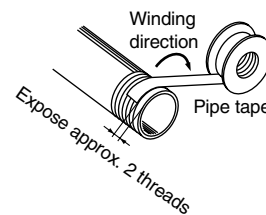
#### 1. Preparation before piping

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.

#### 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 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 1.25mm<sup>2</sup> 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  $\pm 10\%$  of the rated voltage. In cases with a DC power supply where importance is placed on responsiveness, stay within  $\pm 5\%$  of the rated value. The voltage drop is the value in the lead wire section connecting the coil.
4. When a surge from the solenoid affects the electrical circuitry, install a surge absorber, 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.)

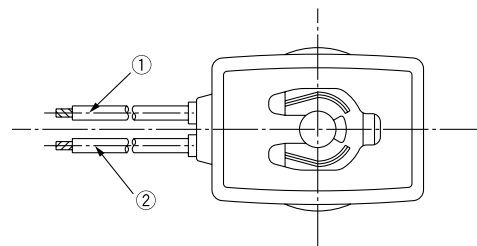
## Electrical Connections

### ⚠ Caution

#### Grommet

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

Class B coil: AWG20 Insulator O.D. 2.4 mm

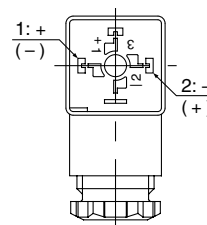


Rated voltage	Lead wire color	
	①	②
DC (Class B only)	Black	Red
100 VAC	Blue	Blue
200 VAC	Red	Red
Other AC	Gray	Gray

\* There is no polarity. (For the low power consumption type, there is polarity.)

#### DIN connector (Class B only)

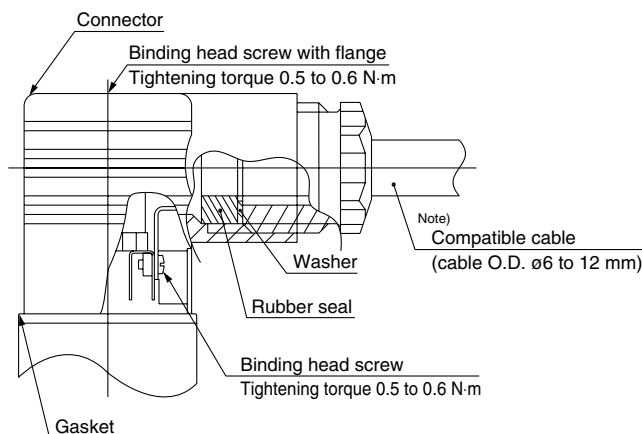
Since internal connections are as shown below for the DIN connector, make connections to the power supply accordingly.



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

\* There is no polarity.

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



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





# 2 Port Solenoid Valve for Fluid Control/Precautions 4

Be sure to read before handling.

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

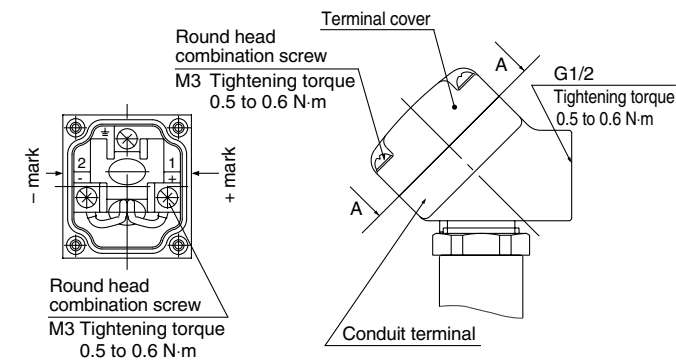
## Electrical Connections

### 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

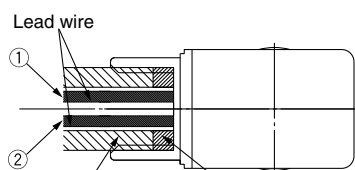
(Internal connection diagram)

#### 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. 2.4 mm



Wiring conduit

Seal (VCW20-15-6)

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

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 low power consumption type, there is polarity.)

Description	Part no.
Seal	VCW20-15-6

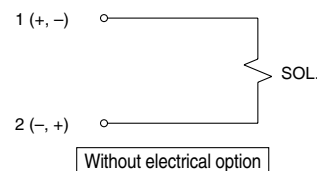
Note) Please order separately.

## Electrical Circuits

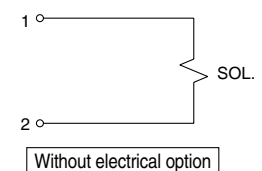
### Caution

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

##### DC circuit

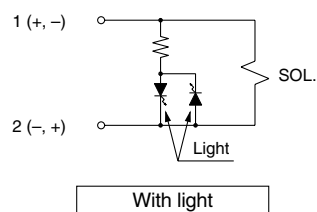


##### AC circuit

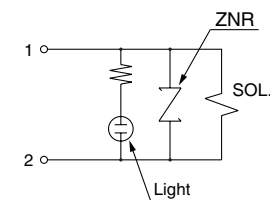
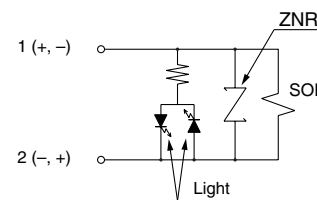
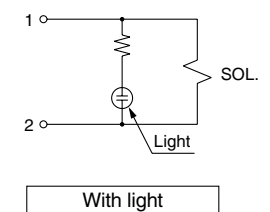


#### Conduit terminal, DIN connector

##### DC circuit

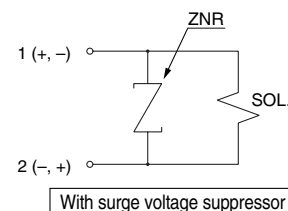


##### AC circuit

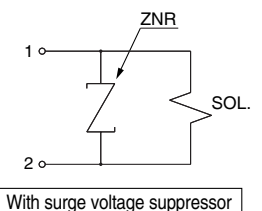


#### Grommet, Conduit terminal, DIN connector

##### DC circuit



##### AC circuit





## 2 Port Solenoid Valve for Fluid Control/Precautions 5

Be sure to read before handling.

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

### Operating Environment

#### ⚠ Warning

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

### Lubrication

#### ⚠ Caution

1. This solenoid valve can be operated without lubrication.

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

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

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

Classification of viscosity (cst) (40°C)	Viscosity according to ISO Grade	32
Idemitsu Kosan Co.,Ltd.		Turbine oil P-32
Nippon Mitsubishi 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 Mitsubishi 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. Demount 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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