

Direct Operated 2 Port Solenoid Valve

VX21/22/23 Series

For Air, Medium Vacuum, Water, Oil and Steam

Variations

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

Valve type

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

Solenoid coil type

Insulation type: Class B, Class H

Rated voltage

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

Voltage in () indicates special voltage.

Material

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

* Refer to individual pages for details of each fluid.

Electrical entry

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



Normally Closed (N.C.)

Normally Open (N.O.)

Size		Size 1	Size 2	Size 3
Orifice diameter	2 mmø	●	—	—
	3 mmø	●	—	—
	4 mmø	—	●	—
	5 mmø	●	—	●
	7 mmø	—	●	—
	8 mmø	—	—	●
Port size		1/8, 1/4 ø6, ø8	1/4, 3/8 ø8, ø10	1/4, 3/8, 1/2 ø10, ø12

* N.C. only

Manifold (For Air, Medium Vacuum)

Valve type

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

Manifold type

Common SUP type
Individual SUP type

Solenoid coil type

Insulation type: Class B

Rated voltage

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

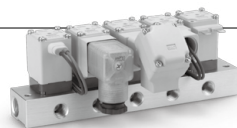
Voltage in () indicates special voltage.

Material

Body — Resin
Base — Aluminum
Seal — NBR, FKM

Electrical entry

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



Manifold

Size		Size 1	Size 2	Size 3
Orifice diameter	2 mmø	●	—	—
	3 mmø	●	—	—
	4 mmø	—	●	—
	5 mmø	●	—	●
	7 mmø	—	●	●
Port size	Common SUP type (Air)	IN	3/8	
		OUT	1/8, 1/4	
	Individual SUP type (Medium vacuum)	IN	1/8, 1/4	
		OUT	3/8	

VX21/22/23 Series

Common Specifications

Standard Specifications

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

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

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

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

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

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

Solenoid Coil Specifications

Normally Closed (N.C.)

DC Specification

Class B

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

Class H

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

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

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

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

Class B

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

Class H

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

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

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

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

Normally Open (N.O.)

DC Specification

Class B

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

Class H

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

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

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

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

Class B

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

Class H

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

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

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

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

VX21/22/23 Series

Selection Steps

Selection Steps

Step 1 Select the fluid.

Item	Selection item	Page	Symbol
Select the fluid.	Air	Page 33, 34	0
	Water	Page 42	2
	Oil	Page 44	3
	Medium vacuum	Page 38	4
	Steam	Page 46	5

VX2 3 0 A A

Step 2 Select "Body material", "Port size" and "Orifice diameter" from "Flow rate — Pressure" of each fluid.

Item	Selection item	Symbol
Select from "Flow rate — Pressure." • Body material • Port size • Orifice diameter	Size Size 3	3
	Body material Aluminum	A
	Port size 1/8	A
	Orifice diameter 2	2

VX2 3 0 A A

Step 3 Select electrical specification.

Item	Selection item	Symbol
Select electrical specification.	Voltage 24 VDC	A
	Electrical entry Grommet	A

VX2 3 0 A A

Step 4 For special options, refer to pages 49 to 51.

VX21/22/23 Series



For Water Single Unit

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

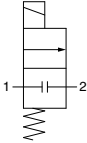
⚠ When water is used as the fluid

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

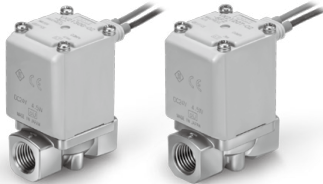
Model/Valve Specifications

Symbol

N.C.

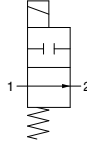


When the valve is closed, flow is blocked from port 1 to port 2. However, if the pressure in port 2 is higher than port 1, the valve will not be able to block the fluid and it will flow from port 2 to port 1.



Symbol

N.O.



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



Normally Closed (N.C.)

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

Normally Open (N.O.)

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

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

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

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

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

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

Fluid and Ambient Temperature

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

Note) With no freezing

Valve Leakage Rate

Internal Leakage

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

External Leakage

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

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

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

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



For Water Single Unit

How to Order (Single Unit)



Note) Refer to the table on page 53 for UL-compliant.



VX2 1 2 A A

Fluid
2 Water

Coil size/Valve type

Size	Symbol	Valve type
Size 1	1	N.C.
	4	N.O.

Size 2	2	N.C.
	5	N.O.

Size 3	3	N.C.
	6	N.O.

Body material/Port size/Orifice diameter

Symbol	Body material	Port size	Orifice diameter
A	C37	1/8	2
B			3
C			5
D		1/4	2
E			3
F			5
H	Stainless steel	1/8	2
J			3
K			5
L		1/4	2
M			3
N			5

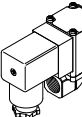
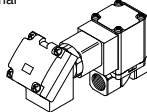
A	C37	1/4	4
B			7
D			4
E			7
H			4
J	Stainless steel	1/4	7
K			4
L			7
M			4
N			7

A	C37	1/4	5
B			8
C			10 (N.C. only)
D			5
E			8
F		3/8	10 (N.C. only)
G			10 (N.C. only)
H			5
J			8
K			10 (N.C. only)
L	Stainless steel	1/4	5
M			8
N			10 (N.C. only)
P			10 (N.C. only)

Common Specifications

Seal material	NBR
Coil insulation type	Class B
Thread type	Rc

Voltage/Electrical entry

Symbol	Voltage	Electrical entry
A	24 VDC	Grommet 
	B 100 VAC	Grommet (With surge voltage suppressor) 
	C 110 VAC	
	D 200 VAC	
	E 230 VAC	
F	24 VDC	
G	24 VDC	DIN terminal (With surge voltage suppressor) 
H 100 VAC		
J 110 VAC		
K 200 VAC		
L 230 VAC		
M	24 VDC	Conduit terminal (With surge voltage suppressor) 
N 100 VAC		
P 110 VAC		
Q 200 VAC		
R 230 VAC		
S	24 VDC	Conduit (With surge voltage suppressor) 
T 100 VAC		
U 110 VAC		
V 200 VAC		
W 230 VAC		
Y	24 VDC	Flat terminal 
Z	Other voltages	

For special options, refer to pages 49 to 51.

Special voltage	24 VAC
	48 VAC
	220 VAC
	240 VAC
	12 VDC
DIN terminal with light	
Conduit terminal with light	
Without DIN connector	

Applicable to deionized water (Seal material: FKM)	
Seal material: EPDM	
Oil-free	
G thread	
NPT thread	
With bracket	
Mounting holes on the bottom side of the body	
Special electrical entry direction	

VX21/22/23 Series Special Options

Electrical Options

(Special voltage, With light, Without DIN connector)

VX2 1 0 A Z 1A

Enter standard product number.

Electrical option

Electrical specification/Voltage/Electrical entry

Specification	Symbol	Class H*	Voltage	Electrical entry
Special voltage	1A	●	48 VAC	Grommet (With surge voltage suppressor)
	1B	●	220 VAC	
	1C	●	240 VAC	
	1U	●	24 VAC	
	1D	—	12 VDC	Grommet (With surge voltage suppressor)
	1E	—	12 VDC	
	1F	—	12 VDC	
	1F	●	48 VAC	DIN terminal (With surge voltage suppressor)
	1G	●	220 VAC	
	1H	●	240 VAC	
	1V	●	24 VAC	
	1J	—	12 VDC	Conduit terminal (With surge voltage suppressor)
	1K	●	48 VAC	
	1L	●	220 VAC	
	1M	●	240 VAC	
	1W	●	24 VAC	Conduit (With surge voltage suppressor)
	1N	—	12 VDC	
	1P	●	48 VAC	
	1Q	●	220 VAC	
	1R	●	240 VAC	Flat terminal
	1Y	●	24 VAC	
	1S	—	12 VDC	
	1T	—	12 VDC	

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

Without DIN connector	3A	—	24 VDC	DIN terminal (With surge voltage suppressor)
	3B	—	100 VAC	
	3C	—	110 VAC	
	3D	—	200 VAC	
	3E	—	230 VAC	
	3F	—	48 VAC	
	3G	—	220 VAC	
	3H	—	240 VAC	
	3V	—	24 VAC	
	3J	—	12 VDC	

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

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

Example) VX2 1 2 A Z 1A Z

Electrical option Other option

Other Options

Low concentration ozone resistant and applicable to deionized water

Oil-free

Port thread

VX2 1 0 A A Z

Enter standard product number.

Other option

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

Symbol	Low concentration ozone resistant and applicable to deionized water ^{*1, *3} (Seal material: FKM)	Oil-free	Port thread
Nil	—	—	Rc, One-touch fitting ^{*2}
A	—	—	G ^{*4}
B	—	—	NPT
C	○	—	Rc, One-touch fitting ^{*2}
D	—	—	G ^{*4}
E	—	○	NPT
F	—	—	G ^{*4}
G	○	—	NPT
H	—	—	Rc, One-touch fitting ^{*2}
K	○	○	G ^{*4}
L	—	—	NPT
Z	—	○	Rc, One-touch fitting ^{*2}

*1 Applicable to air (VX2□□0) and water (VX2□□2).

*2 When the body is resin, One-touch fittings are equipped.

*3 When using deionized water or any other fluid that may corrode C37 (brass), select a stainless steel body.

*4 For connection, prepare a fitting compliant with ISO 16030 and JIS B 8674.

Made to Order

<Special lead wire length>

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

VX2 □ □ □ □ XL □

Lead wire length

XL1	600 mm
XL2	1000 mm
XL3	1500 mm
XL4	3000 mm

<High pressure>

VX2 □ □ □ □ XH □

Correspondence table

Size	Symbol	Body material	Port size	Orifice dia.	Max. operating pressure differential
1	N.C.	Q	C37	1/8	2 MPa
		R	1/4	1/4	
		S	1/8	1/8	
		T	1/4	1/4	
2	N.C.	Q	C37	1/4	3 MPa
		R	3/8	3/8	
		S	1/4	1/4	
		T	3/8	3/8	
3	N.C.	Q	C37	1/4	3 MPa
		R	3/8	3/8	
		S	1/4	1/4	
		T	3/8	3/8	

* The aluminum and PBT bodies are not available.

Option

Symbol	Specifications	Electrical entry direction	Bracket
Nil	In side (Standard)		
A	90°		None
B	180°		
C	270°		
D	In side (Standard)		
E	90°		With bracket
F	180°		
G	270°		
H	In side (Standard)		Mounting holes on the bottom side of the body
J	90°		
K	180°		
L	270°		

Installation Options
(Mounting Option/Special Electrical Entry Direction)

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

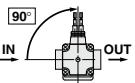
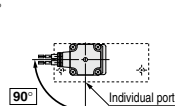
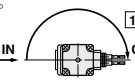
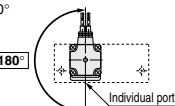
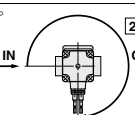
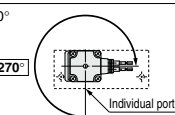
Combinations	Symbol	 Special electrical entry direction	 With bracket	 Mounting holes on the bottom side of the body	 Seal material: EPDM
	XC□	●	●	●	●
	XB□	●	●	●	●
	XNB□	●	●	●	●
	X332□	●	●	●	●

 Special Electrical Entry Direction

VX2□□□□XC A

Enter standard product number.

Special electrical entry direction

Symbol	Electrical entry direction	
	Single unit	Manifold
A	90° 	90° 
	180° 	180° 
	270° 	270° 

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

Example) VX2 1 2 A Z 1 A Z XC A

Electrical option Other option Special electrical entry direction

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

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

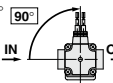
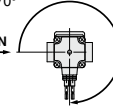
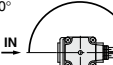
Electrical option Other option With bracket/Special electrical entry direction

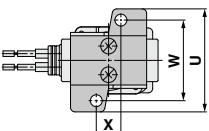
 With Bracket/
Special Electrical Entry Direction

VX2□□□□XB A

Enter standard product number.

With bracket/Special electrical entry direction

Symbol	Electrical entry direction	
	Standard	
Nil		
A	90° 	270° 
	180° 	

	(mm)			
	Size	Port size	U	W
	1	1/8, 1/4	46	36
	2	1/4, 3/8	56	46
3	1/2	3/8	56	46
		1/2	—	—

- *1 Bracket is attached as standard with the resin body, so there are no XB settings.
- *2 When the orifice is ø8, ø10, and the body port size is 1/4 or 3/8, use a foot type bracket. (The L-bracket of the old VX series is not compatible.) If the body port size is 1/2, there are no XB settings. (Refer to the following.)
- *3 On the bottom side of the standard body, there is no female thread for mounting a bracket. Please be careful because the bracket cannot be retrofit.
- *4 Bracket is packed in the same container as the main body.

Bracket Interchangeable with an Old Type

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

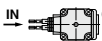
Installation Options
(Mounting Option/Special Electrical Entry Direction)

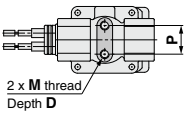
  **Mounting Holes on the Bottom Side of the Body/
Special Electrical Entry Direction**

VX2     **XNB A**

Enter standard product number.

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

Symbol	Electrical entry direction	Symbol	Electrical entry direction
Nil	Standard 		
A	90° 	C	270° 
B	180° 		



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

Note) Resin body is not available.

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

Example) **VX2 1 2 A Z 1 A Z XNB A**

Electrical option

Other option

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

    **Seal Material: EPDM/With Bracket/
Mounting Holes on the Bottom Side of the Body/
Special Electrical Entry Direction**

VX2     **X332 A**

Enter standard product number. Seal material: EPDM

Fluid symbol

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

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

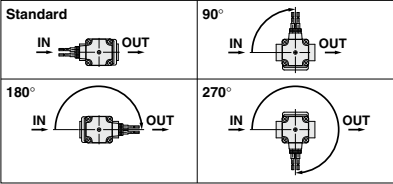
Specifications		
Symbol	Electrical entry direction	Bracket
Nil	IN side (Standard)	None
A	90°	
B	180°	
C	270°	
D	IN side (Standard)	With bracket*1, 2
E	90°	
F	180°	
G	270°	
H	IN side (Standard)	Mounting holes on the bottom side of the body*1
J	90°	
K	180°	
L	270°	

*1 Resin body is not available.

*2 The model with bracket is not available for port size 1/2.

*3 "Other Options", which can be combined, are A, B, D, E, Z.

*4 Electrical entry direction



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

Example) **VX2 1 2 A Z 1 A Z X332 A**

Electrical option

Other option

Seal material: EPDM/
With bracket/Mounting holes on the bottom side of the body/
Special electrical entry direction

VX2
VXK
VXD
VXZ
VXS
VXB
VXE
VXP
VXR
VXH
VXF
VX3
VXA

VX21/22/23 Series

UL-compliant

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

For Air

VX210 Valve type: N.C.

Size, Valve type, Fluid	Body material, Port size	Voltage, Electrical entry, Electrical options	Other options	With ^{Note} bracket
VX210	A	A	Nil	Nil
	B	B	A	XC*
	C	C	B	XB*
	D	D	C	XNB*
	E	E	D	X332*
	F	F	E	
H ^{Note}	M	F		
J ^{Note}	N	G		
K ^{Note}	P	H		
L ^{Note}	Q	K		
M ^{Note}	R	L		
N ^{Note}	S	Z		
	T			
	U			
	V			
	W			
	Y			
	Z1A			
	Z1B			
	Z1C			
	Z1U			
	Z1D			
	Z1E			
	Z1K			
	Z1L			
	Z1M			
	Z1W			
	Z1N			
	Z1P			
	Z1Q			
	Z1R			
	Z1Y			
	Z1S			
	Z1T			
	Z2K			
	Z2L			
	Z2M			
	Z2N			
	Z2P			
	Z2Q			
	Z2R			
	Z2S			
	Z2W			
	Z2T			
	Z3A			
	Z3B			
	Z3C			
	Z3D			
	Z3E			
	Z3F			
	Z3G			
	Z3H			
	Z3V			
	Z3J			

Note) Body material/
Port size: Since
the bracket is
attached to H, J,
K, L, M and N,
"XB" cannot be
selected.

VX220 Valve type: N.C.

Size, Valve type, Fluid	Body material, Port size	Voltage, Electrical entry, Electrical options	Other options	With ^{Note} bracket
VX220	A	A	Nil	Nil
	B	B	A	XC*
	D	C	B	XB*
	E	D	C	XNB*
H ^{Note}	E	D	E	X332*
J ^{Note}	F	E		
L ^{Note}	M	F		
M ^{Note}	N	G		
	P	H		
	Q	K		
	R	L		
	S	Z		
	T			
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	V			
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	Z1A			
	Z1B			
	Z1C			
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	Z2M			
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	Z2T			
	Z3A			
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	Z3C			
	Z3D			
	Z3E			
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	Z3G			
	Z3H			
	Z3V			
	Z3J			

Note) Body material/
Port size: Since
the bracket is
attached to H, J,
L and M, "XB"
cannot be
selected.

VX230 Valve type: N.C.

Size, Valve type, Fluid	Body material, Port size	Voltage, Electrical entry, Electrical options	Other options	With ^{Note} bracket
VX230	A	A	Nil	Nil
	B	B	A	XC*
	C	C	B	XB*
	D	D	C	XNB*
	E	E	D	X332*
	F	F	E	
G ^{Note 1)}	M	F		
H ^{Note 2)}	N	G		
J ^{Note 2)}	P	H		
K ^{Note 2)}	Q	K		
L ^{Note 2)}	R	L		
M ^{Note 2)}	S	Z		
N ^{Note 2)}	T			
	U			
	V			
	W			
	Y			
	Z1A			
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	Z3H			
	Z3V			
	Z3J			

Note 1) Body
material/Port
size: Since "with
bracket" setting
is not provided
on G, "XB"
cannot be
selected.

Note 2) Body
material/Port
size: Since the
bracket is
attached to H, J,
K, L, M and N,
"XB" cannot be
selected.

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

For Water

VX212 Valve type: N.C.

Size, Valve type, Fluid	Body material, Port size	Voltage, Electrical entry, Electrical options	Other options	With bracket
VX212	A	A	Nil	Nil
	B	B	A	XC*
	C	C	B	XB*
	D	D	C	XNB*
	E	E	D	X332 [†]
	F	F	E	
	H	M	F	
	J	N	G	
	K	P	H	
	L	Q	K	
	M	R	L	
	N	S	Z	
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	Z3H			
	Z3V			
	Z3J			

VX222 Valve type: N.C.

Size, Valve type, Fluid	Body material, Port size	Voltage, Electrical entry, Electrical options	Other options	With bracket
VX222	A	A	Nil	Nil
	B	B	A	XC*
	D	C	B	XB*
	E	D	C	XNB*
	H	E	D	X332 [†]
	J	F	E	
	L	M	F	
	M	N	G	
		P	H	
		Q	K	
		R	L	
		S	Z	
	T			
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	Z3H			
	Z3V			
	Z3J			

VX232 Valve type: N.C.

Size, Valve type, Fluid	Body material, Port size	Voltage, Electrical entry, Electrical options	Other options	With bracket
VX232	A	A	Nil	Nil
	B	B	A	XC*
	C	C	B	XB*
	D	D	C	XNB*
	E	E	D	X332 [†]
	F	F	E	
	G (Note)	M	F	
	H	N	G	
	J	P	H	
	K	Q	K	
	L	R	L	
	M	S	Z	
	N	T		
	P (Note)	U		
		V		
		W		
		Y		
		Z1A		
		Z1B		
		Z1C		
		Z1U		
		Z1D		
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		Z3H		
		Z3V		
		Z3J		

(Note) Body material/
Port size: Since
"with bracket"
setting is not
provided on G
and P, "XB"
cannot be
selected.

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

VX21/22/23 Series

For Medium vacuum

VX214 Valve type: N.C.

Size, Valve type, Fluid	Body material, Port size	Voltage, Electrical entry, Electrical options	Other options	With bracket
VX214	A	A	Nil	Nil
	B	B	A	XC*
	C	C	B	XB*
	D	D		XNB*
	E	E		X332*
	F	F		
	H	M		
	J	N		
	K	P		
	L	Q		
	M	R		
	N	S		
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	Z3H			
	Z3V			
	Z3J			

VX224 Valve type: N.C.

Size, Valve type, Fluid	Body material, Port size	Voltage, Electrical entry, Electrical options	Other options	With bracket
VX224	A	A	Nil	Nil
	B	B	A	XC*
	D	C	B	XB*
	E	D		XNB*
	H	E		X332*
	J	F		
	L	M		
	M	N		
		P		
		Q		
		R		
		S		
		T		
		U		
		V		
		W		
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		Z3G		
		Z3H		
		Z3V		
		Z3J		

VX234 Valve type: N.C.

Size, Valve type, Fluid	Body material, Port size	Voltage, Electrical entry, Electrical options	Other options	With bracket
VX234	A	A	Nil	Nil
	B	B	A	XC*
	C	C	B	XB*
	D	D		XNB*
	E	E		X332*
	F	F		
	G (Note)	M		
	H	N		
	J	P		
	K	Q		
	L	R		
	M	S		
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	P (Note)	U		
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		Z1A		
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		Z3D		
		Z3E		
		Z3F		
		Z3G		
		Z3H		
		Z3V		
		Z3J		

Note) Body material/Port size: Since "with bracket" setting is not provided on G and P, "XB" cannot be selected.

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

For Oil

VX213 Valve type: N.C.

Size, Valve type, Fluid	Body material, Port size	Voltage, Electrical entry, Electrical options	Other options	With bracket
VX213	A	A	Nil	Nil
	B	B	A	XC*
	C	C	B	XB*
	D	D	D	XNB*
	E	E	E	
	F	F	Z	
	H	M		
	J	N		
	K	P		
	L	Q		
	M	R		
	N	S		
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		Z1A		
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		Z3D		
		Z3E		
		Z3F		
		Z3G		
		Z3H		
		Z3V		
		Z3J		

VX223 Valve type: N.C.

Size, Valve type, Fluid	Body material, Port size	Voltage, Electrical entry, Electrical options	Other options	With bracket
VX223	A	A	Nil	Nil
	B	B	A	XC*
	D	C	B	XB*
	E	D	D	XNB*
	H	E	E	
	J	F	Z	
	L	M		
	M	N		
		P		
		Q		
		R		
		S		
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		Z3C		
		Z3D		
		Z3E		
		Z3F		
		Z3G		
		Z3H		
		Z3V		
		Z3J		

VX233 Valve type: N.C.

Size, Valve type, Fluid	Body material, Port size	Voltage, Electrical entry, Electrical options	Other options	With bracket
VX233	A	A	Nil	Nil
	B	B	A	XC*
	C	C	B	XB*
	D	D	D	XNB*
	E	E	E	
	F	F	Z	
	G (Note)	M		
	H	N		
	J	P		
	K	Q		
	L	R		
	M	S		
	N	T		
	P (Note)	U		
		V		
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		Z3D		
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		Z3F		
		Z3G		
		Z3H		
		Z3V		
		Z3J		

Note) Body material/
Port size: Since
"with bracket"
setting is not
provided on G
and P, "XB"
cannot be
selected.

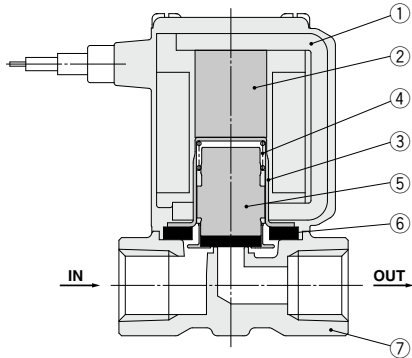
Refer to pages 49 to 51 for electrical options, other options, and bracket/electrical entry direction.

VX21/22/23 Series

Construction/Single Unit

Normally Closed (N.C.)

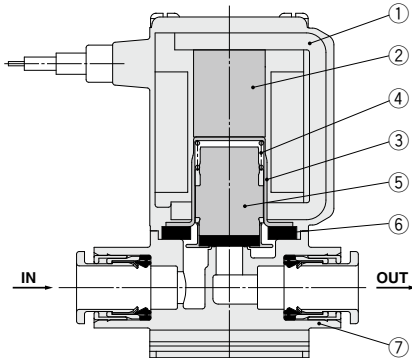
Body material: Aluminum, C37, Stainless steel



Component Parts

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

Body material: Resin

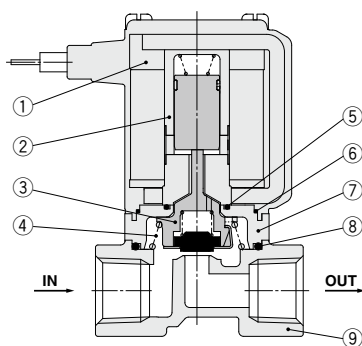


Component Parts

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

Normally Open (N.O.)

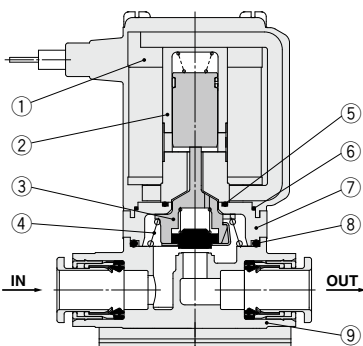
Body material: Aluminum, C37, Stainless steel



Component Parts

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

Body material: Resin



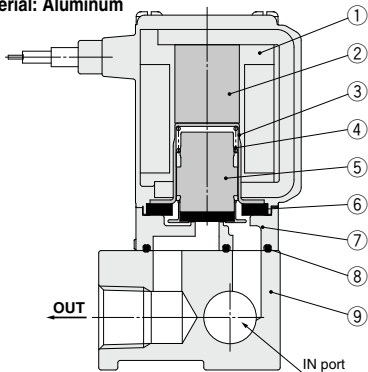
Component Parts

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

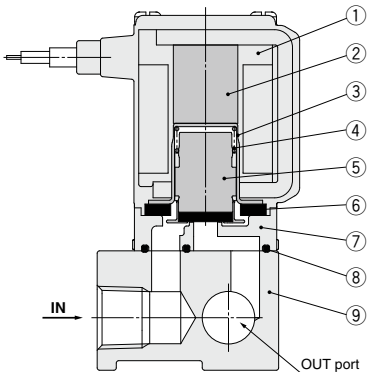
Construction/Manifold

Normally Closed (N.C.)
Base material: Aluminum

Common SUP type (for air)



Individual SUP type (for medium vacuum)



Component Parts

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

VX2

VXK

VXD

VXZ

VXS

VXB

VXE

VXP

VXR

VXH

VXF

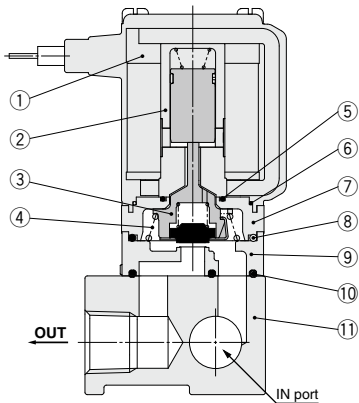
VX3

VXA

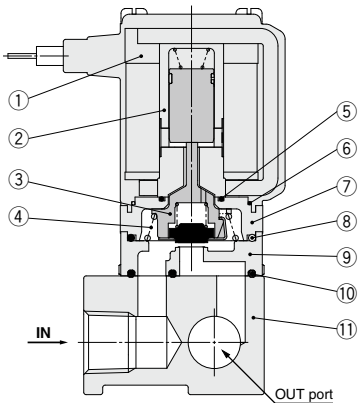
Normally Open (N.O.)

Base material: Aluminum

Common SUP type (for air)



Individual SUP type (for medium vacuum)



Component Parts

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

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

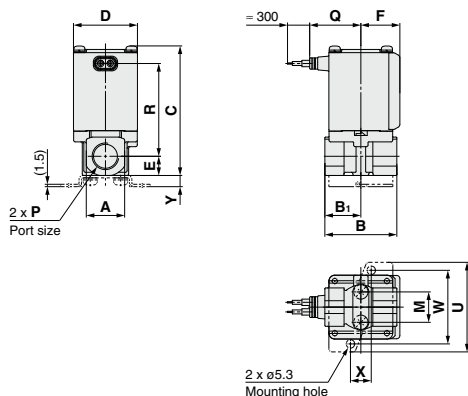
VX21/22/23 Series



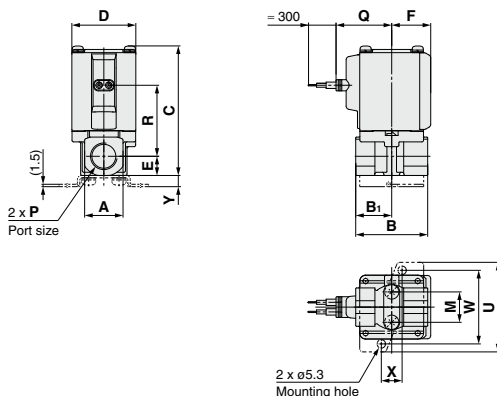
For Air

Dimensions/Body Material: Aluminum

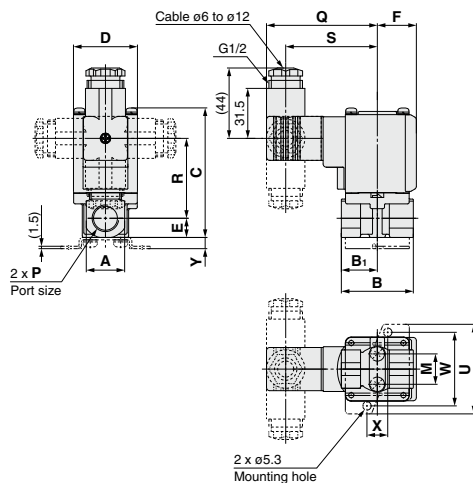
Grommet



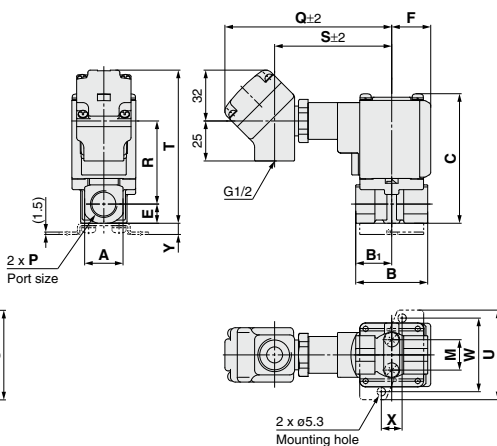
Grommet (with surge voltage suppressor)



DIN terminal



Conduit terminal



Size	Port size P	A	B	B ₁	C	D	E	F	(mm) Mounting bracket dimensions				
									M	U	W	X	Y
1	1/8, 1/4	19	43	21	61 (67)	30	9.5	20	12.8	46	36	11	6
2	1/4, 3/8	24	45	22.5	76 (84)	35	12	22	19	56	46	13	7
3	1/4, 3/8	24	45	22.5	81 (89)	40	12	24.5	19	56	46	13	7
	1/2	30	50	25	86.5	40	15	24.5	—	—	—	—	—

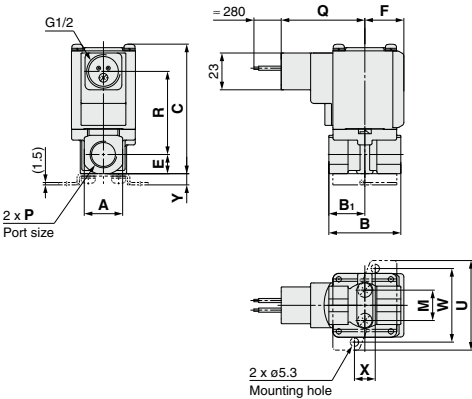
Size	Port size P	Electrical entry										
		Grommet		Grommet (with surge voltage suppressor)		DIN terminal			Conduit terminal			
		Q	R	Q	R	Q	R	S	Q	R	S	T
1	1/8, 1/4	27	42 (47.5)	30	28.5 (34)	64.5	34 (39.5)	52.5	99.5	36 (41.5)	68.5	77 (83)
2	1/4, 3/8	29.5	53.5 (61.5)	32.5	39.5 (47.5)	67	45 (53)	55	102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

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

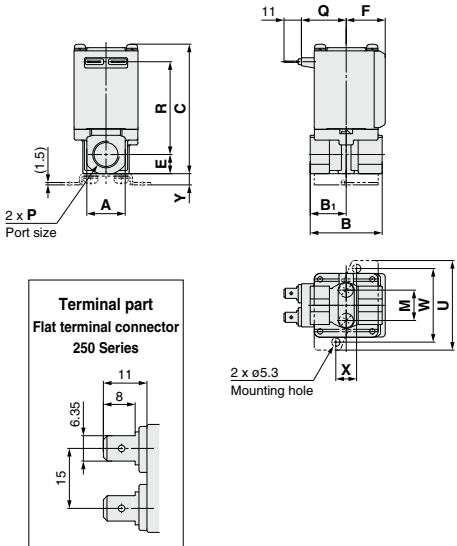


Dimensions/Body Material: Aluminum

Conduit



Flat terminal type



- VX2
- VXK
- VXD
- VXZ
- VXS
- VXB
- VXE
- VXP
- VXR
- VXH
- VXF
- VX3
- VXA

Size	Port size P	A	B	B ₁	C	D	E	F	Mounting bracket dimensions					
									M	U	W	X	Y	
1	1/8, 1/4	19	43	21	61 (67)	30	9.5	20	12.8	46	36	11	6	
2	1/4, 3/8	24	45	22.5	76 (84)	35	12	22	19	56	46	13	7	
3	1/4, 3/8	24	45	22.5	81 (89)	40	12	24.5	19	56	46	13	7	
	1/2	30	50	25	86.5	40	15	24.5	—	—	—	—	—	

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

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



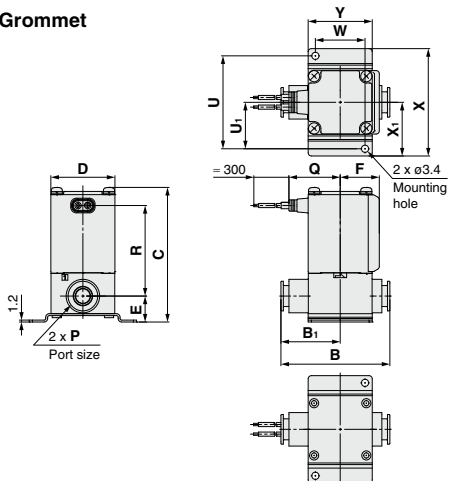
VX21/22/23 Series



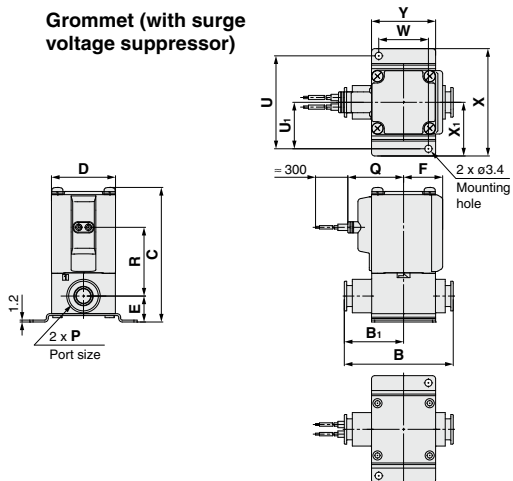
For Air

Dimensions/Body Material: Resin

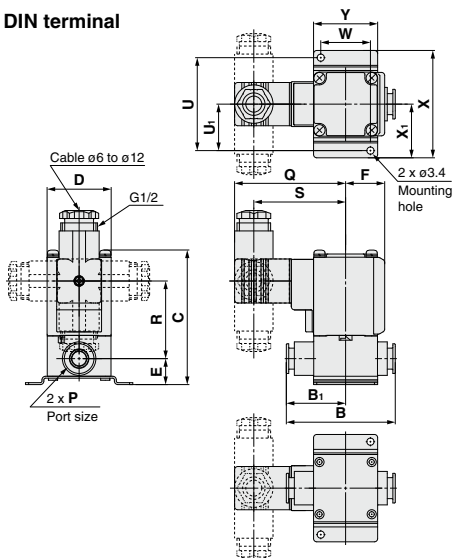
Grommet



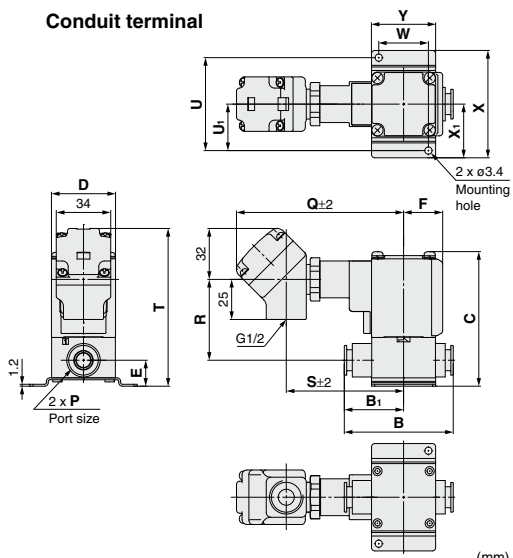
Grommet (with surge voltage suppressor)



DIN terminal



Conduit terminal



(mm)

Size	One-touch fitting P	B	B ₁	C	D	E	F	Mounting bracket dimensions					
								U	U ₁	W	X	X ₁	Y
1	ø6, ø8	53.5	29	65.5 (71.5)	30	13.5	20	45	22.5	22	52	26	30
2	ø8, ø10	66	36	76.5 (84.5)	35	15	22	53	26.5	27	62	31	35
3	ø10, ø12	68	37	84 (92)	40	16.5	24.5	58	29	31	67	33.5	40

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

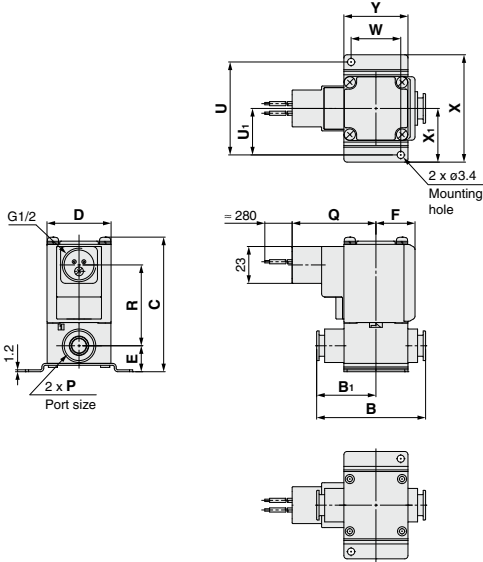
Size	One-touch fitting P	Electrical entry											
		Grommet		Grommet (with surge voltage suppressor)	DIN terminal			Conduit terminal					
		Q	R	Q	R	S	Q	R	S	T			
1	ø6, ø8	27	42.5 (48)	30	29 (34.5)	64.5	34.5 (40)	52.5	99.5	36.5 (42)	68.5	81.5 (87)	
2	ø8, ø10	29.5	51 (59)	32.5	37 (45)	67	43 (50.5)	55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

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

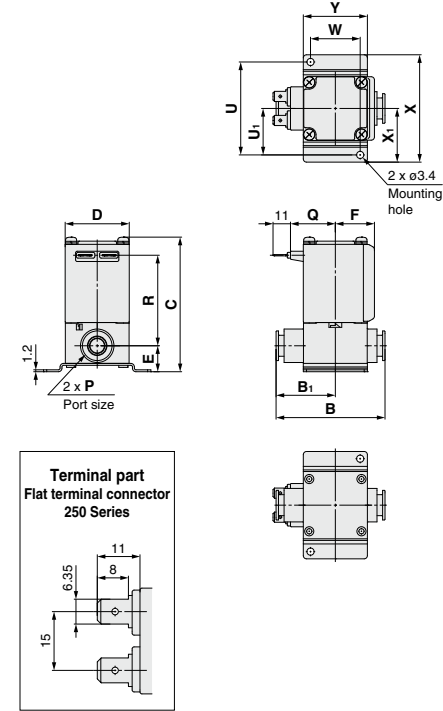


Dimensions/Body Material: Resin

Conduit



Flat terminal



- VX2
- VXK
- VXD
- VXZ
- VXS
- VXB
- VXE
- VXP
- VXR
- VXH
- VXF
- VX3
- VXA

Size	One-touch fitting P	B	B ₁	C	D	E	F	Mounting bracket dimensions								Electrical entry			
																Conduit		Flat terminal	
								U	U ₁	W	X	X ₁	Y	Q	R	Q	R		
1	ø6, ø8	53.5	29	65.5 (71.5)	30	13.5	20	45	22.5	22	52	26	30	47.5	36.5 (42)	23	42.5 (48)		
2	ø8, ø10	66	36	76.5 (84.5)	35	15	22	53	26.5	27	62	31	35	50	45 (52.5)	25.5	51 (59)		
3	ø10, ø12	68	37	84 (92)	40	16.5	24.5	58	29	31	67	33.5	40	52.5	50.5 (58.5)	28	56.5 (64.5)		

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

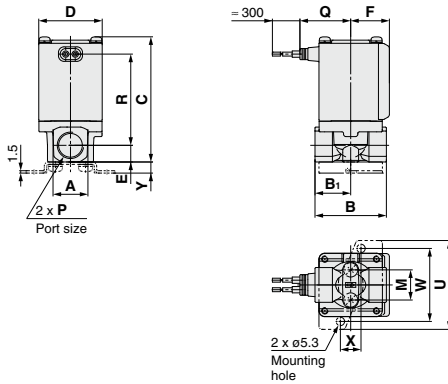
VX21/22/23 Series



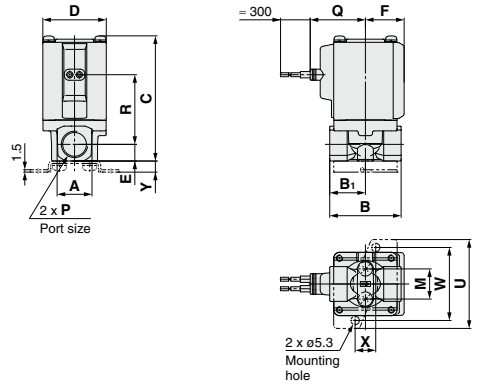
For Medium Vacuum, Water, Oil

Dimensions/Body Material: C37, Stainless Steel

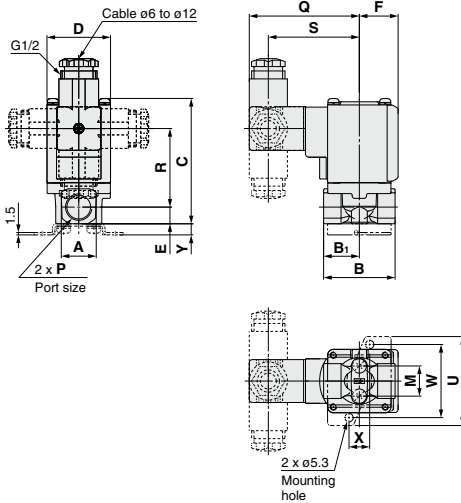
Grommet



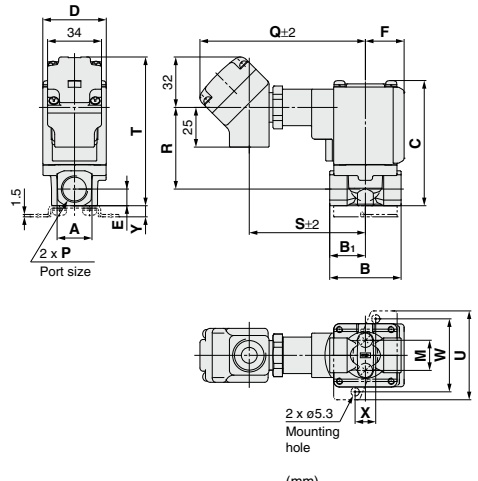
Grommet (with surge voltage suppressor)



DIN terminal



Conduit terminal

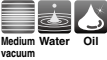


Size	Port size P	A	B	B ₁	C	D	E	F	Mounting bracket dimensions				
									M	U	W	X	Y
1	1/8, 1/4	19	43	21	61 (67)	30	9.5	20	12.8	46	36	11	6
2	1/4, 3/8	22	45	22.5	74.5 (82.5)	35	10.5	22	19	56	46	13	7
3	1/4, 3/8	22	45	22.5	79 (87)	40	10.5	24.5	19	56	46	13	7
	1/2	29.5	50	25	85.5	40	14	24.5	—	—	—	—	—

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

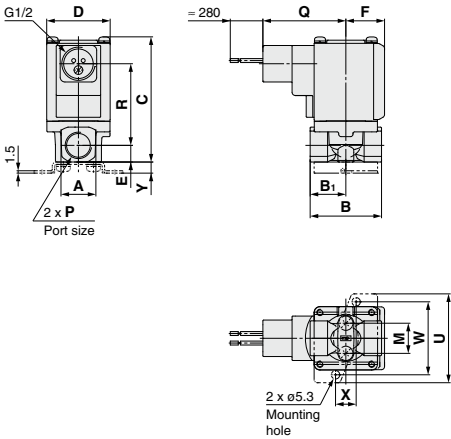
() : Denotes the Normally Open (N.O.) dimensions.

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

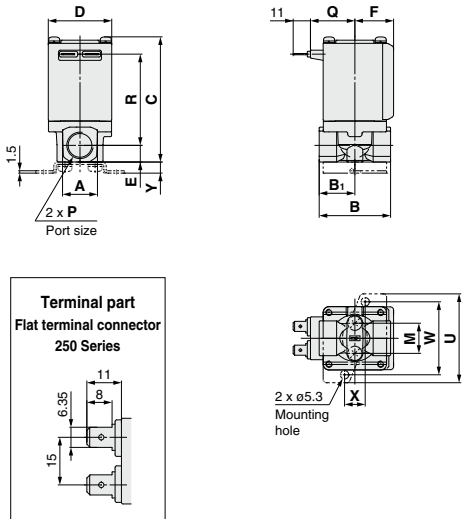


Dimensions/Body Material: C37, Stainless Steel

Conduit



Flat terminal



- VX2
- VXK
- VXD
- VXZ
- VXS
- VXB
- VXE
- VXP
- VXR
- VXH
- VXF
- VX3
- VXA

Size	Port size P	A	B	B ₁	C	D	E	F	Mounting bracket dimensions (mm)				
									M	U	W	X	Y
1	1/8, 1/4	19	43	21	61 (67)	30	9.5	20	12.8	46	36	11	6
2	1/4, 3/8	22	45	22.5	74.5 (82.5)	35	10.5	22	19	56	46	13	7
3	1/4, 3/8	22	45	22.5	79 (87)	40	10.5	24.5	19	56	46	13	7
	1/2	29.5	50	25	85.5	40	14	24.5	—	—	—	—	—

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

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

VX21/22/23 Series

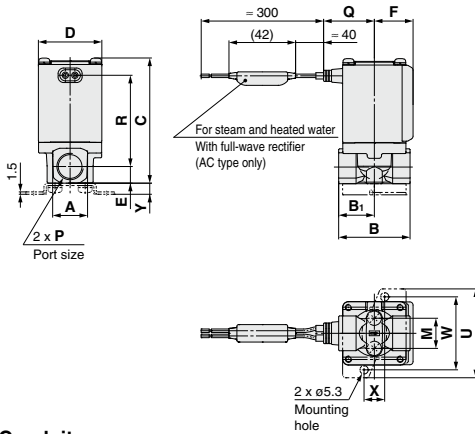


For Steam

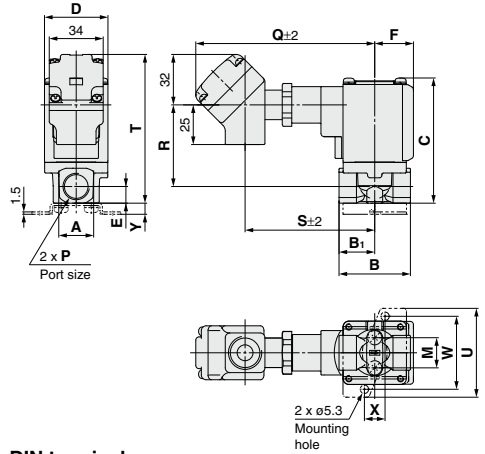
* Can be used with heated water.

Dimensions/Body Material: C37, Stainless Steel

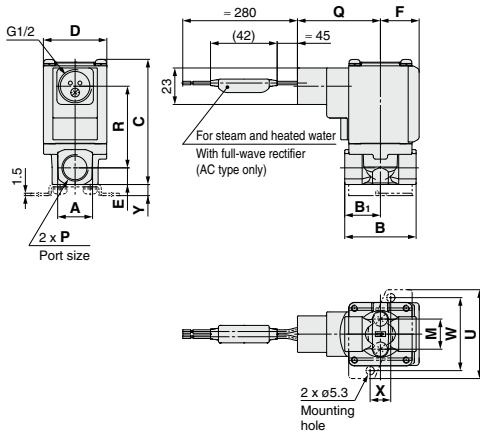
Grommet



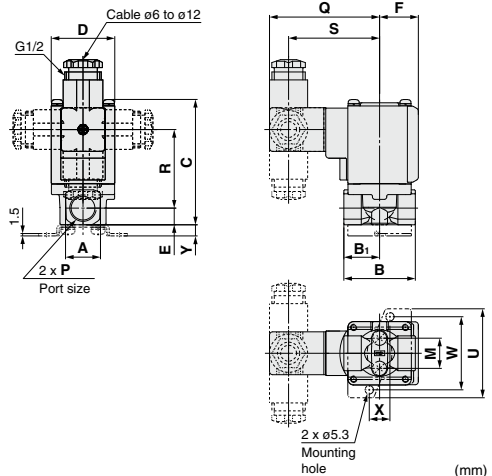
Conduit terminal



Conduit



DIN terminal



Size	Port size P	A	B	B ₁	C	D	E	F	Mounting bracket dimensions					
									M	U	W	X	Y	
1	1/8, 1/4	19	43	21	61 (67)	30	9.5	20	12.8	46	36	11	6	
2	1/4, 3/8	22	45	22.5	74.5 (82.5)	35	10.5	22	19	56	46	13	7	
3	1/4, 3/8	22	45	22.5	79 (87)	40	10.5	24.5	19	56	46	13	7	
	1/2	29.5	50	25	85.5	40	14	24.5	—	—	—	—	—	—

Size	Port size P	Electrical entry									
		Grommet		Conduit terminal			Conduit		DIN terminal		
		Q	R	Q	R	S	Q	R	Q	R	S
1	1/8, 1/4	27	42 (47.5)	108	36 (41.5)	77	47.5	36 (41.5)	64.5	34 (39.5)	52.5
2	1/4, 3/8	29.5	53.5 (61.5)	110.5	47 (55)	79.5	50	47 (55)	67	45 (53)	55
3	1/4, 3/8	32	57.5 (65.5)	113	51.5 (59.5)	82	52.5	51.5 (59.5)	69.5	49.5 (57.5)	57.5
	1/2	32	61	113	55	82	52.5	55	69.5	53	57.5

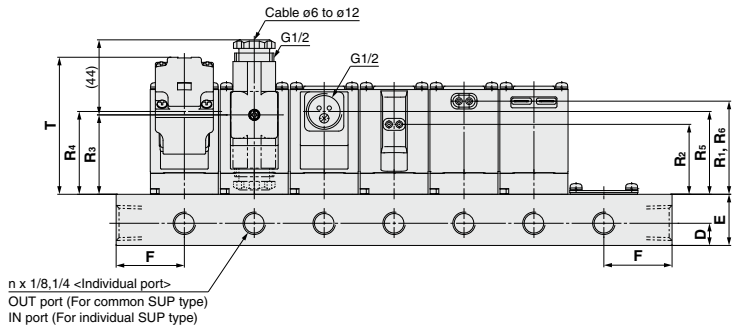
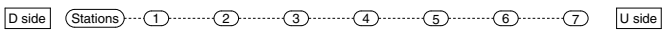
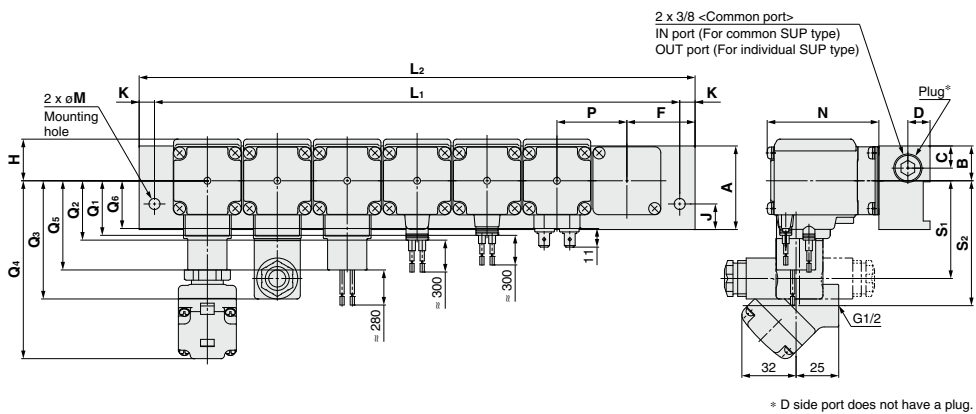
() : Denotes the Normally Open (N.O.) dimensions.

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

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



Dimensions/Manifold/Base Material: Aluminum



- VX2
- VXK
- VXD
- VXZ
- VXS
- VXB
- VXE
- VXP
- VXR
- VXH
- VXF
- VX3
- VXA

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

Size	A	B	C	D	E	F	H	J	K	M	N	P
1	38	15.5	10.5	11	25	32	20	12	7	6.5	50.5 (56.5)	36
2	49	18	13	13	30	36	22	15	9	8.5	60.5 (68.5)	36
3	49	20.5	13	13	30	40	24.5	15	9	8.5	65.5 (73.5)	41

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

() : Denotes the Normally Open (N.O.) dimensions.
* When using a DIN terminal that faces downward, be careful of interference in the electrical wires and piping.

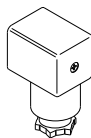
VX21/22/23 Series



For Air, Medium Vacuum, Water, Oil and Steam

Replacement Parts

• DIN Connector Part No.



<For Class B Coil>

Electrical option	Rated voltage	Connector part no.
None	24 VDC	3G-GDM2A-G
	12 VDC	
	100 VAC	
	110 VAC	
	200 VAC	
	220 VAC	
	230 VAC	
	240 VAC	
	24 VAC	
	48 VAC	
With light	24 VDC	GDM2A-L5
	12 VDC	GDM2A-L6
	100 VAC	GDM2A-L1
	110 VAC	GDM2A-L1
	200 VAC	GDM2A-L2
	220 VAC	GDM2A-L2
	230 VAC	GDM2A-L2
	240 VAC	GDM2A-L2
	24 VAC	GDM2A-L5
	48 VAC	GDM2A-L15

<For Class H Coil>

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

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

• Gasket Part No. for DIN Connector

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

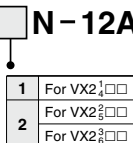
VCW20-1-29-1-F (For Class H Coil)

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

VX021S-1-16FB

• Bracket Assembly Part No. (for Metal Body)

VX02 □ N - 12A



1	For VX2 ₁ □□
2	For VX2 ₂ □□
	For VX2 ₃ □□

* 2 mounting screws are shipped together with the bracket assembly.

* On the bottom side of the standard body, there is no female thread for mounting a bracket.
Please select XNB□.

VX21/22/23 Series

Glossary of Terms

Pressure Terminology

1. Maximum operating pressure differential

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

2. Minimum operating pressure differential

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

3. Maximum system pressure

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

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

4. Withstand pressure

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

Electrical Terminology

1. Apparent power (VA)

Volt-ampere is the product of voltage (V) and current (A).

Power consumption (W): For AC, $W = V \cdot A \cdot \cos \theta$.

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

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

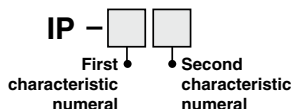
2. Surge voltage

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

3. Degree of protection

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

Verify the degree of protection for each product.



●First Characteristics:

Degrees of protection against solid foreign objects

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

Electrical Terminology

●Second Characteristics:

Degrees of protection against water

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

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

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

Others

1. Material

NBR: Nitrile rubber

FKM: Fluororubber

EPDM: Ethylene propylene rubber

2. Oil-free treatment

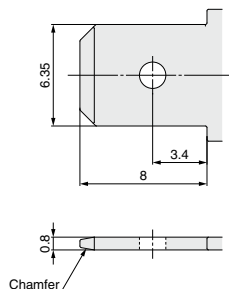
The degreasing and washing of wetted parts

3. Symbol

In the symbol $\begin{matrix} \text{---} & \text{---} & \text{---} \\ | & | & | \\ \text{---} & \text{---} & \text{---} \end{matrix}$, when the valve is closed, flow is blocked from port 1 to port 2. However, if the pressure in port 2 is higher than port 1, the valve will not be able to block the fluid and it will flow from port 2 to port 1.

Flat Terminal

Flat terminal/Electrical connection size of molded coil



Solenoid Valve Flow Rate Characteristics

(How to indicate flow rate characteristics)

1. Indication of flow rate characteristics

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

Table (1) Indication of Flow Rate Characteristics

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

2. Pneumatic equipment

2.1 Indication according to the international standards

(1) Conformed standard

ISO 6358: 1989 : Pneumatic fluid power—Components using compressible fluids—Determination of flow rate characteristics

JIS B 8390: 2000 : Pneumatic fluid power—Components using compressible fluids—How to test flow rate characteristics

(2) Definition of flow rate characteristics

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

Sonic conductance **C** : Value which divides the passing mass flow rate of an equipment in a choked flow condition by the product of the upstream absolute pressure and the density in a standard condition.

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

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

Subsonic flow : Flow greater than the critical pressure ratio

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

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

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

(3) Formula for flow rate

It is described by the practical units as following.

When

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

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

When

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

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

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

C : Sonic conductance [$\text{dm}^3/(\text{s}\cdot\text{bar})$], dm^3 (Cubic decimeter) of SI = L (liter).

b : Critical pressure ratio [—]

P₁ : Upstream pressure [MPa]

P₂ : Downstream pressure [MPa]

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

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

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

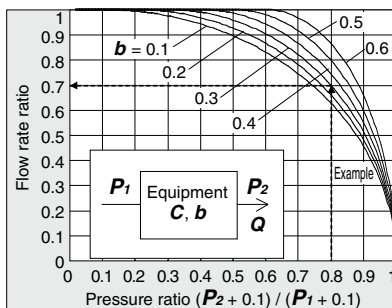
Example)

Obtain the air flow rate for **P₁** = 0.4 [MPa], **P₂** = 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 = $600 \times 2 \times (0.4 + 0.1) \times \sqrt{\frac{293}{273 + 20}} = 600$ [L/min (ANR)]

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

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



Graph (1) Flow rate characteristics

(4) Test method

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

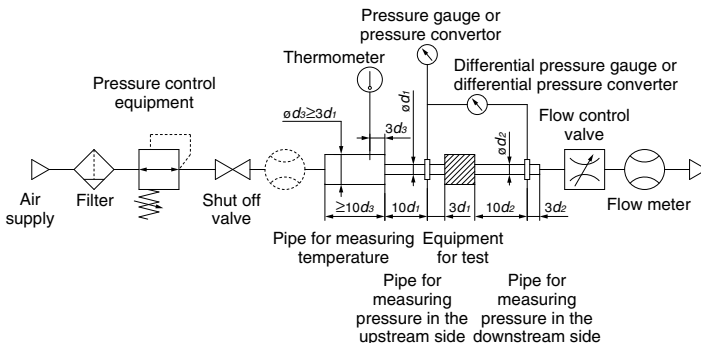


Fig. (1) Test circuit based on ISO 6358: 1989, JIS B 8390: 2000

2.2 Effective area **S**

(1) Conformed standard

JIS B 8390: 2000: Pneumatic fluid power—Components using compressible fluids—Determination of flow rate characteristics

Equipment standards: JIS B 8373: Solenoid valve for pneumatics

JIS B 8379: Silencer for pneumatics

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

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

(2) Definition of flow rate characteristics

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

(3) Formula for flow rate

When

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

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

When

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

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

Conversion with sonic conductance **C**:

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

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

S : Effective area [mm²]

P₁ : Upstream pressure [MPa]

P₂ : Downstream pressure [MPa]

T : Temperature [°C]

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

(4) Test method

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

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

S : Effective area [mm²]

V : Air tank capacity [L]

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]

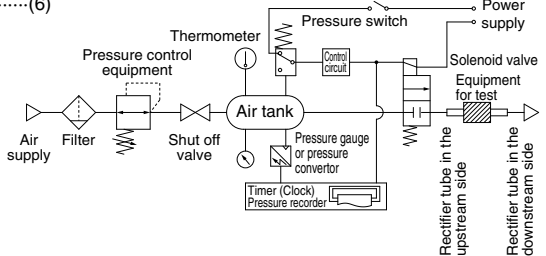


Fig. (2) Test circuit based on JIS B 8390: 2000

2.3 Flow coefficient **Cv** factor

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

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

$$Cv = \frac{Q}{114.5 \sqrt{\frac{\Delta P (P_2 + P_a)}{T_1}}} \quad \text{.....(7)}$$

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

P_1 : Pressure of the upstream tapping port [bar gauge]

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

Q : Flow rate [L/s standard condition]

P_a : Atmospheric pressure [bar absolute]

T_1 : Upstream absolute temperature [K]

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

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

3. Process fluid control equipment

(1) Conformed standard

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

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

JIS B 2005-1: 2012: Industrial-process control valves – Part 1: Control valve terminology and general considerations

JIS B 2005-2-3: 2004: Industrial-process control valves – Part 2: Flow capacity – Section 3: Test procedures

Equipment standards: JIS B 8471: Solenoid valve for water

JIS B 8472: Solenoid valve for steam

JIS B 8473: Solenoid valve for fuel oil

(2) Definition of flow rate characteristics

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

$$Kv = Q \sqrt{\frac{1 \times 10^5}{\Delta P} \cdot \frac{\rho}{1000}} \quad \text{.....(8)}$$

Kv: Flow coefficient [m³/h]

Q : Flow rate [m³/h]

ΔP : Pressure difference [Pa]

ρ : Density of fluid [kg/m³]

(3) Formula of flow rate

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

In the case of liquid:

$$Q = 53 Kv \sqrt{\frac{\Delta P}{G}} \quad \text{.....(9)}$$

Q : Flow rate [L/min]

Kv: Flow coefficient [m³/h]

ΔP : Pressure difference [MPa]

G : Relative density [water = 1]

In the case of saturated aqueous vapor:

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

Q : Flow rate [kg/h]

Kv: Flow coefficient [m³/h]

ΔP : Pressure difference [MPa]

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

P_2 : Downstream pressure [MPa]

VX2
VXK
VXD
VXZ
VXS
VXB
VXE
VXP
VXR
VXH
VXF
VX3
VXA

Conversion of flow coefficient:

$K_v = 0.865 C_v$ (11)

Here,

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

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

(4) Test method

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

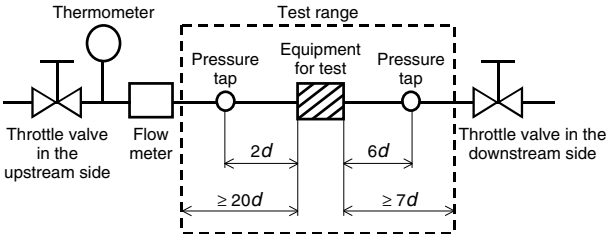
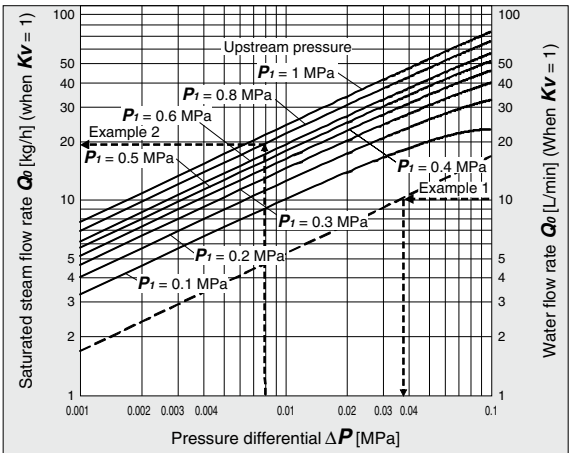


Fig. (3) Test circuit based on IEC60534-2-3, JIS B 2005-2-3



Graph (2) Flow rate characteristics

Example 1)

Obtain the pressure difference when water [15 L/min] runs through the solenoid valve with a **Kv** = 1.5 m³/h. As the flow rate when **Kv** = 1 is calculated as the formula: $Q_0 = 15 \times 1/1.5 = 10$ [L/min], read off ΔP when Q_0 is 10 [L/min] in Graph (2). The reading is 0.036 [MPa].

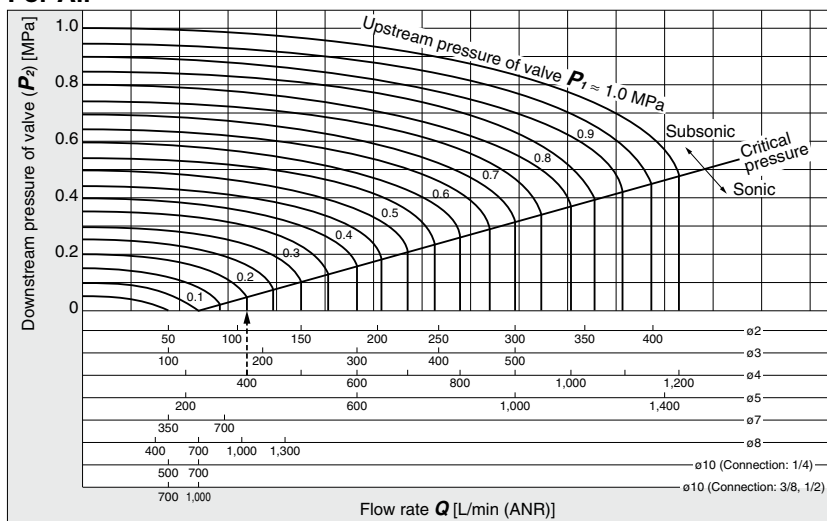
Example 2)

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

Flow Rate Characteristics 1

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

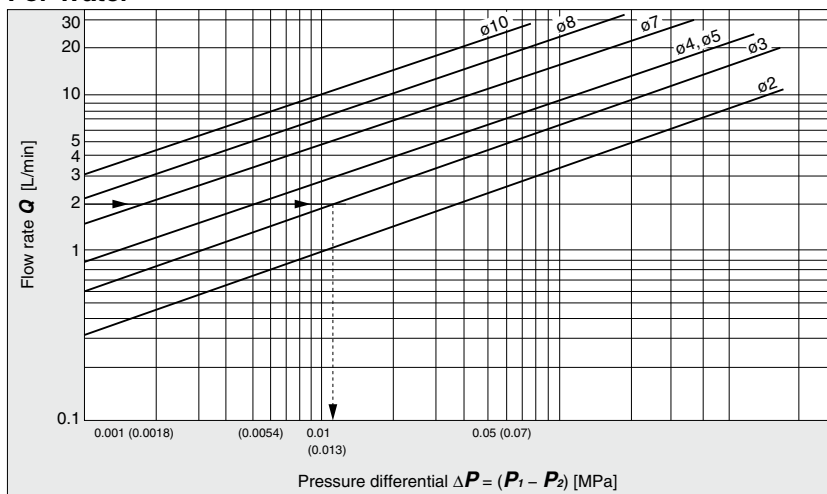
For Air



How to read the graph

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

For Water



How to read the graph

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

VX2

VXK

VXD

VXZ

VXS

VXB

VXE

VXP

VXR

VXH

VXF

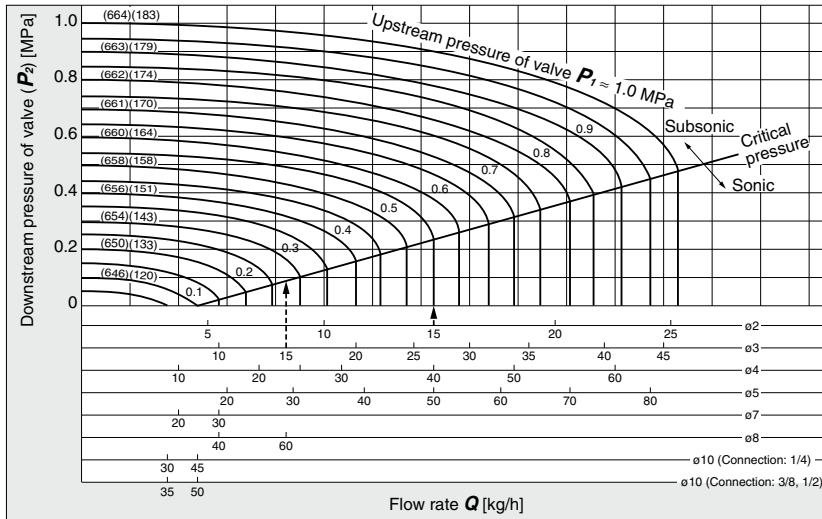
VX3

VXA

Flow Rate Characteristics 2

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

For Saturated Steam



How to read the graph

The sonic range pressure to generate a flow rate of 15 kg/h is $P_1 \approx 0.55$ MPa for a $\phi 2$ orifice and $P_1 \approx 0.28$ MPa for a $\phi 3$ orifice.