



# Operation Manual

PRODUCT NAME

*PIROT OPERATED 2 PORT SOLENOID VALVE*

MODEL / Series / Product Number

VXD Series

**SMC Corporation**

# Contents

## 1. Contents

2.Specifications	P1 to 39
3.Glossary of Terms	P40
4.Solenoid Valve Flow-rate Characteristics	P41 to 45
5. Flow-rate Characteristics	P46 to 47
6.Spccific Product Precautions	P48 to 53
7.Safety Instructions	P54
8.Troubleshooting	P55 to 57

# Pilot Operated 2 Port Solenoid Valve **New**



Air



Water



Oil



Heated water  
(99°C)



High temperature oil  
(99°C)



**Compact**  
Height

Approx. **7% Smaller\*** (7 mm)  
(VXD24)

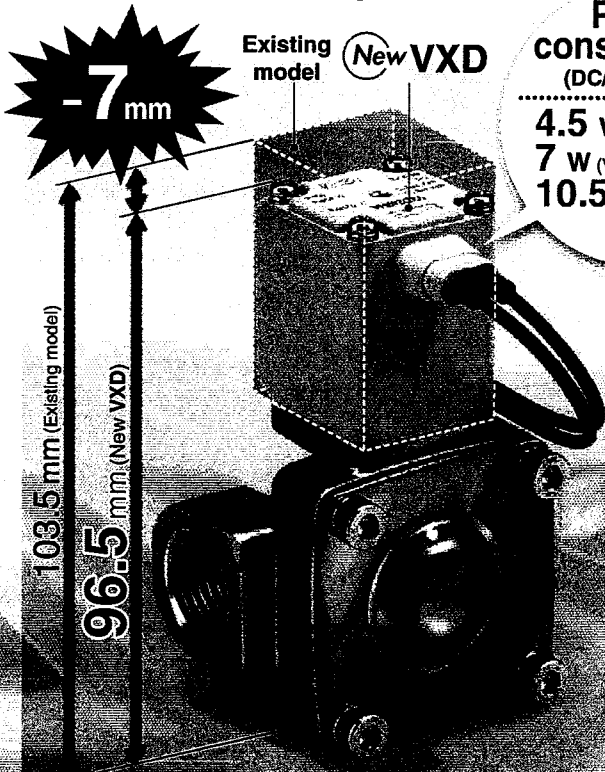
\* Comparison with SMC existing model

**Lightweight**  
Weight

**20% Lighter\*** (90 g)  
(VXD23 Resin body)

Options newly added!

Class H/24 VDC  
Class H/DIN terminal  
Seal material: EPDM



**Power consumption**  
(DC/N.C. valve)

4.5 W (VXD23 to 25)  
7 W (VXD26, 27)  
10.5 W (VXD28, 29)

**Body material**

Resin (VXD2<sub>A</sub><sup>3</sup>)    Aluminum (VXD2<sub>A</sub><sup>3</sup>)

Resin body    Aluminum body

Bracket standard equipment

Applicable tubing O.D.  
ø10, ø12/mm  
ø3/8", 1/2"

**Body material**

C37, Stainless steel, CAC407  
(VXD2<sub>A</sub><sup>3</sup> to 2<sub>B</sub><sup>3</sup>)    (VXD2<sub>E</sub><sup>2</sup> to 2<sub>G</sub><sup>2</sup>)

C37 body    Stainless steel body

CAC407 body

**Solenoid coil type**

Insulation type Class B/H

Class B    Class H

**Valve type**

N.C.    N.O.

Enclosure **IP65**  
Electrical only flat terminal type terminal is IP40

**Series VXD**

**SMC**  
CAT.ES70-50B ©

# Pilot Operated 2 Port Solenoid Valve

Series **VXD**



**Enclosure**  
IP65

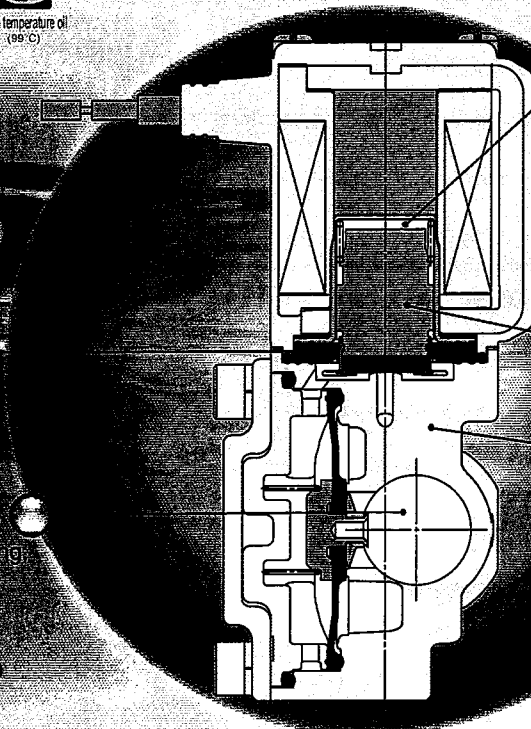
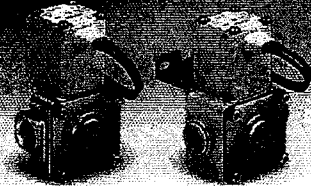
**Flame resistance**  
UL94V-0 conformed

Flame resistant

**Low-noise**  
construction

**Piping variations**

One-touch fitting, One-touch fitting, One-touch fitting



## Clearance

By providing a bumper and clearance, we reduced the collision sound of the core when ON (when the valve is open). Because of the clearance, when using highly viscous fluids such as oil, the armature does not get stuck and the responsiveness when OFF (when the valve is closed) is improved.

## Power consumption

4.5 W (VXD23 to 25)

7.5 W (VXD26 to 27)

10.5 W (VXD28 to 29)

## Improved armature durability

## Body material

### Air

Aluminum (VXD2<sup>3A</sup>)

Resin (VXD2<sup>3A</sup>)

C37, Stainless steel (VXD2<sup>4B</sup> to 2<sup>6D</sup>)

CAC407 (VXD2<sup>7E</sup> to 2<sup>8G</sup>)

### Water/Oil/Heated water/High temperature oil

C37, Stainless steel (VXD2<sup>3A</sup> to 2<sup>6D</sup>)

CAC407 (VXD2<sup>7E</sup> to 2<sup>8G</sup>)

## Built-in full-wave rectifier type (AC specification: Insulation type Class B/H)

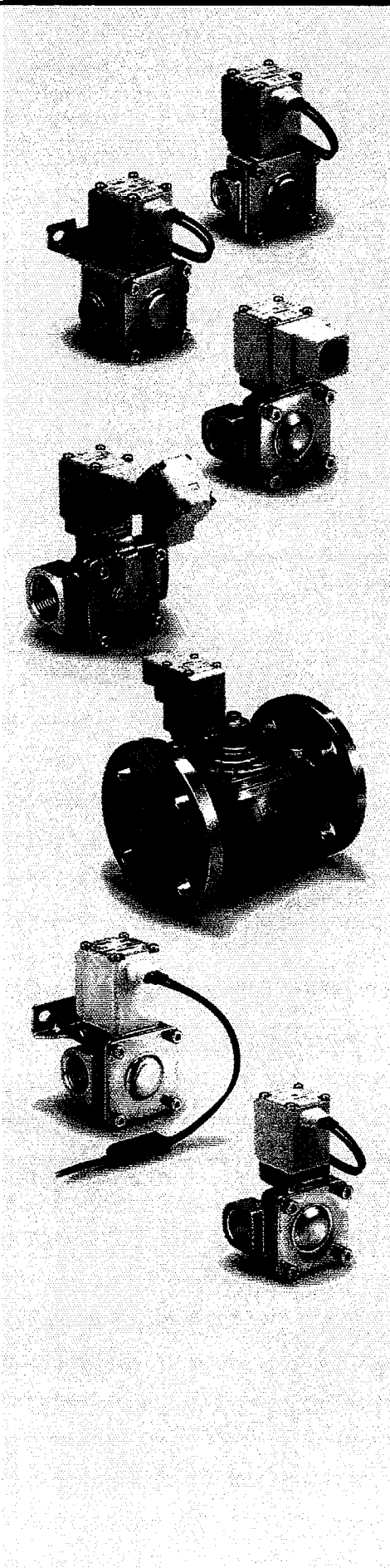
- **Improved durability**  
Service life is extended by the special construction. (compared with current shading coil)
- **Reduced buzz noise**  
Rectified to DC by the full-wave rectifier, resulting in a buzz noise reduction.
- **Reduced apparent power (Class B, N.C. valve)**  
10 VA → 7 VA (VXD23 to 25)  
20 VA → 9.5 VA (VXD26 to 27)  
32 VA → 12 VA (VXD28 to 29)
- **Improved OFF response**  
Specially constructed to improve the OFF response when operated with a higher viscosity fluid such as oil.
- **Low-noise construction**  
Specially constructed to reduce the metal noise during operation.







Model	Size	Orifice diameter	Body material	Port size										
				Thread				Flange			One-touch fitting			
				1/4	3/8	1/2	3/4	1	32A	40A	50A	ø10	ø3/8"	ø12
VXD2 <sup>3A</sup>	8A 10A 15A	10 mmø	Aluminum	●	●	●	—	—	—	—	—	—	—	—
			Resin	—	—	—	—	—	—	—	●	●	●	
			C37	●	●	●	—	—	—	—	—	—	—	
VXD2 <sup>4B</sup>	10A 15A	15 mmø	C37	—	●	●	—	—	—	—	—	—	—	
			Stainless steel	—	●	●	—	—	—	—	—	—	—	
VXD2 <sup>5C</sup>	20A	20 mmø	C37	—	—	—	●	—	—	—	—	—	—	
			Stainless steel	—	—	—	●	—	—	—	—	—	—	
VXD2 <sup>6D</sup>	25A	25 mmø	C37	—	—	—	—	●	—	—	—	—	—	
			Stainless steel	—	—	—	—	●	—	—	—	—	—	
VXD2 <sup>7E</sup>	32A	35 mmø	CAC407	—	—	—	—	—	●	—	—	—	—	
VXD2 <sup>8G</sup>	40A	40 mmø	CAC407	—	—	—	—	—	—	●	—	—	—	
VXD2 <sup>9H</sup>	50A	50 mmø	CAC407	—	—	—	—	—	—	—	●	—	—	

# INDEX

## Pilot Operated 2 Port Solenoid Valve Series VXD



Common Specifications .....	P. 3
Selection Steps .....	P. 4
 <b>For Air</b>	
Model/Valve Specifications, Fluid and Ambient Temperature, Valve Leakage Rate .....	P. 5, 6
How to Order .....	P. 7
 <b>For Water</b>	
Model/Valve Specifications, Fluid and Ambient Temperature, Valve Leakage Rate .....	P. 8, 9
How to Order .....	P. 10
 <b>For Oil</b>	
Model/Valve Specifications, Fluid and Ambient Temperature, Valve Leakage Rate ....	P. 11, 12
How to Order .....	P. 13
 <b>For Heated water</b>	
Model/Valve Specifications, Fluid and Ambient Temperature, Valve Leakage Rate ....	P. 14, 15
How to Order .....	P. 16
 <b>For High temperature oil</b>	
Model/Valve Specifications, Fluid and Ambient Temperature, Valve Leakage Rate ....	P. 17, 18
How to Order.....	P.19
Other Special Options .....	P. 20
Construction .....	P. 23
Dimensions	
For Air/Water/Oil	
Body material: Resin .....	P. 25
Body material: Aluminum, C37, Stainless steel ...	P. 27
Body material: C37, Stainless steel .....	P. 29
Body material: CAC407 .....	P. 33
For Heated water/High temperature oil	
Body material: C37, Stainless steel .....	P. 35
Body material: CAC407 .....	P. 38
Replacement Parts .....	P. 39
Glossary of Terms .....	P. 40
Solenoid Valve Flow-rate Characteristics .....	P. 41
Flow-rate Characteristics .....	P. 46
Specific Product Precautions .....	P. 48
Safety Instructions.....	Back cover

Specifications

For Air

For Water

For Oil

For Heated water

For High temperature oil

Options

Construction

Dimensions

# Series VXD Common Specifications

## Standard Specifications

Valve specifications	Valve construction		Pilot operated 2 port diaphragm type
	Withstand pressure		2.0 MPa (Resin body type 1.5 MPa)
	Body material		Aluminum, Resin, C37 (Brass), Stainless steel, CAC407 (Bronze casting)
	Seal material		NBR, FKM, EPDM <sup>Note 3)</sup>
	Enclosure		Dust-tight, Water-jet-proof type (IP65) <sup>Note 1)</sup>
	Environment		Location without corrosive or explosive gases
Coil specifications	Rated voltage	AC	100 VAC, 200 VAC, 110 VAC, 230 VAC, (220 VAC, 240 VAC, 48 VAC, 24 VAC) <sup>Note 2)</sup>
		DC	24 VDC, (12 VDC) <sup>Note 2)</sup>
	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 20.)

Note 3) For seal material/EPDM, refer to page 21.

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

## Solenoid Coil Specifications

### Normally Closed (N.C.)

#### DC Specification

##### Class B

Model	Power consumption (W) <sup>Note 1)</sup>	Temperature rise (°C) <sup>Note 2)</sup>
VXD23 to 25	4.5	50
VXD26, 27	7	55
VXD28, 29	10.5	65

##### Class H

Model	Power consumption (W) <sup>Note 1)</sup>	Temperature rise (°C) <sup>Note 2)</sup>
VXD23 to 25	9	100
VXD26, 27	12	100
VXD28, 29	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

Model	Apparent power (VA) <sup>Note 1) 2)</sup>	Temperature rise (°C) <sup>Note 3)</sup>
VXD23 to 25	7	60
VXD26, 27	9.5	70
VXD28, 29	12	70

#### Class H

Model	Apparent power (VA) <sup>Note 1) 2)</sup>	Temperature rise (°C) <sup>Note 3)</sup>
VXD23 to 25	9	100
VXD26, 27	12	100
VXD28, 29	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

Model	Power consumption (W) <sup>Note 1)</sup>	Temperature rise (°C) <sup>Note 2)</sup>
VXD2A to 2C	7.5	60
VXD2D, 2E	8.5	70
VXD2F, 2G	12.5	70

##### Class H

Model	Power consumption (W) <sup>Note 1)</sup>	Temperature rise (°C) <sup>Note 2)</sup>
VXD2A to 2C	9	100
VXD2D, 2E	12	100
VXD2F, 2G	15	100

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

#### Class B

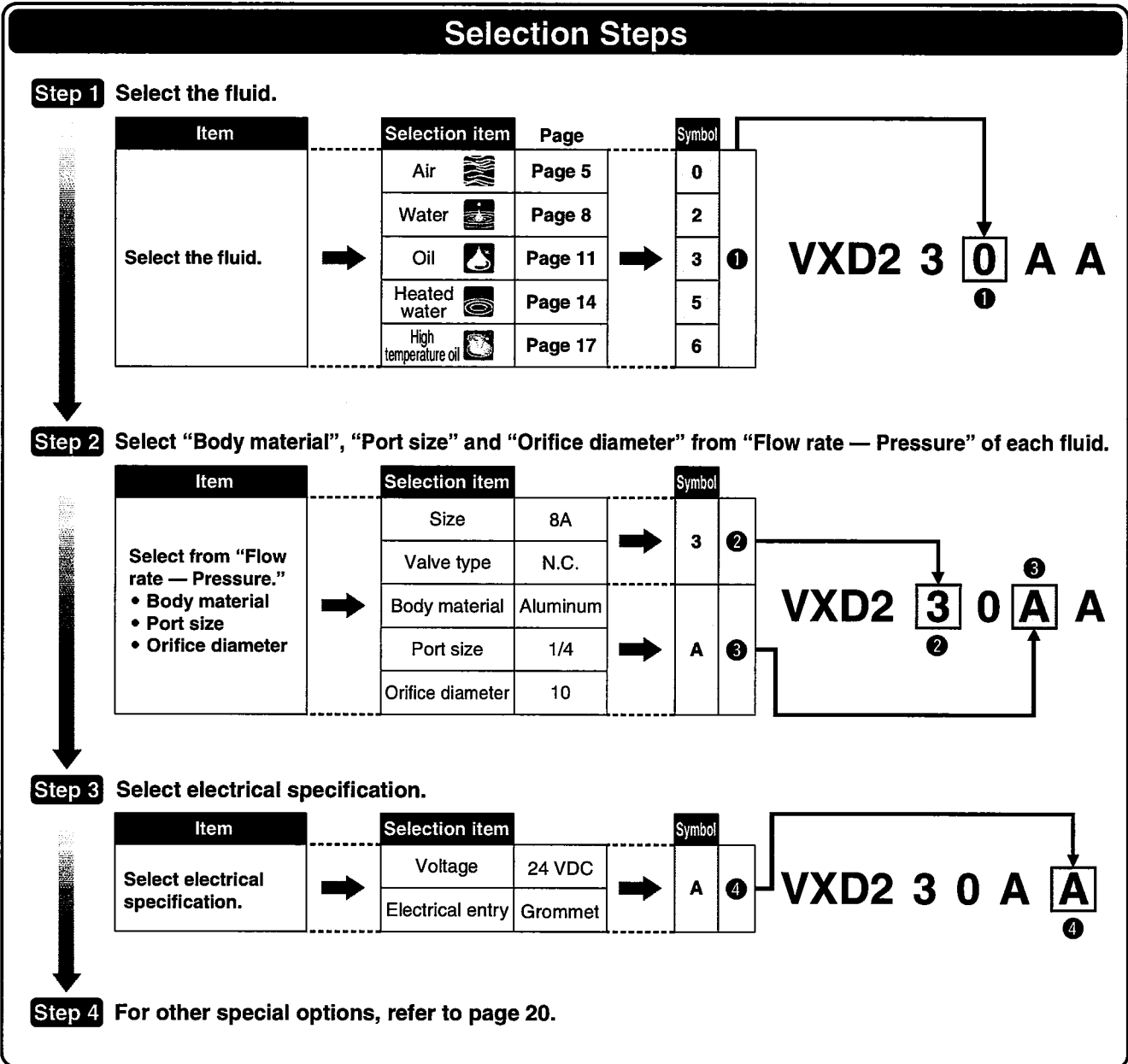
Model	Apparent power (VA)	Temperature rise (°C)
VXD2A to 2C	9	60
VXD2D, 2E	10	70
VXD2F, 2G	14	70

#### Class H

Model	Apparent power (VA) <sup>Note 1) 2)</sup>	Temperature rise (°C) <sup>Note 3)</sup>
VXD2A to 2C	9	100
VXD2D, 2E	12	100
VXD2F, 2G	15	100

# Series VXD Selection Steps

Specifications



For Air

For Water

For Oil

For Heated water

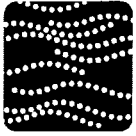
For High temperature oil

Options

Construction

Dimensions

# Series VXD

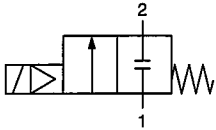


**For Air**

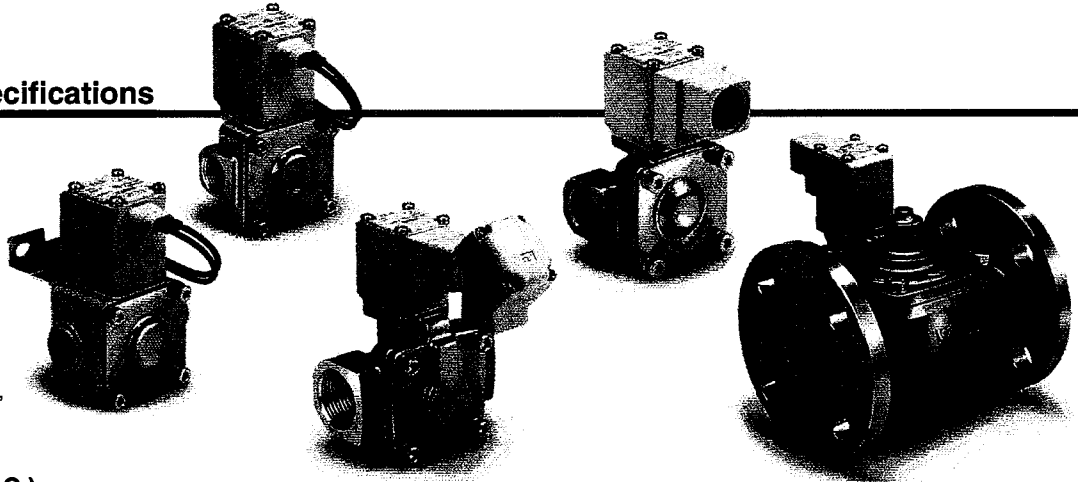
## Model/Valve Specifications

**N.C.**

Symbol



Refer to "Glossary of Terms" on page 40 for symbol.



### Normally Closed (N.C.)

Body material	Port size	Orifice diameter (mm)	Model	Min. operating pressure differential <sup>Note 1</sup> (MPa)	Max. operating pressure differential		Flow-rate characteristics				Max. system pressure (MPa)	Weight <sup>Note 2</sup> (g)								
					AC	DC	C	b	Cv	Effective area (mm <sup>2</sup> )										
Aluminum	1/4 (8A)	10	VXD230	0.02	0.9	0.7	8.5	0.35	2.0	—	1.5	370								
	3/8 (10A)						9.2						2.4							
	1/2 (15A)						9.2							2.4						
Resin	ø10						15	VXD240	0.02				1.0	1.0	5.6	0.33	1.3	225	1360	
	ø3/8"														4.8	0.33	0.9			415
	ø12														7.2	0.33	1.5			
Stainless steel, C37	3/8 (10A)	20	VXD250	0.03	1.0	1.0	18.0	0.35	5.0	560	6800									
	1/2 (15A)						20.0					5.5								
	3/4 (20A)						38.0						0.30	9.5						
	1 (25A)						—	—	—			880								
CAC407	32A Flange	35	VXD270	0.03	1.0	1.0	—	—	225	8400										
	40A Flange	40	VXD280						415											
	50A Flange	50	VXD290						560											

Note 1) Be aware that even if the pressure differential is above the minimum operating pressure differential when the valve is closed, the pressure differential may fall below the minimum operating pressure differential when the valve opens, depending on the power of the supply source (pumps, compressors, etc.) or the type of pipe restrictions.

Note 2) Weight of grommet type. Add 10 g for conduit type, 30 g for DIN terminal type, 60 g for conduit terminal type respectively.

• Refer to "Glossary of Terms" on page 40 for details on the minimum operating pressure differential, maximum operating pressure differential, maximum system pressure.

## Fluid and Ambient Temperature

Fluid temperature (°C)	Ambient temperature (°C)
-10 <sup>Note</sup> to 60	-20 to 60

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

## Valve Leakage Rate

### Internal Leakage

Seal material	Leakage rate (Air) <sup>Note 1</sup>	
	VXD23 to 26 (8A to 25A)	VXD27 to 29 (32A to 50A)
NBR (FKM) <sup>Note 2</sup>	15 cm <sup>3</sup> /min or less (Aluminum body type)	10 cm <sup>3</sup> /min or less
	15 cm <sup>3</sup> /min or less (Resin body type)	
	2 cm <sup>3</sup> /min or less (Metal body type)	

### External Leakage

Seal material	Leakage rate (Air) <sup>Note 1</sup>	
	VXD23 to 26 (8A to 25A)	VXD27 to 29 (32A to 50A)
NBR (FKM) <sup>Note 2</sup>	15 cm <sup>3</sup> /min or less (Aluminum body type)	1 cm <sup>3</sup> /min or less
	15 cm <sup>3</sup> /min or less (Resin body type)	
	1 cm <sup>3</sup> /min or less (Metal body type)	

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

Note 2) For seal material/FKM, refer to "Other options" on page 20 for the selection.



Specifications

For Air

For Water

For Oil

For Heated water

For High temperature oil

Options

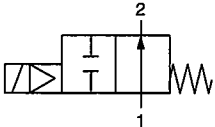
Construction

Dimensions

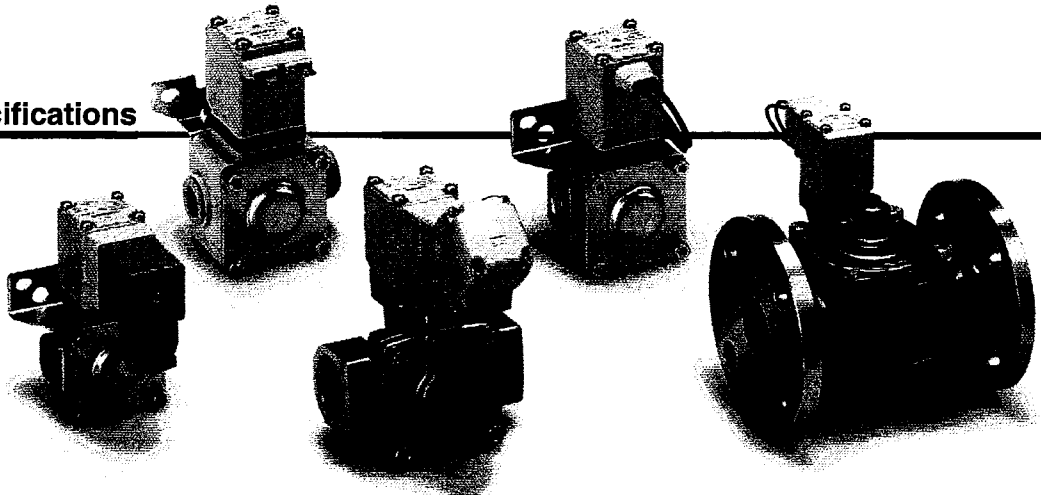
**Model/Valve Specifications**

**N.O.**

Symbol



Refer to "Glossary of Terms" on page 40 for symbol.



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

Body material	Port size	Orifice diameter (mmø)	Model	Min. operating pressure differential <sup>Note 1)</sup> (MPa)	Max. operating pressure differential		Flow-rate characteristics				Max. system pressure (MPa)	Weight (g) <sup>Note 2)</sup>
					AC	DC	C	b	Cv	Effective area (mm <sup>2</sup> )		
Aluminum	1/4 (8A)	10	VXD2A0	0.02	0.6	0.4	8.5	0.35	2.0	—	1.5	390
	3/8 (10A)						9.2		2.4			390
	1/2 (15A)						9.2		2.4			390
Resin	ø10						0.33	5.6	1.3			350
	ø3/8"							4.8	0.9			350
	ø12							7.2	1.5			350
Stainless steel, C37	3/8 (10A)	15	VXD2B0	0.03	0.7	0.7	18.0	0.35	5.0	740		
	1/2 (15A)	20.0	5.5				740					
	3/4 (20A)	20	VXD2C0				38.0	0.30	9.5	860		
	1 (25A)	25	VXD2D0						225	1390		
CAC407	32A Flange	35	VXD2E0			415	5430					
	40A Flange	40	VXD2F0			560	6840					
	50A Flange	50	VXD2G0			880	8440					

Note 1) Be aware that even if the pressure differential is above the minimum operating pressure differential when the valve is closed, the pressure differential may fall below the minimum operating pressure differential when the valve opens, depending on the power of the supply source (pumps, compressors, etc.) or the type of pipe restrictions.

Note 2) Weight of grommet type. Add 10 g for conduit type, 30 g for DIN terminal type, 60 g for conduit terminal type respectively.

• Refer to "Glossary of Terms" on page 40 for details on the minimum operating pressure differential, maximum operating pressure differential, maximum system pressure.

**Fluid and Ambient Temperature**

Fluid temperature (°C)	Ambient temperature (°C)
-10 <sup>Note)</sup> to 60	-20 to 60

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

**Valve Leakage Rate**

**Internal Leakage**

Seal material	Leakage rate (Air) <sup>Note 1)</sup>	
	VXD2A to 2D (8A to 25A)	VXD2E to 2G (32A to 50A)
NBR (FKM) <sup>Note 2)</sup>	15 cm <sup>3</sup> /min or less (Aluminum body type)	10 cm <sup>3</sup> /min or less
	15 cm <sup>3</sup> /min or less (Resin body type)	
	2 cm <sup>3</sup> /min or less (Metal body type)	

**External Leakage**

Seal material	Leakage rate (Air) <sup>Note 1)</sup>	
	VXD2A to 2D (8A to 25A)	VXD2E to 2G (32A to 50A)
NBR (FKM) <sup>Note 2)</sup>	15 cm <sup>3</sup> /min or less (Aluminum body type)	1 cm <sup>3</sup> /min or less
	15 cm <sup>3</sup> /min or less (Resin body type)	
	1 cm <sup>3</sup> /min or less (Metal body type)	

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

Note 2) For seal material/FKM, refer to "Other options" on page 20 for the selection.

# Series VXD

 For Air

## How to Order



VXD2 **3** **0** **A** **A**



### Common Specifications

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

\* When the body is resin, one-touch fittings are supplied. For body size 32A or more, the ports will be the flange type.

### Size—Valve type

Symbol	Size	Valve type
3	8A	N.C.
	10A	
	15A	
A		N.O.

### Body material/Port size/Orifice diameter

Symbol	Body material	Port size	Orifice diameter
A	Aluminum	1/4	10
B		3/8	
C		1/2	
D	Resin	ø10 One-touch fitting	
E		ø3/8" One-touch fitting	
F		ø12 One-touch fitting	

Symbol	Size	Valve type
4	10A	N.C.
B	15A	N.O.

Symbol	Body material	Port size	Orifice diameter
G	C37	3/8	15
H		1/2	
J	Stainless steel	3/8	
K		1/2	

Symbol	Size	Valve type
5	20A	N.C.
C		N.O.

Symbol	Body material	Port size	Orifice diameter
L	C37	3/4	20
M	Stainless steel		

Symbol	Size	Valve type
6	25A	N.C.
D		N.O.

Symbol	Body material	Port size	Orifice diameter
N	C37	1	25
P	Stainless steel		

Symbol	Size	Valve type
7	32A	N.C.
E		N.O.

Symbol	Body material	Port size	Orifice diameter
Q	CAC407	32A Flange	35

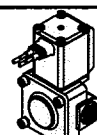
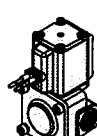
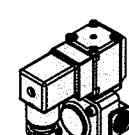
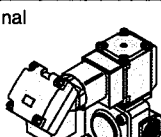
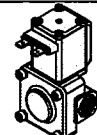
Symbol	Size	Valve type
8	40A	N.C.
F		N.O.

Symbol	Body material	Port size	Orifice diameter
R	CAC407	40A Flange	40

Symbol	Size	Valve type
9	50A	N.C.
G		N.O.

Symbol	Body material	Port size	Orifice diameter
S	CAC407	50A Flange	50

### 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	DIN terminal (With surge voltage suppressor) 
G	24 VDC		
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
T	100 VAC		
U	110 VAC		
V	200 VAC		
W	230 VAC		
Y	24 VDC	Flat terminal 	
			Z

For other special options, refer to page 20.

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

Dimensions → Page on and after 25 (Single Unit)



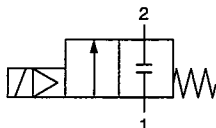
## For Water

\* Possible to use this for air.  
Note that the maximum operating pressure differential and flow-rate characteristics should be within the specifications for air.

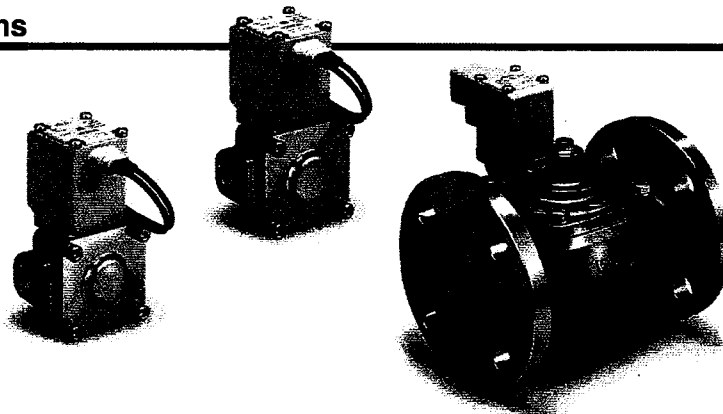
### Model/Valve Specifications

**N.C.**

Symbol



Refer to "Glossary of Terms" on page 40 for symbol.



### Normally Closed (N.C.)

Body material	Port size	Orifice diameter (mm)	Model	Min. operating pressure differential <sup>Note 1)</sup> (MPa)	Max. operating pressure differential		Flow-rate characteristics		Max. system pressure (MPa)	Weight <sup>Note 2)</sup> (g)
					AC	DC	Av (x 10 <sup>-6</sup> m <sup>2</sup> )	Conversion Cv		
Stainless steel, C37	1/4 (8A)	10	VXD232	0.02	0.7	0.5	46	1.9	1.5	480
	3/8 (10A)						58	2.4		480
	1/2 (15A)						58	2.4		480
	3/8 (10A)	15	VXD242		110	4.5	720			
	1/2 (15A)				130	5.5	720			
	3/4 (20A)				230	9.5	840			
CAC407	1 (25A)	25	VXD262	0.03	1.0	1.0	310	13	1360	
	32A Flange	35	VXD272				550	23	5400	
	40A Flange	40	VXD282				740	31	6800	
	50A Flange	50	VXD292				1200	49	8400	

Note 1) Be aware that even if the pressure differential is above the minimum operating pressure differential when the valve is closed, the pressure differential may fall below the minimum operating pressure differential when the valve opens, depending on the power of the supply source (pumps, compressors, etc.) or the type of pipe restrictions.

Note 2) Weight of grommet type. Add 10 g for conduit type, 30 g for DIN terminal type, 60 g for conduit terminal type respectively.

• Refer to "Glossary of Terms" on page 40 for details on the minimum operating pressure differential, maximum operating pressure differential, maximum system pressure.

### Fluid and Ambient Temperature

Fluid temperature (°C)	Ambient temperature (°C)
1 to 60 <sup>Note)</sup>	-20 to 60

Note) No freezing

### Valve Leakage Rate

#### Internal Leakage

Seal material	Leakage rate (Water) <sup>Note 1)</sup>	
	VXD23 to 26 (8A to 25A)	VXD27 to 29 (32A to 50A)
NBR (FKM) <sup>Note 2)</sup>	0.2 cm <sup>3</sup> /min or less	1 cm <sup>3</sup> /min or less

#### External Leakage

Seal material	Leakage rate (Water) <sup>Note 1)</sup>	
	VXD23 to 26 (8A to 25A)	VXD27 to 29 (32A to 50A)
NBR (FKM) <sup>Note 2)</sup>	0.1 cm <sup>3</sup> /min or less	0.1 cm <sup>3</sup> /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 20 for the selection.

Specifications

For Air

For Water

For Oil

For Heated water

For High temperature oil

Options

Construction

Dimensions

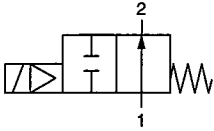
# Series VXD



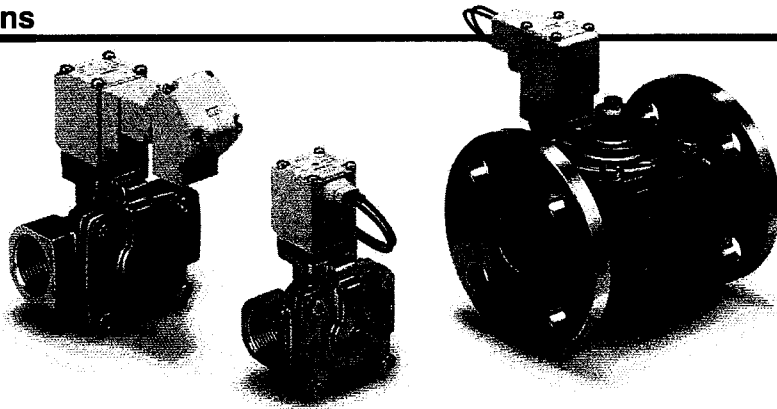
## Model/Valve Specifications

**N.O.**

Symbol



Refer to "Glossary of Terms" on page 40 for symbol.



### Normally Open (N.O.)

Body material	Port size	Orifice diameter (mm)	Model	Min. operating pressure differential <sup>Note 1)</sup> (MPa)	Max. operating pressure differential		Flow-rate characteristics		Max. system pressure (MPa)	Weight <sup>Note 2)</sup> (g)
					AC	DC	Av (x 10 <sup>-6</sup> m <sup>2</sup> )	Conversion Cv		
Stainless steel, C37	1/4 (8A)	10	VXD2A2	0.02	0.4	0.3	46	1.9	1.5	500
	3/8 (10A)						58	2.4		500
	1/2 (15A)						58	2.4		500
	3/8 (10A)	15	VXD2B2		110	4.5	740			
	1/2 (15A)				130	5.5	740			
	3/4 (20A)				20	VXD2C2	230	9.5		860
	1 (25A)						25	VXD2D2		310
CAC407	32A Flange	35	VXD2E2	0.03	0.7	0.7	550	23	5430	
	40A Flange	40	VXD2F2				740	31	6840	
	50A Flange	50	VXD2G2				1200	49	8440	

Note 1) Be aware that even if the pressure differential is above the minimum operating pressure differential when the valve is closed, the pressure differential may fall below the minimum operating pressure differential when the valve opens, depending on the power of the supply source (pumps, compressors, etc.) or the type of pipe restrictions.

Note 2) Weight of grommet type. Add 10 g for conduit type, 30 g for DIN terminal type, 60 g for conduit terminal type respectively.

• Refer to "Glossary of Terms" on page 40 for details on the minimum operating pressure differential, maximum operating pressure differential, maximum system pressure.

## Fluid and Ambient Temperature

Fluid temperature (°C)	Ambient temperature (°C)
1 to 60 <sup>Note)</sup>	-20 to 60

Note) No freezing

## Valve Leakage Rate

### Internal Leakage

Seal material	Leakage rate (Water) <sup>Note 1)</sup>	
	VXD2A to 2D (8A to 25A)	VXD2E to 2G (32A to 50A)
NBR (FKM) <sup>Note 2)</sup>	0.2 cm <sup>3</sup> /min or less	1 cm <sup>3</sup> /min or less

### External Leakage

Seal material	Leakage rate (Water) <sup>Note 1)</sup>	
	VXD2A to 2D (8A to 25A)	VXD2E to 2G (32A to 50A)
NBR (FKM) <sup>Note 2)</sup>	0.1 cm <sup>3</sup> /min or less	0.1 cm <sup>3</sup> /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 20 for the selection.

# Pilot Operated 2 Port Solenoid Valve *Series VXD*



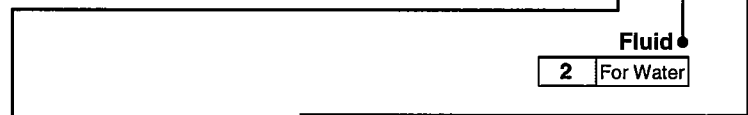
## How to Order

VXD2 **3** **2** **A** **A**

### Common Specifications

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

\* For body size 32A or more, the ports will be the flange type.



### Size—Valve type

Symbol	Size	Valve type
<b>3</b>	8A	N.C.
	10A	N.O.
	15A	
<b>A</b>		

### Body material/Port size/Orifice diameter

Symbol	Body material	Port size	Orifice diameter
<b>A</b>	C37	1/4	10
<b>B</b>		3/8	
<b>C</b>		1/2	
<b>D</b>	Stainless steel	1/4	
<b>E</b>		3/8	
<b>F</b>		1/2	

Symbol	Size	Valve type
<b>4</b>	10A	N.C.
<b>B</b>	15A	N.O.

Symbol	Body material	Port size	Orifice diameter
<b>G</b>	C37	3/8	15
<b>H</b>		1/2	
<b>J</b>	Stainless steel	3/8	
<b>K</b>		1/2	

Symbol	Size	Valve type
<b>5</b>	20A	N.C.
<b>C</b>		N.O.

Symbol	Body material	Port size	Orifice diameter
<b>L</b>	C37	3/4	20
<b>M</b>	Stainless steel		

Symbol	Size	Valve type
<b>6</b>	25A	N.C.
<b>D</b>		N.O.

Symbol	Body material	Port size	Orifice diameter
<b>N</b>	C37	1	25
<b>P</b>	Stainless steel		

Symbol	Size	Valve type
<b>7</b>	32A	N.C.
<b>E</b>		N.O.

Symbol	Body material	Port size	Orifice diameter
<b>Q</b>	CAC407	32A Flange	35

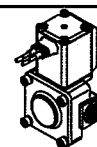
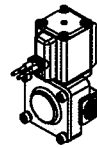
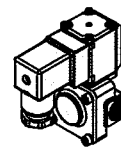
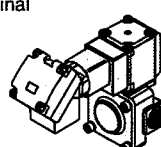
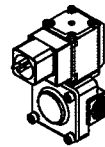

Symbol	Size	Valve type
<b>8</b>	40A	N.C.
<b>F</b>		N.O.

Symbol	Body material	Port size	Orifice diameter
<b>R</b>	CAC407	40A Flange	40

Symbol	Size	Valve type
<b>9</b>	50A	N.C.
<b>G</b>		N.O.

Symbol	Body material	Port size	Orifice diameter
<b>S</b>	CAC407	50A Flange	50

### Voltage/Electrical entry

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

For other special options, refer to page 20.

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	
Special electrical entry direction	

Dimensions → Page on and after 27 (Single Unit)

Specifications

For Air

For Water

For Oil

For Heated water

For High temperature oil

Options

Construction

Dimensions

# Series VXD



**For Oil**

\* Possible to use this for air and water.  
Note that the maximum operating pressure differential and flow-rate characteristics should be within the specifications of the fluid used.

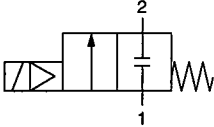
**⚠ When the fluid is oil.**

The kinematic viscosity must not exceed 50 mm<sup>2</sup>/s. The special construction of the armature adopted in the built-in full-wave rectifier type gives an improvement in OFF response by providing clearance on the absorbed surface when it is switched ON.

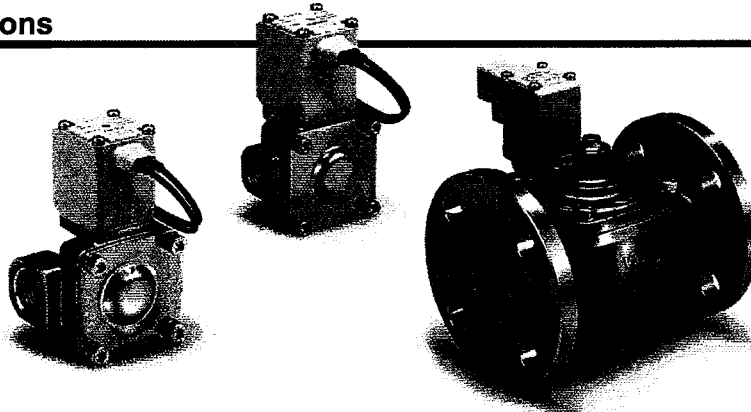
## Model/Valve Specifications

**N.C.**

Symbol



Refer to "Glossary of Terms" on page 40 for symbol.



### Normally Closed (N.C.)

Body material	Port size	Orifice diameter (mm)	Model	Min. operating pressure differential <sup>Note 1)</sup> (MPa)	Max. operating pressure differential		Flow-rate characteristics		Max. system pressure (MPa)	Weight <sup>(Note 2)</sup> (g)
					AC	DC	Av (x 10 <sup>-6</sup> m <sup>2</sup> )	Conversion Cv		
Stainless steel, C37	1/4 (8A)	10	VXD233	0.02	0.5	0.4	46	1.9	1.5	480
	3/8 (10A)						58	2.4		480
	1/2 (15A)						58	2.4		480
	3/8 (10A)	15	VXD243		110	4.5	720			
	1/2 (15A)				130	5.5	720			
	3/4 (20A)				230	9.5	840			
	1 (25A)	25	VXD263		0.7	0.7	310	13		1360
CAC407	32A Flange	35	VXD273	0.03	0.7	0.7	550	23	5400	
	40A Flange	40	VXD283				740	31	6800	
	50A Flange	50	VXD293				1200	49	8400	

Note 1) Be aware that even if the pressure differential is above the minimum operating pressure differential when the valve is closed, the pressure differential may fall below the minimum operating pressure differential when the valve opens, depending on the power of the supply source (pumps, compressors, etc.) or the type of pipe restrictions.

Note 2) Weight of grommet type. Add 10 g for conduit type, 30 g for DIN terminal type, 60 g for conduit terminal type respectively.

• Refer to "Glossary of Terms" on page 40 for details on the minimum operating pressure differential, maximum operating pressure differential, maximum system pressure.

## Fluid and Ambient Temperature

Fluid temperature (°C)	Ambient temperature (°C)
-5 <sup>Note)</sup> to 60	-20 to 60

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

## Valve Leakage Rate

### Internal Leakage

Seal material	Leakage rate (Oil) <sup>Note)</sup>	
	VXD23 to 26 (8A to 25A)	VXD27 to 29 (32A to 50A)
FKM	0.2 cm <sup>3</sup> /min or less	1 cm <sup>3</sup> /min or less

### External Leakage

Seal material	Leakage rate (Oil) <sup>Note)</sup>	
	VXD23 to 26 (8A to 25A)	VXD27 to 29 (32A to 50A)
FKM	0.1 cm <sup>3</sup> /min or less	0.1 cm <sup>3</sup> /min or less

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

# Pilot Operated 2 Port Solenoid Valve *Series VXD*



**⚠ When the fluid is oil.**

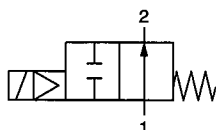
The kinematic viscosity must not exceed 50 mm<sup>2</sup>/s. The special construction of the armature adopted in the built-in full-wave rectifier type gives an improvement in OFF response by providing clearance on the absorbed surface when it is switched ON.

Specifications

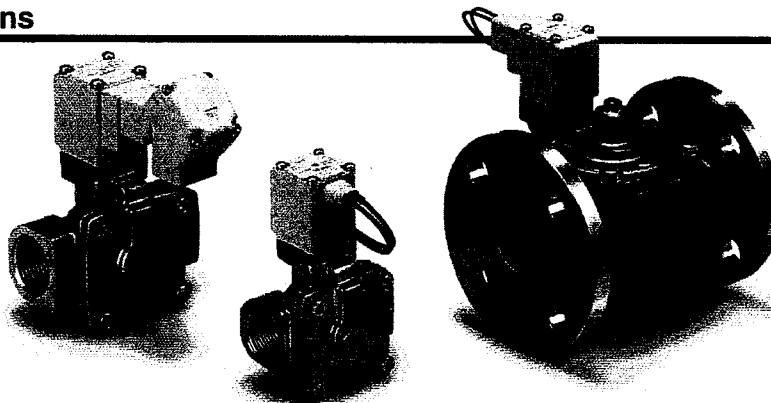
## Model/Valve Specifications

**N.O.**

Symbol



Refer to "Glossary of Terms" on page 40 for symbol.



For Air

For Water

For Oil

For heated water

For High temperature oil

### Normally Open (N.O.)

Body material	Port size	Orifice diameter (mmø)	Model	Min. operating pressure differential <sup>Note 1)</sup> (MPa)	Max. operating pressure differential		Flow-rate characteristics		Max. system pressure (MPa)	Weight <sup>Note 2)</sup> (g)
					AC	DC	Av (x 10 <sup>-6</sup> m <sup>2</sup> )	Conversion Cv		
Stainless steel, C37	1/4 (8A)	10	VXD2A3	0.02	0.4	0.3	46	1.9	1.5	500
	3/8 (10A)						58	2.4		500
	1/2 (15A)						58	2.4		500
	3/8 (10A)	15	VXD2B3		110	4.5	740			
	1/2 (15A)				130	5.5	740			
	3/4 (20A)				230	9.5	860			
	1 (25A)				310	13	1390			
CAC407	32A Flange	35	VXD2E3	0.03	0.6	0.6	550	23	5430	
	40A Flange	40	VXD2F3				740	31	6840	
	50A Flange	50	VXD2G3				1200	49	8440	

Note 1) Be aware that even if the pressure differential is above the minimum operating pressure differential when the valve is closed, the pressure differential may fall below the minimum operating pressure differential when the valve opens, depending on the power of the supply source (pumps, compressors, etc.,) or the type of pipe restrictions.

Note 2) Weight of grommet type. Add 10 g for conduit type, 30 g for DIN terminal type, 60 g for conduit terminal type respectively.

• Refer to "Glossary of Terms" on page 40 for details on the minimum operating pressure differential, maximum operating pressure differential, maximum system pressure.

## Fluid and Ambient Temperature

Fluid temperature (°C)	Ambient temperature (°C)
-5 <sup>Note)</sup> to 60	-20 to 60

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

## Valve Leakage Rate

### Internal Leakage

Seal material	Leakage rate (Oil) <sup>Note)</sup>	
	VXD2A to 2D (8A to 25A)	VXD2E to 2G (32A to 50A)
FKM	0.2 cm <sup>3</sup> /min or less	1 cm <sup>3</sup> /min or less

### External Leakage

Seal material	Leakage rate (Oil) <sup>Note)</sup>	
	VXD2A to 2D (8A to 25A)	VXD2E to 2G (32A to 50A)
FKM	0.1 cm <sup>3</sup> /min or less	0.1 cm <sup>3</sup> /min or less

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

Options

Construction

Dimensions

# Series VXD



## How to Order



VXD2 **3** **3** **A** **A**



### Common Specifications

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

\* For body size 32A or more, the ports will be the flange type.

### Size—Valve type

Symbol	Size	Valve type
3	8A	N.C.
	10A	N.O.
A	15A	

### Body material/Port size/Orifice diameter

Symbol	Body material	Port size	Orifice diameter
A	C37	1/4	10
B		3/8	
C		1/2	
D	Stainless steel	1/4	
E		3/8	
F		1/2	

Symbol	Size	Valve type
4	10A	N.C.
	15A	N.O.

Symbol	Body material	Port size	Orifice diameter
G	C37	3/8	15
H		1/2	
J	Stainless steel	3/8	
K		1/2	

Symbol	Size	Valve type
5	20A	N.C.
		N.O.

Symbol	Body material	Port size	Orifice diameter
L	C37	3/4	20
M	Stainless steel		

Symbol	Size	Valve type
6	25A	N.C.
		N.O.

Symbol	Body material	Port size	Orifice diameter
N	C37	1	25
P	Stainless steel		

Symbol	Size	Valve type
7	32A	N.C.
		N.O.

Symbol	Body material	Port size	Orifice diameter
Q	CAC407	32A Flange	35

Symbol	Size	Valve type
8	40A	N.C.
		N.O.

Symbol	Body material	Port size	Orifice diameter
R	CAC407	40A Flange	40

Symbol	Size	Valve type
9	50A	N.C.
		N.O.

Symbol	Body material	Port size	Orifice diameter
S	CAC407	50A Flange	50

### 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
G	24 VDC	DIN terminal (With surge voltage suppressor)								
			H	100 VAC						
					J	110 VAC				
							K	200 VAC		
									L	230 VAC
N	100 VAC	Conduit terminal (With surge voltage suppressor)								
			P	110 VAC						
					Q	200 VAC				
							R	230 VAC		
									S	24 VDC
U	110 VAC	Conduit (With surge voltage suppressor)								
			V	200 VAC						
					W	230 VAC				
							Y	24 VDC		
Z	Other voltages and electrical option	Flat terminal								

For other special options, refer to page 20.

Special voltage	24 VAC
	48 VAC
	220 VAC
	240 VAC
	12 VDC
DIN terminal with light	
Conduit terminal with light	
Without DIN connector	
Oil-free	
G thread	
NPT thread	
With bracket	
Special electrical entry direction	

Dimensions → Page on and after 27 (Single Unit)





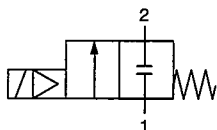
## For Heated water

\* Possible to use this for air (up to 99°C) and water.  
 Note that the maximum operating pressure differential and flow-rate characteristics should be within the specifications of the fluid used.

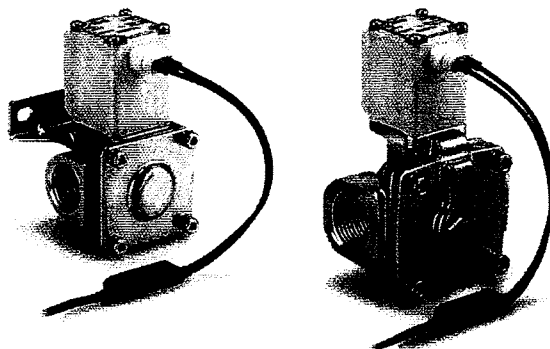
### Model/Valve Specifications

**N.C.**

Symbol



Refer to "Glossary of Terms" on page 40 for symbol.



### Normally Closed (N.C.)

Body material	Port size	Orifice diameter (mmø)	Model	Min. operating pressure differential <sup>Note 1)</sup> (MPa)	Max. operating pressure differential		Flow-rate characteristics		Max. system pressure (MPa)	Weight <sup>Note 2)</sup> (g)
					AC	DC	Av (x 10 <sup>-6</sup> m <sup>2</sup> )	Conversion Cv		
Stainless steel, C37	1/4 (8A)	10	VXD235	0.02	0.7	0.5	46	1.9	1.5	480
	3/8 (10A)						58	2.4		480
	1/2 (15A)						58	2.4		480
	3/8 (10A)	15	VXD245		110	4.5	720			
	1/2 (15A)				130	5.5	720			
	3/4 (20A)				230	9.5	840			
1 (25A)	25	VXD265	310	13	1360					
CAC407	32A Flange	35	VXD275	0.03	1.0	1.0	550	23	5400	
	40A Flange	40	VXD285				740	31	6800	
	50A Flange	50	VXD295				1200	49	8400	

Note 1) Be aware that even if the pressure differential is above the minimum operating pressure differential when the valve is closed, the pressure differential may fall below the minimum operating pressure differential when the valve opens, depending on the power of the supply source (pumps, compressors, etc.,) or the type of pipe restrictions.

Note 2) Weight of grommet type. Add 10 g for conduit type, 60 g for conduit terminal type respectively.

• Refer to "Glossary of Terms" on page 40 for details on the minimum operating pressure differential, maximum operating pressure differential, maximum system pressure.

### Fluid and Ambient Temperature

Fluid temperature (°C)	Ambient temperature (°C)
1 to 99	-20 to 60

Note) No freezing

### Valve Leakage Rate

#### Internal Leakage

Seal material	Leakage rate (Water) <sup>Note)</sup>	
	VXD23 to 26 (8A to 25A)	VXD27 to 29 (32A to 50A)
EPDM	0.2 cm <sup>3</sup> /min or less	1 cm <sup>3</sup> /min or less

#### External Leakage

Seal material	Leakage rate (Water) <sup>Note)</sup>	
	VXD23 to 26 (8A to 25A)	VXD27 to 29 (32A to 50A)
EPDM	0.1 cm <sup>3</sup> /min or less	0.1 cm <sup>3</sup> /min or less

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

Specifications

For Air

For Water

For Oil

For heated water

For High temperature oil

Options

Construction

Dimensions

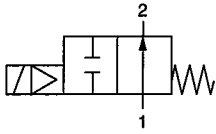
# Series VXD



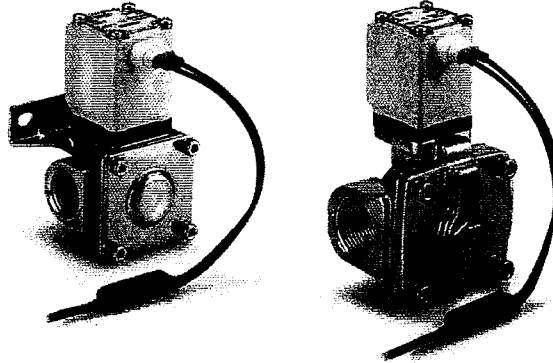
## Model/Valve Specifications

**N.O.**

Symbol



Refer to "Glossary of Terms" on page 40 for symbol.



### Normally Open (N.O.)

Body material	Port size	Orifice diameter (mm)	Model	Min. operating pressure differential <sup>Note 1)</sup> (MPa)	Max. operating pressure differential		Flow-rate characteristics		Max. system pressure (MPa)	Weight <sup>Note 2)</sup> (g)
					AC	DC	Av (x 10 <sup>-6</sup> m <sup>2</sup> )	Conversion Cv		
Stainless steel, C37	1/4 (8A)	10	VXD2A5	0.02	0.4	0.3	46	1.9	1.5	500
	3/8 (10A)						58	2.4		500
	1/2 (15A)						58	2.4		500
	3/8 (10A)	15	VXD2B5		110	4.5	740			
	1/2 (15A)				130	5.5	740			
	3/4 (20A)				20	VXD2C5	230	9.5		860
	1 (25A)						25	VXD2D5		310
CAC407	32A Flange	35	VXD2E5	0.03	0.7	0.7	550	23	5430	
	40A Flange	40	VXD2F5				740	31	6840	
	50A Flange	50	VXD2G5				1200	49	8440	

Note 1) Be aware that even if the pressure differential is above the minimum operating pressure differential when the valve is closed, the pressure differential may fall below the minimum operating pressure differential when the valve opens, depending on the power of the supply source (pumps, compressors, etc.) or the type of pipe restrictions.

Note 2) Weight of grommet type. Add 10 g for conduit type, 60 g for conduit terminal type respectively.

• Refer to "Glossary of Terms" on page 40 for details on the minimum operating pressure differential, maximum operating pressure differential, maximum system pressure.

## Fluid and Ambient Temperature

Fluid temperature (°C)	Ambient temperature (°C)
1 to 99	-20 to 60

Note) No freezing

## Valve Leakage Rate

### Internal Leakage

Seal material	Leakage rate (Water) <sup>Note)</sup>	
	VXD2A to 2D (8A to 25A)	VXD2E to 2G (32A to 50A)
EPDM	0.2 cm <sup>3</sup> /min or less	1 cm <sup>3</sup> /min or less

### External Leakage

Seal material	Leakage rate (Water) <sup>Note)</sup>	
	VXD2A to 2D (8A to 25A)	VXD2E to 2G (32A to 50A)
EPDM	0.1 cm <sup>3</sup> /min or less	0.1 cm <sup>3</sup> /min or less

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

# Pilot Operated 2 Port Solenoid Valve **Series VXD**

 **For Heated water**



## How to Order

VXD2 **3** **5** **A** **B**

### Common Specifications

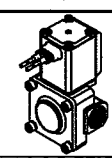
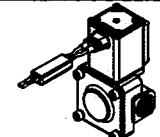
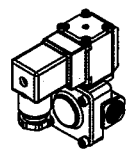
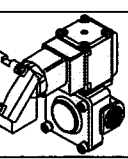
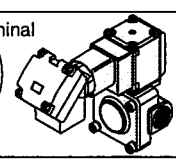
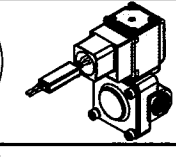
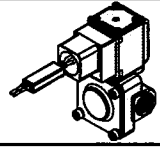
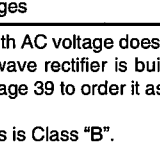
Seal material	EPDM
Coil insulation type	Class H
Thread type	Rc*

\* For body size 32A or more, the ports will be the flange type.

● Size—Valve type			● Body material/Port size/Orifice diameter			
Symbol	Size	Valve type	Symbol	Body material	Port size	Orifice diameter
3	8A 10A 15A	N.C. N.O.	A	C37	1/4	10
			B		3/8	
C	1/2					
A	N.C. N.O.	N.C. N.O.	D	Stainless steel	1/4	
			E		3/8	
			F		1/2	
4	10A 15A	N.C. N.O.	G	C37	3/8	15
			H		1/2	
B	N.C. N.O.	N.C. N.O.	J	Stainless steel	3/8	
K			1/2			
5	20A	N.C. N.O.	L	C37	3/4	20
			M	Stainless steel		
6	25A	N.C. N.O.	N	C37	1	25
			P	Stainless steel		
7	32A	N.C. N.O.	Q	CAC407	32A Flange	35
			E	N.C. N.O.	N.C. N.O.	CAC407
8	40A	N.C. N.O.	N.C. N.O.			
F						
9	50A	N.C. N.O.	S	CAC407	50A Flange	50
			G			

Fluid  
5 For Heated water

### ● Voltage/Electrical entry

Symbol	Voltage	Electrical entry		
A	24 VDC	Grommet 		
		Grommet (With surge voltage suppressor) 		
			B	100 VAC
			C	110 VAC
D	200 VAC			
E	230 VAC			
G	24 VDC	DIN terminal 		
		DIN terminal (With surge voltage suppressor Note 1) 2) 		
			H	100 VAC
			J	110 VAC
K	200 VAC			
L	230 VAC			
N	100 VAC	Conduit terminal 		
		Conduit terminal (With surge voltage suppressor) 		
			P	110 VAC
			Q	200 VAC
R	230 VAC			
T	100 VAC	Conduit 		
		Conduit (With surge voltage suppressor) 		
			U	110 VAC
			V	200 VAC
W	230 VAC			
Z	Other voltages			

Note 1) Coil for DIN terminal H type with AC voltage does not have full-wave rectifier. Full-wave rectifier is built in the DIN connector. Refer to page 39 to order it as an accessory.

Note 2) DIN connector insulation class is Class "B".

Note 3) Flat terminal is not available.

For other special options, refer to page 20.

Special voltage	24 VAC
	48 VAC
	220 VAC
	240 VAC
Conduit terminal with light	
Seal material: EPDM	
Oil-free	
G thread	
NPT thread	
With bracket	
Special electrical entry direction	

Dimensions → Page on and after 35 (Single Unit)

Specifications

For Air

For Water

For Oil

For Heated water

For High temperature oil

Options

Construction

Dimensions

# Series VXD



## For High temperature oil

\* Possible to use this for air (up to 99°C) and water.  
Note that the maximum operating pressure differential and flow-rate characteristics should be within the specifications of the fluid used.

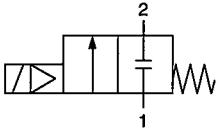
### ⚠ When the fluid is oil.

The kinematic viscosity must not exceed 50 mm<sup>2</sup>/s. The special construction of the armature adopted in the built-in full-wave rectifier type gives an improvement in OFF response by providing clearance on the absorbed surface when it is switched ON.

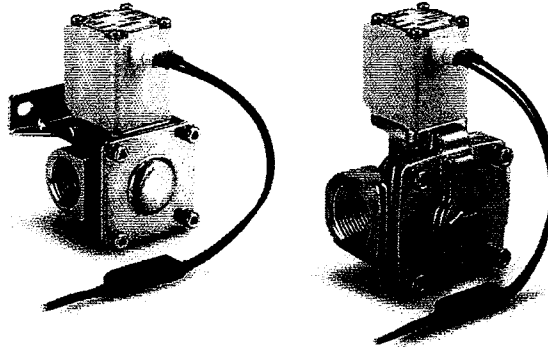
## Model/Valve Specifications

N.C.

Symbol



Refer to "Glossary of Terms" on page 40 for symbol.



### Normally Closed (N.C.)

Body material	Port size	Orifice diameter (mmø)	Model	Min. operating pressure differential <sup>Note 1)</sup> (MPa)	Max. operating pressure differential		Flow-rate characteristics		Max. system pressure (MPa)	Weight <sup>Note 2)</sup> (g)
					AC	DC	Av (x 10 <sup>-6</sup> m <sup>2</sup> )	Conversion Cv		
Stainless steel, C37	1/4 (8A)	10	VXD236	0.02	0.5	0.4	46	1.9	1.5	480
	3/8 (10A)						58	2.4		480
	1/2 (15A)						58	2.4		480
	3/8 (10A)	15	VXD246		110	4.5	720			
	1/2 (15A)				130	5.5	720			
	3/4 (20A)				230	9.5	840			
	1 (25A)				310	13	1360			
CAC407	32A Flange	35	VXD276	0.03	0.7	0.7	550	23	5400	
	40A Flange	40	VXD286				740	31	6800	
	50A Flange	50	VXD296				1200	49	8400	

Note 1) Be aware that even if the pressure differential is above the minimum operating pressure differential when the valve is closed, the pressure differential may fall below the minimum operating pressure differential when the valve opens, depending on the power of the supply source (pumps, compressors, etc.) or the type of pipe restrictions.

Note 2) Weight of grommet type. Add 10 g for conduit type, 60 g for conduit terminal type respectively.

• Refer to "Glossary of Terms" on page 40 for details on the minimum operating pressure differential, maximum operating pressure differential, maximum system pressure.

## Fluid and Ambient Temperature

Fluid temperature (°C)	Ambient temperature (°C)
-5 <sup>Note)</sup> to 100	-20 to 60

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

## Valve Leakage Rate

### Internal Leakage

Seal material	Leakage rate (Oil) <sup>Note)</sup>	
	VXD23 to 26 (8A to 25A)	VXD27 to 29 (32A to 50A)
FKM	0.2 cm <sup>3</sup> /min or less	1 cm <sup>3</sup> /min or less

### External Leakage

Seal material	Leakage rate (Oil) <sup>Note)</sup>	
	VXD23 to 26 (8A to 25A)	VXD27 to 29 (32A to 50A)
FKM	0.1 cm <sup>3</sup> /min or less	0.1 cm <sup>3</sup> /min or less

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

# Pilot Operated 2 Port Solenoid Valve *Series VXD*

 **For High temperature oil**

 **When the fluid is oil.**

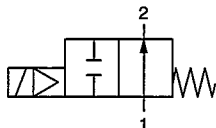
The kinematic viscosity must not exceed 50 mm<sup>2</sup>/s. The special construction of the armature adopted in the built-in full-wave rectifier type gives an improvement in OFF response by providing clearance on the absorbed surface when it is switched ON.

Specifications

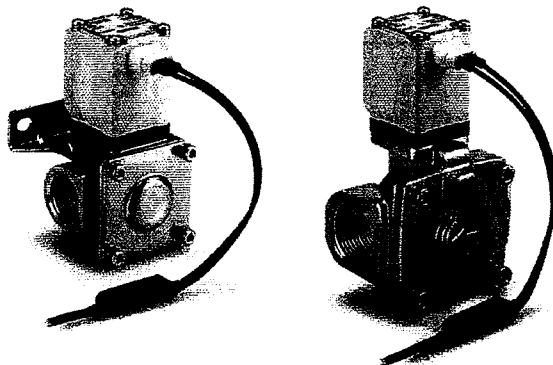
## Model/Valve Specifications

**N.O.**

Symbol



Refer to "Glossary of Terms" on page 40 for symbol.



For Air

For Water

For Oil

For Heated water

For High temperature oil

### Normally Open (N.O.)

Body material	Port size	Orifice diameter (mmø)	Model	Min. operating pressure differential <sup>Note 1)</sup> (MPa)	Max. operating pressure differential		Flow-rate characteristics		Max. system pressure (MPa)	Weight <sup>Note 2)</sup> (g)
					AC	DC	Av (x 10 <sup>-6</sup> m <sup>2</sup> )	Conversion Cv		
Stainless steel, C37	1/4 (8A)	10	VXD2A6	0.02	0.4	0.3	46	1.9	1.5	500
	3/8 (10A)						58	2.4		500
	1/2 (15A)						58	2.4		500
	3/8 (10A)	15	VXD2B6		110	4.5	740			
	1/2 (15A)				130	5.5	740			
	3/4 (20A)				230	9.5	860			
CAC407	1 (25A)	25	VXD2D6	0.03	0.6	0.6	310	13	1390	
	32A Flange	35	VXD2E6				550	23	5430	
	40A Flange	40	VXD2F6				740	31	6840	
	50A Flange	50	VXD2G6				1200	49	8440	

Note 1) Be aware that even if the pressure differential is above the minimum operating pressure differential when the valve is closed, the pressure differential may fall below the minimum operating pressure differential when the valve opens, depending on the power of the supply source (pumps, compressors, etc.) or the type of pipe restrictions.

Note 2) Weight of grommet type. Add 10 g for conduit type, 60 g for conduit terminal type respectively.

• Refer to "Glossary of Terms" on page 40 for details on the minimum operating pressure differential, maximum operating pressure differential, maximum system pressure.

## Fluid and Ambient Temperature

Fluid temperature (°C)	Ambient temperature (°C)
-5 <sup>Note)</sup> to 100	-20 to 60

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

## Valve Leakage Rate

### Internal Leakage

Seal material	Leakage rate (Oil) <sup>Note)</sup>	
	VXD2A to 2D (8A to 25A)	VXD2E to 2G (32A to 50A)
FKM	0.2 cm <sup>3</sup> /min or less	1 cm <sup>3</sup> /min or less

### External Leakage

Seal material	Leakage rate (Oil) <sup>Note)</sup>	
	VXD2A to 2D (8A to 25A)	VXD2E to 2G (32A to 50A)
FKM	0.1 cm <sup>3</sup> /min or less	0.1 cm <sup>3</sup> /min or less

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

Options

Construction

Dimensions

# Series VXD



For High temperature oil

## How to Order



VXD2 **3** **6** **A** **B**

Fluid

**6** For High temperature oil

### Common Specifications

Seal material	FKM
Coil insulation type	Class H
Thread type	Rc*

\* For body size 32A or more, the ports will be the flange type.

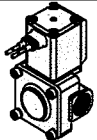
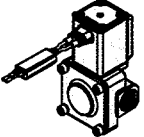
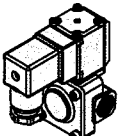
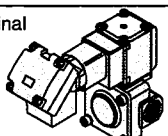
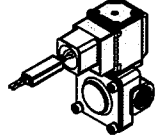
### Size—Valve type

Symbol	Size	Valve type
<b>3</b>	8A	N.C.
	10A	
	15A	
<b>A</b>	10A	N.O.
	15A	

### Body material/Port size/Orifice diameter

Symbol	Body material	Port size	Orifice diameter
<b>A</b>	C37	1/4	10
<b>B</b>		3/8	
<b>C</b>		1/2	
<b>D</b>	Stainless steel	1/4	
<b>E</b>		3/8	
<b>F</b>		1/2	

### Voltage/Electrical entry

Symbol	Voltage	Electrical entry		
<b>A</b>	24 VDC	Grommet 		
			<b>B</b> 100 VAC	
				<b>C</b> 110 VAC
<b>E</b> 230 VAC	Grommet (With surge voltage suppressor) 			
<b>G</b> 24 VDC				
<b>H</b> 100 VAC	DIN terminal (With surge voltage suppressor Note 1) 2)			
			<b>J</b> 110 VAC	
<b>K</b> 200 VAC				
<b>L</b> 230 VAC				
<b>N</b> 100 VAC	Conduit terminal (With surge voltage suppressor) 			
<b>P</b> 110 VAC				
<b>Q</b> 200 VAC				
<b>R</b> 230 VAC	Conduit (With surge voltage suppressor) 			
<b>T</b> 100 VAC				
<b>U</b> 110 VAC				
<b>V</b> 200 VAC				
<b>W</b> 230 VAC	Other voltages			
<b>Z</b>				

Symbol	Size	Valve type
<b>4</b>	10A	N.C.
	15A	
<b>B</b>	10A	N.O.
	15A	

Symbol	Body material	Port size	Orifice diameter
<b>G</b>	C37	3/8	15
<b>H</b>		1/2	
<b>J</b>	Stainless steel	3/8	
<b>K</b>		1/2	

Symbol	Size	Valve type
<b>5</b>	20A	N.C.
		N.O.

Symbol	Body material	Port size	Orifice diameter
<b>L</b>	C37	3/4	20
<b>M</b>	Stainless steel		

Symbol	Size	Valve type
<b>6</b>	25A	N.C.
		N.O.

Symbol	Body material	Port size	Orifice diameter
<b>N</b>	C37	1	25
<b>P</b>	Stainless steel		

Symbol	Size	Valve type
<b>7</b>	32A	N.C.
		N.O.

Symbol	Body material	Port size	Orifice diameter
<b>Q</b>	CAC407	32A Flange	35

Symbol	Size	Valve type
<b>8</b>	40A	N.C.
		N.O.

Symbol	Body material	Port size	Orifice diameter
<b>R</b>	CAC407	40A Flange	40

Symbol	Size	Valve type
<b>9</b>	50A	N.C.
		N.O.

Symbol	Body material	Port size	Orifice diameter
<b>S</b>	CAC407	50A Flange	50

Note 1) Coil for DIN terminal H type with AC voltage does not have full-wave rectifier. Full-wave rectifier is built in the DIN connector. Refer to page 39 to order it as an accessory.

Note 2) DIN connector insulation class is Class "B".

Note 3) Flat terminal is not available.

For other special options, refer to page 20.

Special voltage	24 VAC
	48 VAC
	220 VAC
	240 VAC
Conduit terminal with light	
Oil-free	
G thread	
NPT thread	
With bracket	
Special electrical entry direction	

Dimensions → Page on and after 35 (Single Unit)

# Series VXD

## Other Special Options

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

VXD2 3 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
	1E	—	12 VDC	Grommet (With surge voltage suppressor)
	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		

Specification	Symbol	Class H*	Voltage	Electrical entry
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		

Specification	Symbol	Class H*	Voltage	Electrical entry
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".

### Other Options (Low concentration ozone resistant and applicable to deionized water, Oil-free, Port thread)

VXD2 3 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 (Seal material: FKM)	Oil-free	Port thread
Nil	—	—	Rc, With One-touch fitting*2
A	—	—	G
B	—	—	NPT
C	○	—	Rc, With One-touch fitting*2
D	—	○	G
E	—	○	NPT
F	○	—	G
G	○	—	NPT
H	○	○	Rc, With One-touch fitting*2
K	○	○	G
L	—	○	NPT
Z	—	○	Rc, With One-touch fitting*2

\*1 Applicable to air (VXD2□0) and water (VXD2□2).  
\*2 One-touch fittings are attached to the resin body type.

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

Example) VXD2 3 2 A Z 1A Z

Electrical option

Other option

Specifications

For Air

For Water

For Oil

For Heated water

For High temperature oil

Options

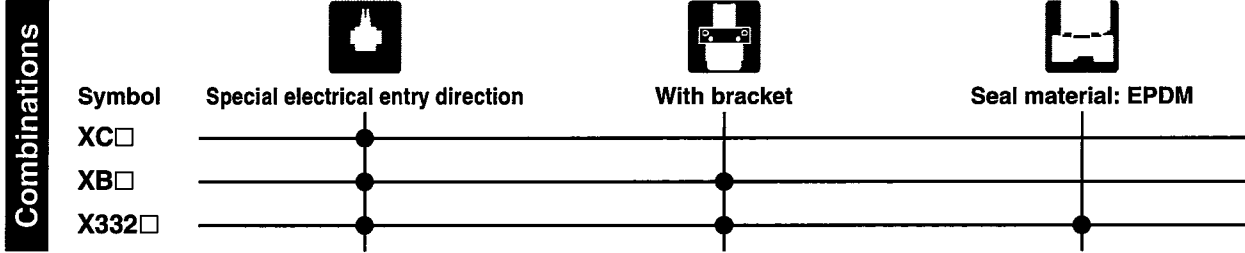
Construction

Dimensions

# Series VXD

## Installation Options (Special Electrical Entry Direction/Mounting Option)

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



### Special Electrical Entry Direction

VXD2 □ □ □ □ XC A

Enter standard product number. ●

#### Special electrical entry direction ●

Symbol	VXD2 <sub>A</sub> <sup>3</sup> to VXD2 <sub>B</sub> <sup>6</sup>	VXD2 <sub>E</sub> <sup>2</sup> to VXD2 <sub>G</sub> <sup>9</sup>
<b>A</b>		
<b>B</b>		
<b>C</b>		

\* For the VXD2<sub>E</sub><sup>2</sup> to VXD2<sub>G</sub><sup>9</sup>, only grommet and flat terminal types are applicable.

### With Bracket/Special Electrical Entry Direction

VXD2 □ □ □ □ XB A

Enter standard product number. ●

#### With bracket/Special electrical entry direction ●

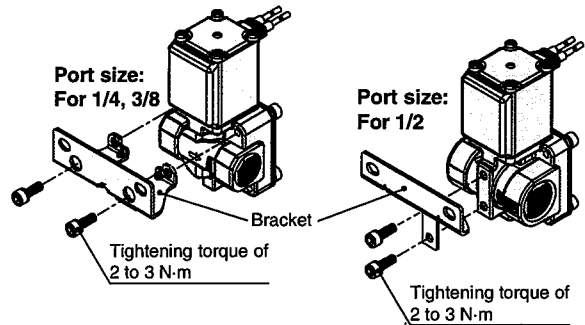
Symbol	VXD2 <sub>A</sub> <sup>3</sup> to VXD2 <sub>B</sub> <sup>6</sup>	
<b>NII</b>		
<b>A</b>		

\*1 Available for the VXD2<sub>A</sub><sup>3</sup> to 2<sub>D</sub><sup>6</sup>.

\*2 Bracket is attached as standard with the resin body type (VXD2<sub>A</sub><sup>3</sup>0<sub>E</sub><sup>C</sup>□), so it is not necessary to add XB to the part number.

\*3 Bracket is packed in the same container as the main body.

#### VXD2<sub>A</sub><sup>3</sup> □ Bracket mounting dimensions



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

Example) VXD2 **3** **2** **A** **Z1A** **Z** **XB** **A**





**Installation Options**  
(Special Electrical Entry Direction/Mounting Option)

   Seal Material: EPDM/With Bracket/  
Special Electrical Entry Direction

VXD2     X332

Enter standard product number.

When the fluid is oil, enter the part number for water (VXD2□2).  
\* VXD2  3   → VXD2  2    
Refer to page 10 for model selection.

EPDM specification

With bracket/Special electrical entry direction



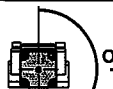

Symbol	Specifications	
	Electrical entry direction	Bracket
Nil	IN side (Standard)	None
A	90°	
B	180°	
C	270°	
D	IN side (Standard)	With bracket*1
E	90°	
F	180°	
G	270°	

\*1 Not available for the VXD2<sub>A</sub><sup>3</sup> (resin body type) and the VXD2<sub>E</sub><sup>7</sup> to VXD2<sub>G</sub><sup>8</sup>.

\*2 "Other options" (refer to page 20), which can be combined, are Nil, A, B, D, E, Z (Oil-free, G thread specifications, NPT thread specifications).

\*3 Available for air and water.

\*4 Electrical entry direction

Symbol	VXD2 <sub>A</sub> <sup>3</sup> to VXD2 <sub>G</sub> <sup>8</sup>	Symbol	VXD2 <sub>A</sub> <sup>3</sup> to VXD2 <sub>G</sub> <sup>8</sup>
Nil D	Standard 	A E	90° 
B F	180° 	C G	270° 

\* 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) VXD2  1  2  A  Z  1A  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

Specifications

For Air

For Water

For Oil

For Heated Water

For High Temperature Oil

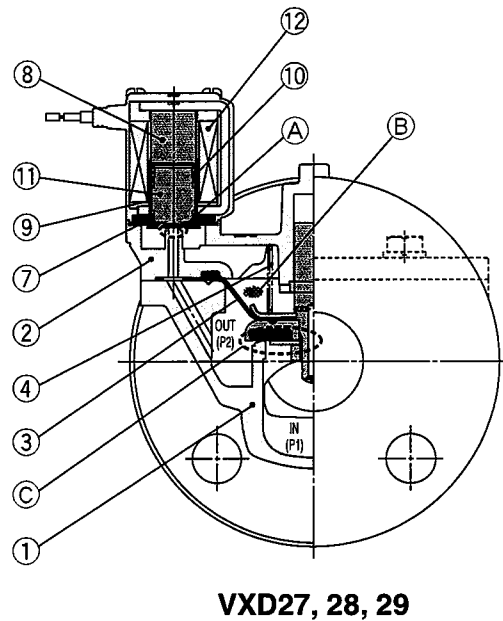
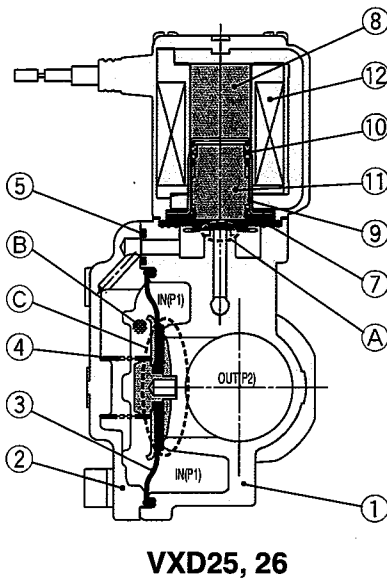
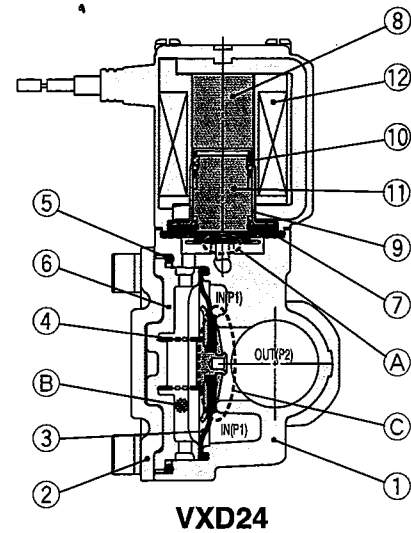
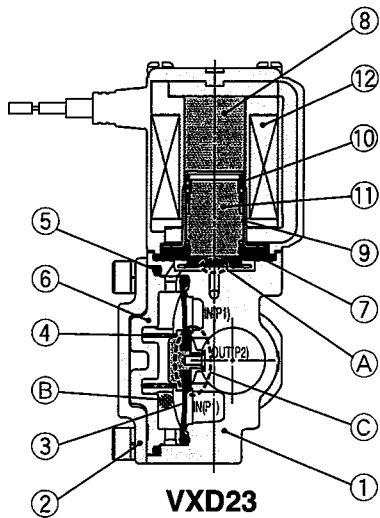
Option

Construction

Dimensions

# Series VXD Construction

Normally Closed (N.C.)



## Component Parts

No.	Description	Model	Material
1	Body	VXD23	C37, Stainless steel, Aluminum, Resin (PBT)
		VXD24 to 26	C37, Stainless steel
		VXD27 to 29	CAC407
2	Bonnet	VXD23, 24	Stainless steel
		VXD25, 26	C37, Stainless steel
		VXD27 to 29	CAC407
3	Diaphragm assembly	VXD23 to 29	Stainless steel, NBR, FKM, EPDM
4	Spring	VXD23 to 29	Stainless steel
5	O-ring	VXD23 to 26	NBR, FKM, EPDM
6	Buffer	VXD23, 24	PPS
7	Stopper	VXD23 to 29	NBR, FKM, EPDM
8	Core		Fe
9	Tube		Stainless steel
10	Spring		Stainless steel
11	Armature assembly		Stainless steel, NBR, FKM, EPDM, Resin (PPS)
12	Solenoid coil		Cu + Fe + Resin

## Operation

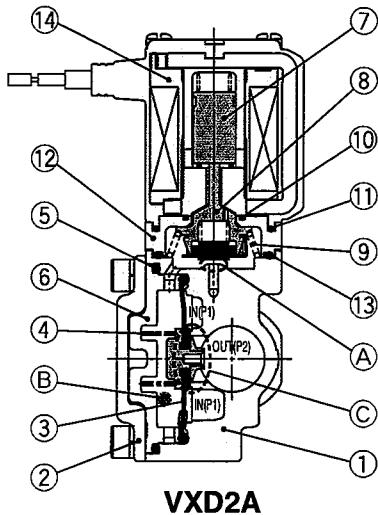
### <Valve open>

When coil ⑫ is energized, armature assembly ⑪ is attracted by core ⑧ and pilot valve ④ is open. When ④ is open, the pressure in pressure chamber ⑥ is reduced and main valve ③ is open.

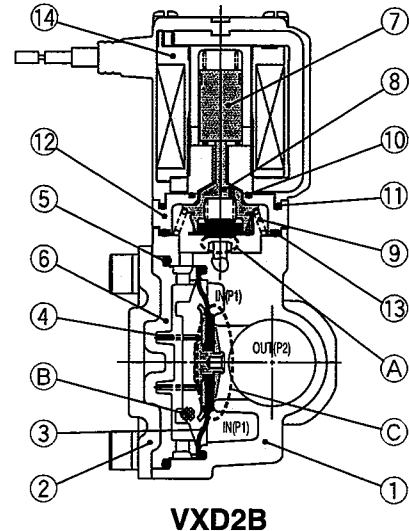
### <Valve closed>

When coil ⑫ is de-energized, pilot valve ④ is closed, pressure in pressure chamber ⑥ increases, and main valve ③ is closed.

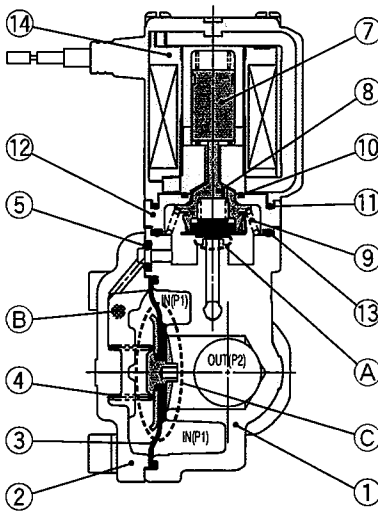
**Normally Open (N.O.)**



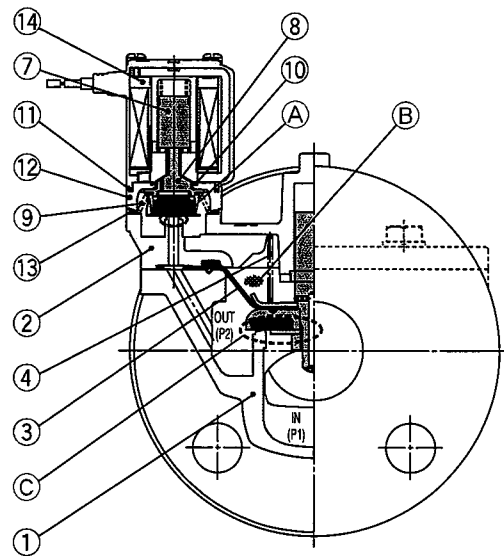
**VXD2A**



**VXD2B**



**VXD2C, 2D**



**VXD2E, 2F, 2G**

Specifications

For Air

For Water

For Oil

For Heated water

For High temperature oil

Options

Construction

Dimensions

**Component Parts**

No.	Description	Model	Material
1	Body	VXD2A	C37, Stainless steel, Aluminum, Resin (PBT)
		VXD2B to 2D	C37, Stainless steel
		VXD2E to 2G	CAC407
2	Bonnet	VXD2A, 2B	Stainless steel
		VXD2C, 2D	C37, Stainless steel
		VXD2E to 2G	CAC407
3	Diaphragm assembly	VXD2A to 2G	Stainless steel, NBR, FKM, EPDM
4	Spring	VXD2A to 2G	Stainless steel
5	O-ring	VXD2A to 2D	NBR, FKM, EPDM
6	Buffer	VXD2A, 2B	PPS
7	Sleeve assembly	VXD2A to 2G	Stainless steel, Resin (PPS)
8	Push rod assembly		Resin (PPS), Stainless steel, NBR, FKM, EPDM
9	Stopper		Stainless steel
10	O-ring A		NBR, FKM, EPDM
11	O-ring B		NBR, FKM, EPDM
12	Adapter		Resin (PPS)
13	O-ring C		NBR, FKM, EPDM
14	Solenoid coil		Cu + Fe + Resin

**Operation**

**<Valve open>**

When coil ⑭ is energized, (already open) pilot valve ① is closed, pressure in pressure chamber ② increases, and main valve ③ is closed.

**<Valve closed>**

When coil ⑭ is de-energized, (already closed) pilot valve ① is open, pressure in pressure chamber ② decreases, and main valve ③ is open.

# Series VXD

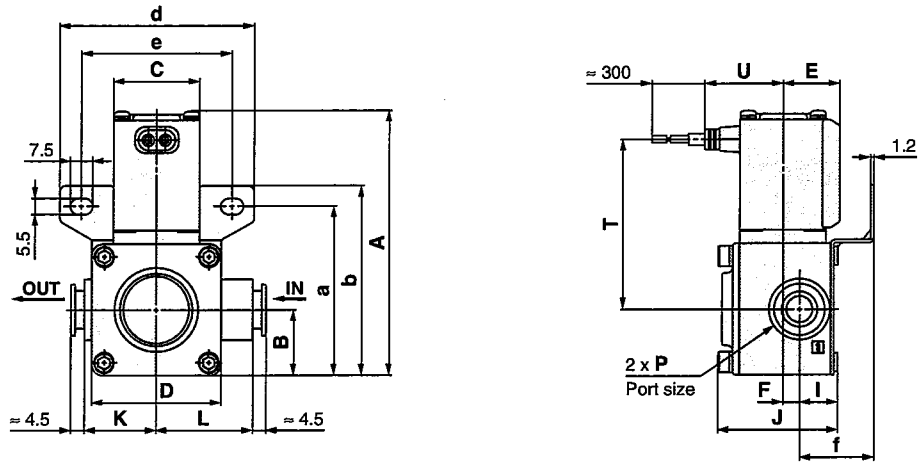


For Air

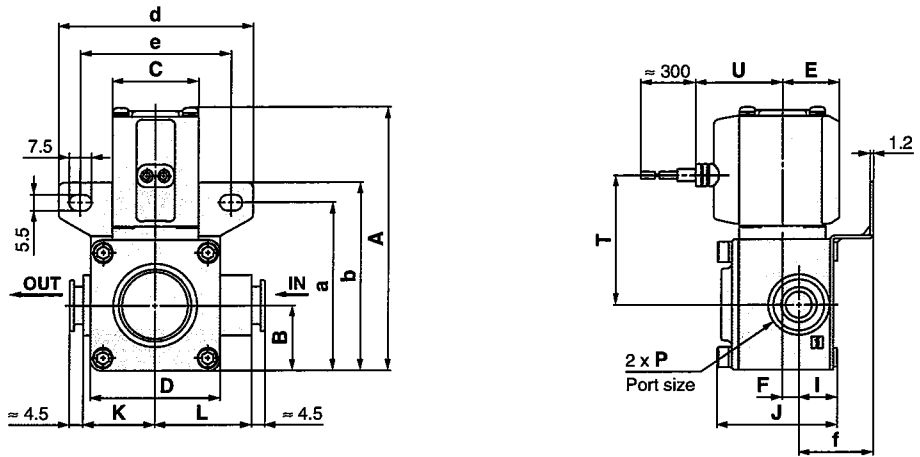
For information on handling One-touch fittings and appropriate tubing, refer to page 50 and KQ2 series One-touch fittings in Best Pneumatics No. 6. The KQ2 series information can be downloaded from the following SMC website, <http://www.smcworld.com>

## Dimensions/VXD2<sup>3</sup><sub>A</sub> Body Material: Resin (ø10, ø3/8", ø12)

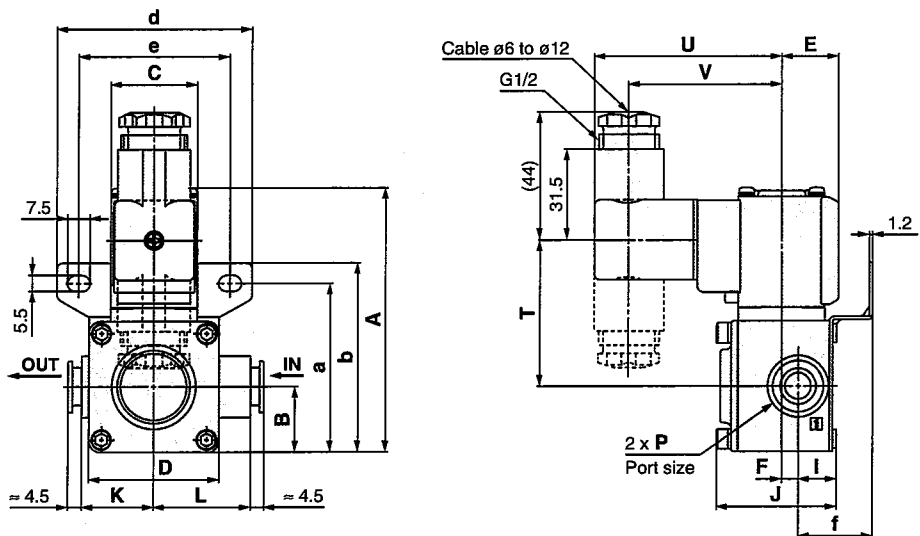
### Grommet



### Grommet (with surge voltage suppressor)



### DIN terminal



(mm)

Model	One-touch fitting P	A	B	C	D	E	F	I	J	K	L	Electrical entry								
												Grommet			Grommet (with surge voltage suppressor)			DIN terminal		
												T	U		T	U		T	U	V
VXD2 <sup>3</sup> <sub>A</sub>	ø10, ø3/8", ø12	91 (97)	22.5	30	45	20	6	13.5	41.5	25	33	58.5 (64.5)	27	45 (50.5)	30	50.5 (56)	64.5	52.5		

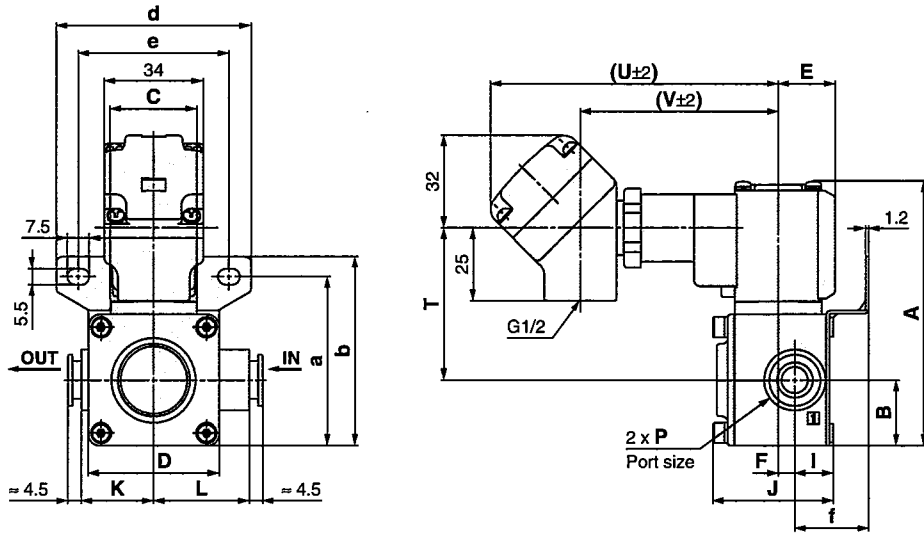
Model	One-touch fitting P	Mounting bracket dimensions				
		a	b	d	e	f
VXD2 <sup>3</sup> <sub>A</sub>	ø10, ø3/8", ø12	58	65	67	52	25.5

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

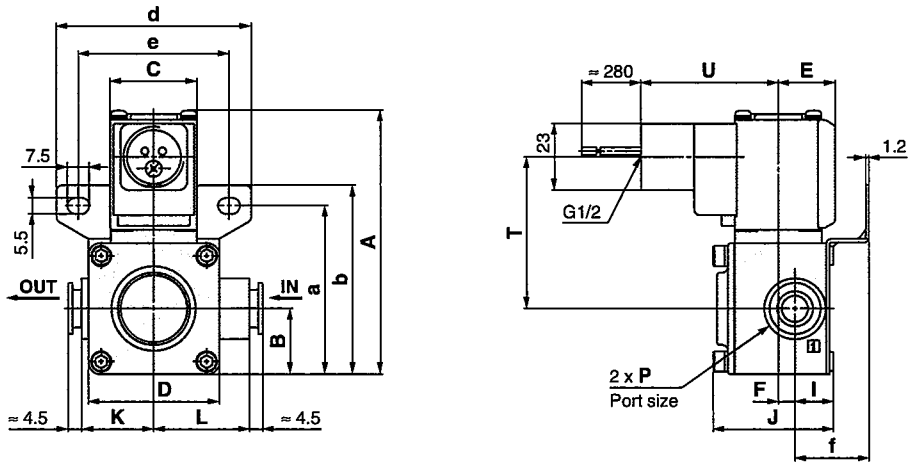


**Dimensions/VXD2<sup>3</sup><sub>A</sub> Body Material: Resin (ø10, ø3/8", ø12)**

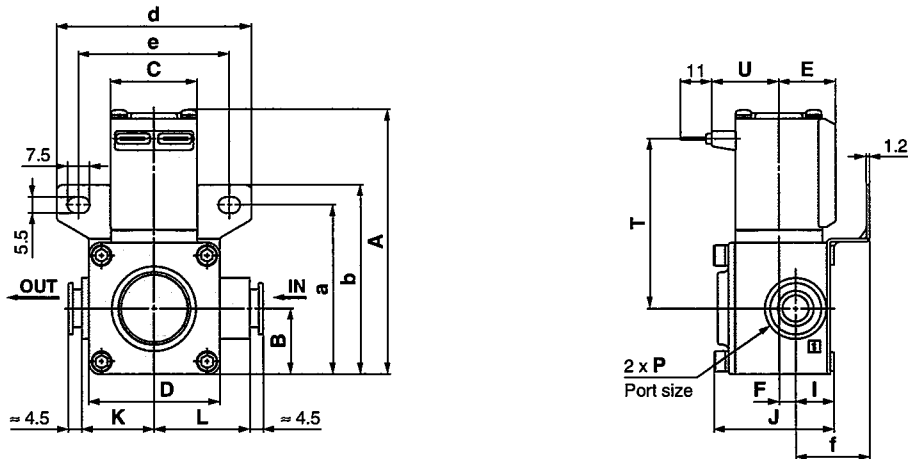
**Conduit terminal**



**Conduit**



**Flat terminal**



(mm)

Model	One-touch fitting P	A	B	C	D	E	F	I	J	K	L	Electrical entry						
												Conduit terminal			Conduit		Flat terminal	
												T	U	V	T	U	T	U
VXD2 <sup>3</sup> <sub>A</sub>	ø10, ø3/8", ø12	91 (97)	22.5	30	45	20	6	13.5	41.5	25	33	52.5 (58)	99.5	68.5	52.5 (58)	47.5	58.5 (64.5)	23
Model	One-touch fitting P	Mounting bracket dimensions																
VXD2 <sup>3</sup> <sub>A</sub>	ø10, ø3/8", ø12	a	b	d	e	f												
		58	65	67	52	25.5												

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

Specifications

For Air

For Water

For Oil

For heated water

For high temperature oil

Options

Construction

Dimensions

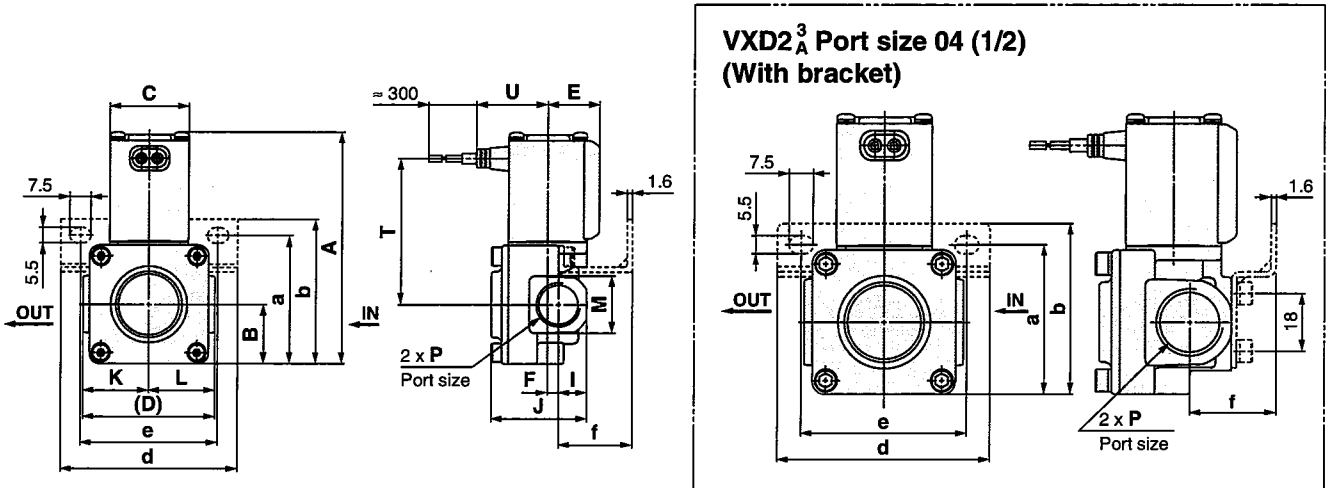
# Series VXD



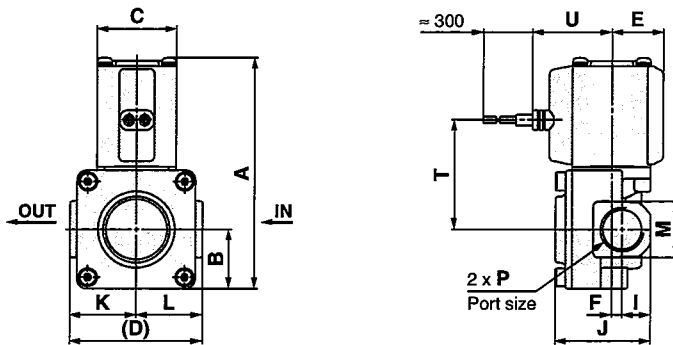
For Air/Water/Oil

## Dimensions/VXD2<sup>3</sup><sub>A</sub> Body Material: Aluminum, C37, Stainless Steel

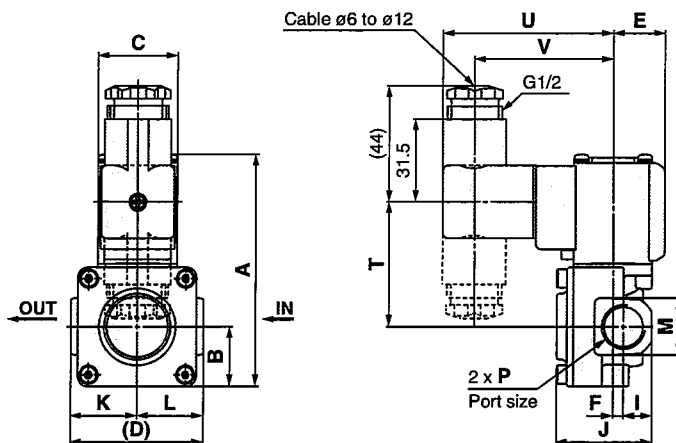
### Grommet



### Grommet (with surge voltage suppressor)



### DIN terminal



(mm)

Model	Port size P	A	B	C	D	E	F	I	J	K	L	M		Electrical entry						
												C37, Stainless steel body	Aluminum body type	Grommet		Grommet (with surge voltage suppressor)		DIN terminal		
														T	U	T	U	T	U	V
VXD2 <sup>3</sup> <sub>A</sub>	1/4, 3/8	88	22.5	30	50	20	4.5	11	37.5	25	25	22	24	55.5	27	42	30	47.5	64.5	52.5
	1/2	(93.5)					5	13	42.5			27	30	(61)	(47.5)	(53)				

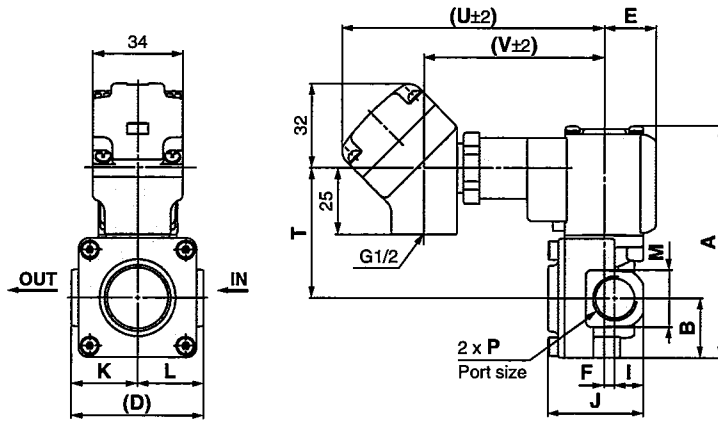
Model	Port size P	Mounting bracket dimensions				
		a	b	d	e	f
VXD2 <sup>3</sup> <sub>A</sub>	1/4, 3/8	48.5	55	67	52	28
	1/2	47	53.5			27

( ): Denotes the Normally Open (N.O.) dimensions.  
Aluminum body is for air. Refer to page 5 for details.

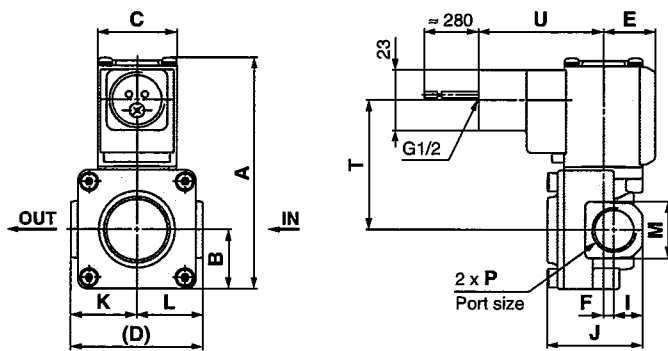


**Dimensions/VXD2<sup>3</sup><sub>A</sub> Body Material: Aluminum, C37, Stainless Steel**

**Conduit terminal**



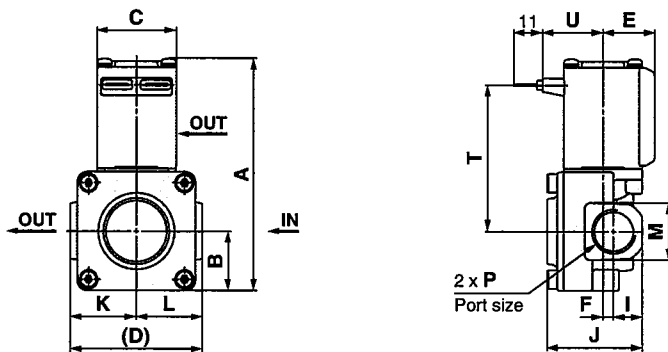
**Conduit**



**VXD2<sup>3</sup><sub>A</sub> □ C □ F □**

Note) Only the VXD2<sup>3</sup><sub>A</sub> with port size of 04 (1/2) has threads on the bottom of the body.

**Flat terminal**



(mm)

Model	Port size P	A	B	C	D	E	F	I	J	K	L	M		Electrical entry						
												C37, Stainless steel body	Aluminum body	Conduit terminal			Conduit		Flat terminal	
														T	U	V	T	U	T	U
VXD2 <sup>3</sup> <sub>A</sub>	1/4, 3/8	88 (93.5)	22.5	30	50	20	4.5	11	37.5	25	25	22	24	49.5	99.5	68.5	49.5	47.5	55.5	23
	1/2						5	13	42.5			27	30	(55)			(55)		(61)	

( ): Denotes the Normally Open (N.O.) dimensions.  
Aluminum body is for air. Refer to page 5 for details.

Specifications

For Air

For Water

For Oil

For Heated water

For High temperature oil

Options

Construction

Dimensions

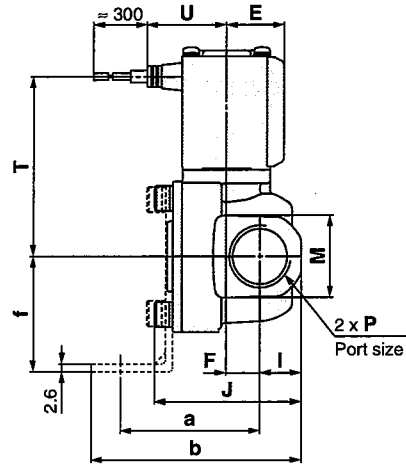
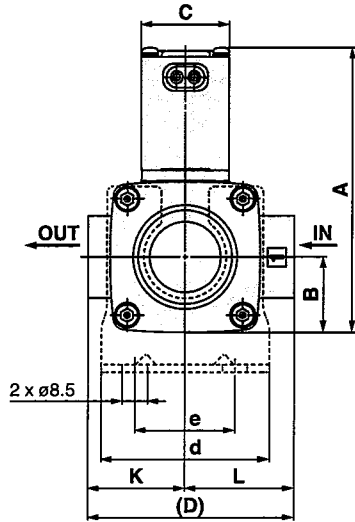
# Series VXD



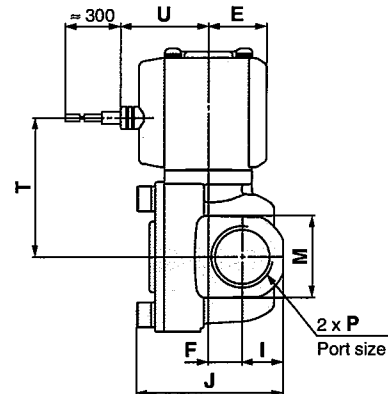
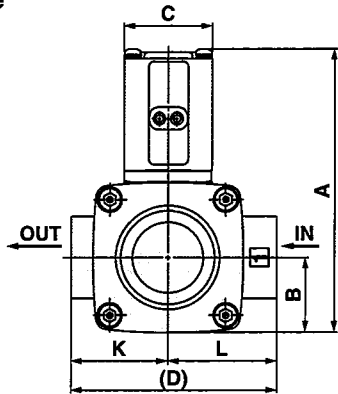
For Air/Water/Oil

## Dimensions/VXD<sub>B</sub><sup>4</sup> Body Material: C37, Stainless Steel

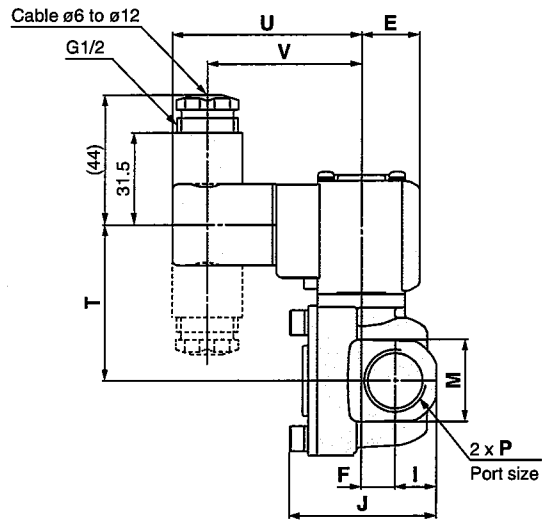
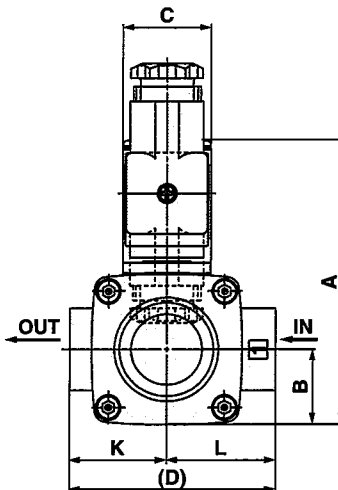
### Grommet



### Grommet (with surge voltage suppressor)



### DIN terminal



(mm)

Model	Port size P	A	B	C	D	E	F	I	J	K	L	M	Electrical entry							
													Grommet			Grommet (with surge voltage suppressor)		DIN terminal		
													T	U	T	U	T	U	V	
VXD <sub>B</sub> <sup>4</sup>	3/8, 1/2	96.5 (102.5)	25.5	30	70	20	11.5	14	50	33	37	28	61 (67)	27	47.5 (53.5)	30	53 (59)	64.5	52.5	

Model	Port size P	Mounting bracket dimensions				
		a	b	d	e	f
VXD <sub>B</sub> <sup>4</sup>	3/8, 1/2	47.5	71.5	57	34	39

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

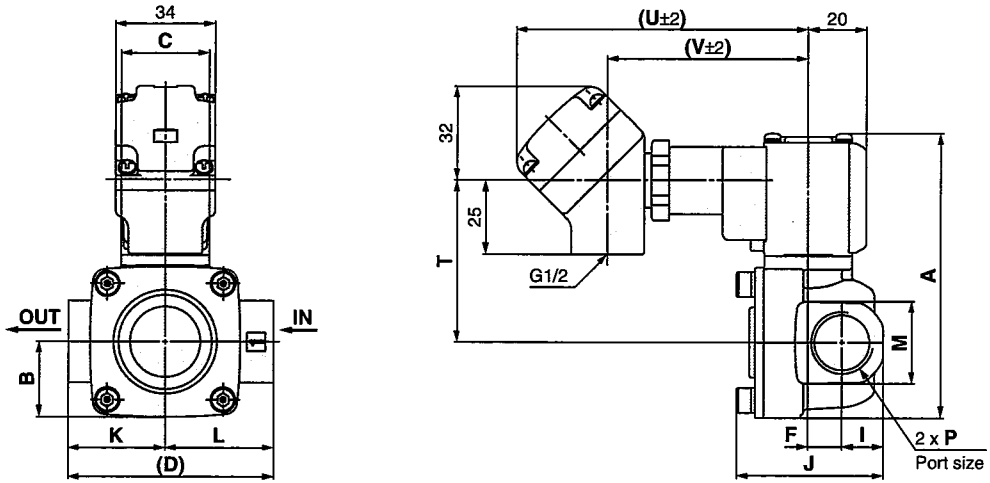


# Pilot Operated 2 Port Solenoid Valve *Series VXD*

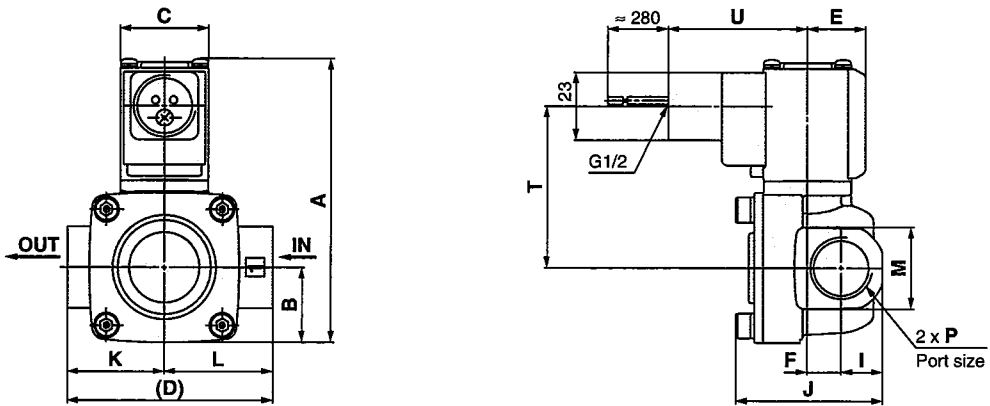


## Dimensions/VXD2<sub>B</sub><sup>4</sup> Body Material: C37, Stainless Steel

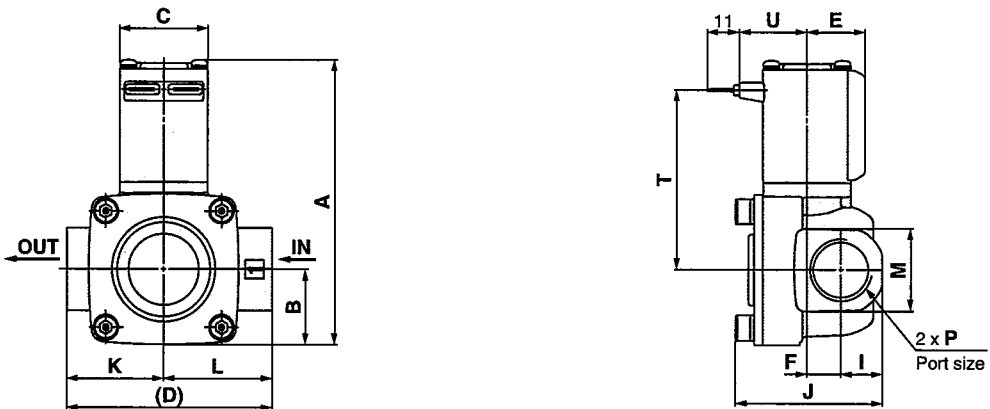
### Conduit terminal



### Conduit



### Flat terminal



Specifications

For Air

For Water

For Oil

For Heated water

For High temperature oil

Options

Construction

Dimensions

Model	Port size P												Electrical entry						
		A	B	C	D	E	F	I	J	K	L	M	Conduit terminal			Conduit		Flat terminal	
		T	U	V	T	U	T	U	T	U									
		(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
VXD2 <sub>B</sub> <sup>4</sup>	3/8, 1/2	96.5 (102.5)	25.5	30	70	20	11.5	14	50	33	37	28	55 (61)	99.5	68.5	55 (61)	47.5	61 (67)	23

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

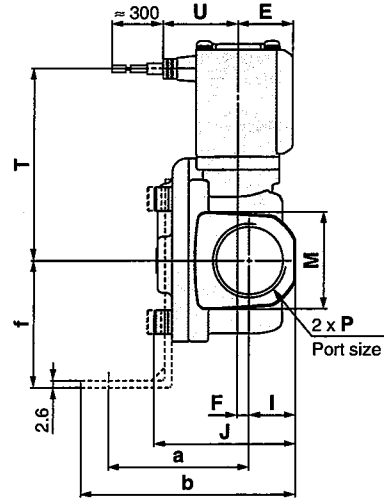
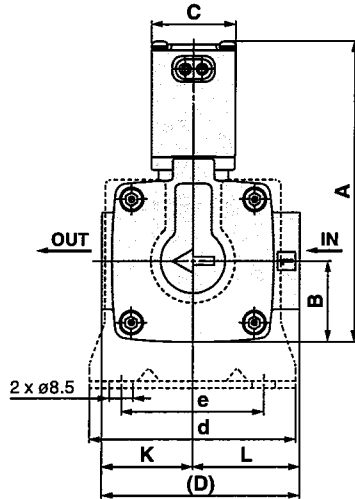
# Series VXD



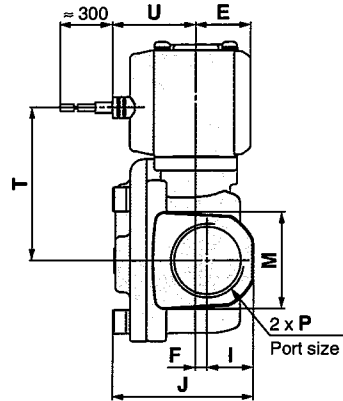
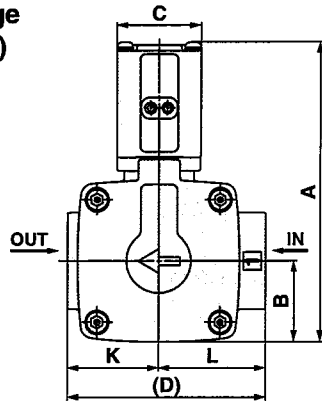
For Air/Water/Oil

## Dimensions/VXD2<sub>C</sub><sup>5</sup>/2<sub>D</sub><sup>6</sup> Body Material: C37, Stainless Steel

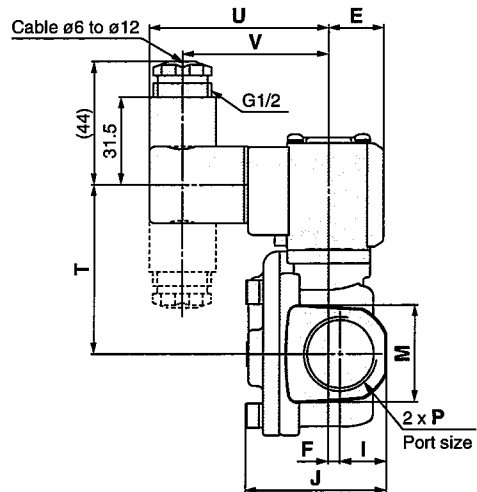
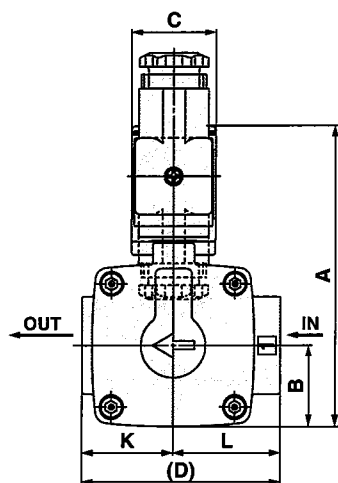
### Grommet



### Grommet (with surge voltage suppressor)



### DIN terminal



(mm)

Model	Port size P	A	B	C	D	E	F	I	J	K	L	M	Electrical entry						
													Grommet		Grommet (with surge voltage suppressor)		DIN terminal		
													T	U	T	U	T	U	V
VXD2 <sub>C</sub> <sup>5</sup>	3/4	107.5 (113.5)	29	30	71	20	4.5	17	51	32.5	38.5	35	68.5 (74.5)	27	55 (61)	30	60.5 (66.5)	64.5	52.5
VXD2 <sub>D</sub> <sup>6</sup>	1	126.5 (134.5)	33	35	95	22	4.5	20	59.5	45.5	49.5	42	82.5 (90.5)	29.5	69 (77)	32.5	74.5 (82.5)	67	55

Model	Port size P	Mounting bracket dimensions				
		a	b	d	e	f
VXD2 <sub>C</sub> <sup>5</sup>	3/4	50.5	77.5	74	51	45.5
VXD2 <sub>D</sub> <sup>6</sup>	1	55.5	85.5	81	58	49.5

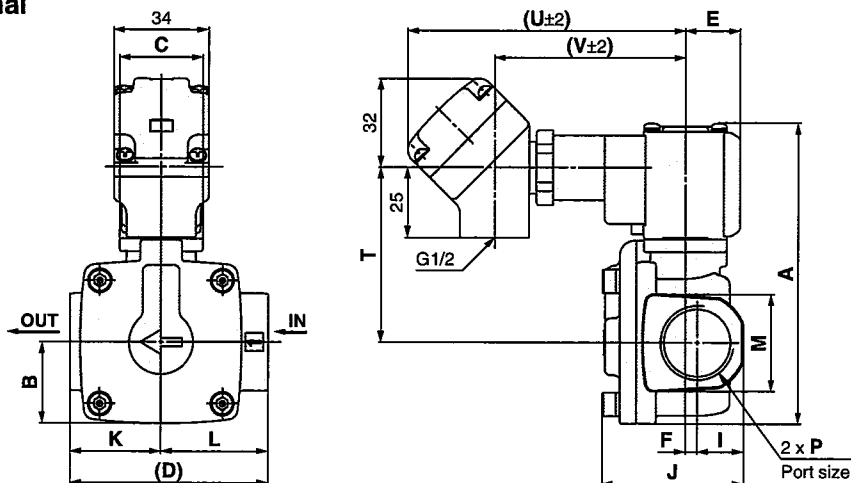
( ): Denotes the Normally Open (N.O.) dimensions.

# Pilot Operated 2 Port Solenoid Valve *Series VXD*

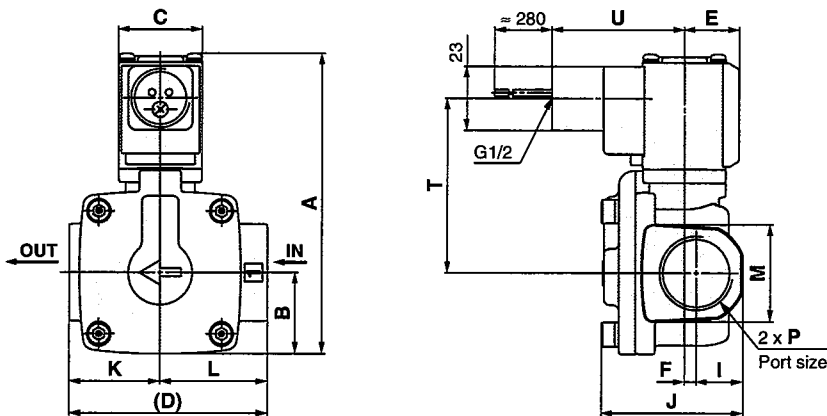


## Dimensions/VXD2<sub>C</sub><sup>5</sup>/2<sub>D</sub><sup>6</sup> Body Material: C37, Stainless Steel

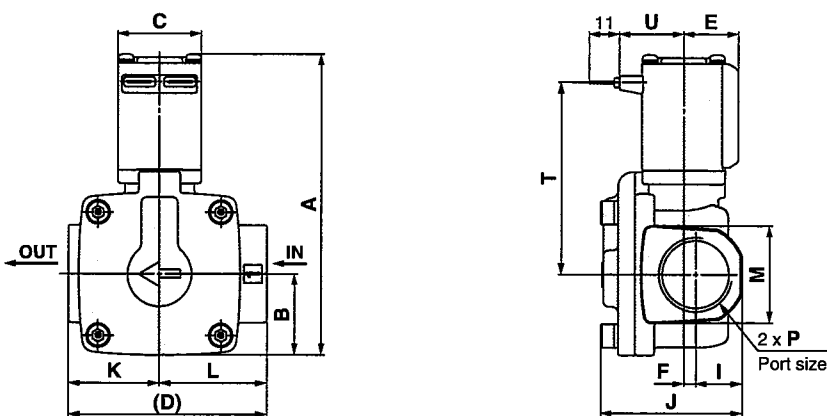
### Conduit terminal



### Conduit



### Flat terminal



(mm)

Model	Port size P	A	B	C	D	E	F	I	J	K	L	M	Electrical entry						
													Conduit terminal			Conduit		Flat terminal	
													T	U	V	T	U	T	U
VXD2 <sub>C</sub> <sup>5</sup>	3/4	107.5 (113.5)	29	30	71	20	4.5	17	51	32.5	38.5	35	62.5 (68.5)	99.5	68.5	62.5 (68.5)	47.5	68.5 (74.5)	23
VXD2 <sub>D</sub> <sup>6</sup>	1	126.5 (134.5)	33	35	95	22	4.5	20	59.5	45.5	49.5	42	76.5 (84.5)	102	71	76.5 (84.5)	50	82.5 (90.5)	25.5

Model	Port size P	Mounting bracket dimensions				
		a	b	d	e	f
VXD2 <sub>C</sub> <sup>5</sup>	3/4	50.5	77.5	74	51	45.5
VXD2 <sub>D</sub> <sup>6</sup>	1	55.5	85.5	81	58	49.5

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

Specifications

For Air

For Water

For Oil

For Heated water

For High temperature oil

Options

Construction

Dimensions

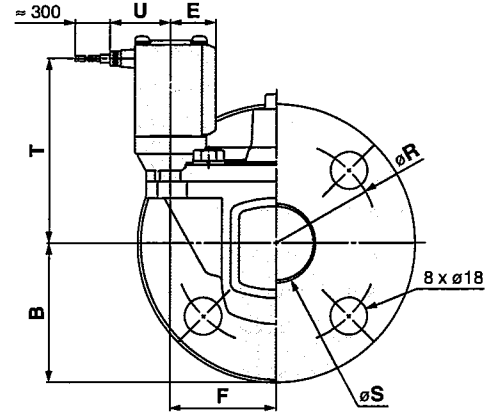
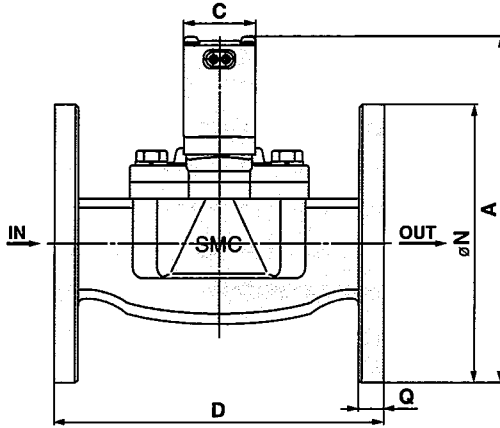
# Series VXD



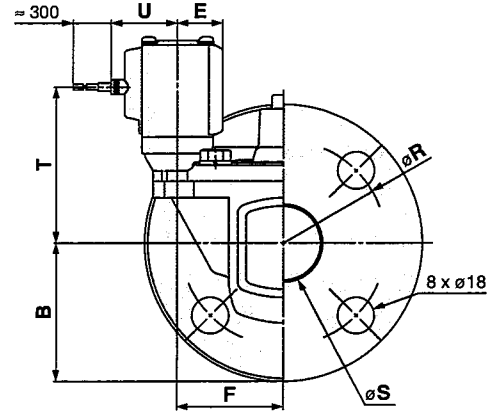
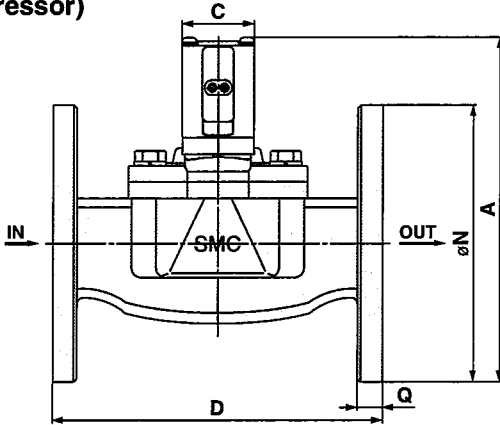
For Air/Water/Oil

Dimensions/VXD<sub>2E</sub><sup>7</sup>/2F<sup>8</sup>/2G<sup>9</sup> Body Material: CAC407

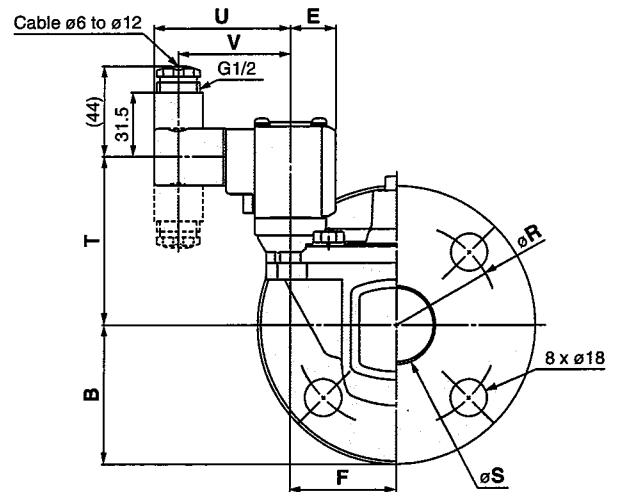
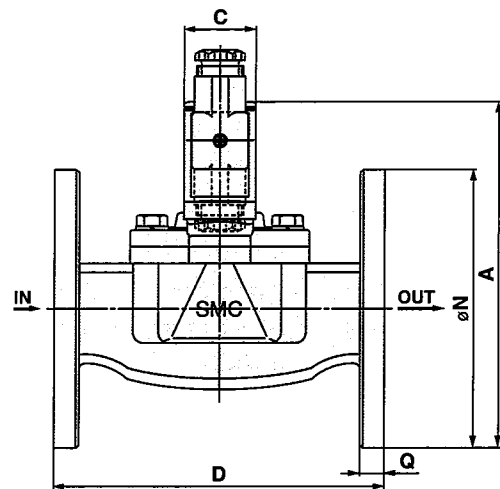
## Grommet



## Grommet (with surge voltage suppressor)



## DIN terminal



(mm)

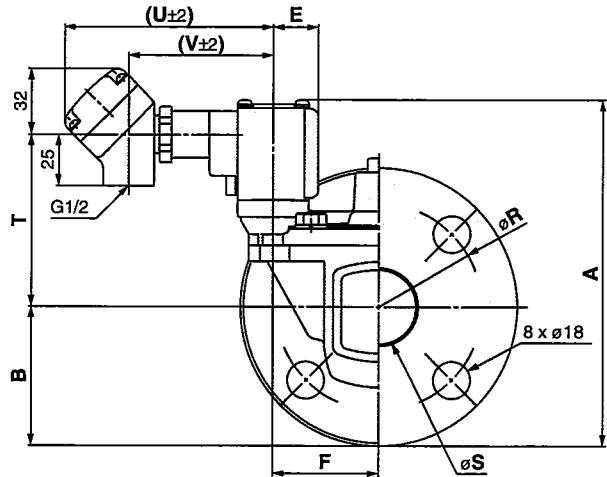
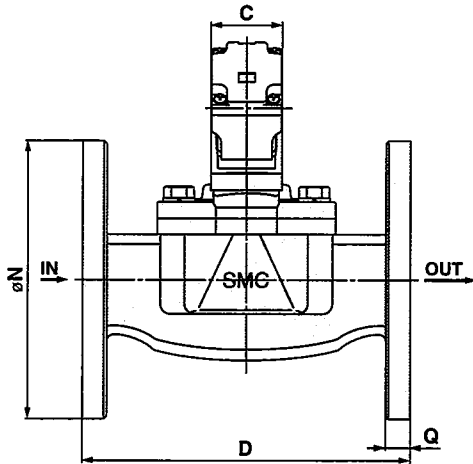
Model	Applicable flange	A	B	C	D	E	F	N	Q	R	S	Electrical entry						
												Grommet		Grommet (with surge voltage suppressor)		DIN terminal		
												T	U	T	U	T	U	V
VXD <sub>2E</sub> <sup>7</sup>	32A	168 (176)	67.5	35	160	22	51.5	135	12	100	36	90 (98)	29.5	76 (84)	32.5	82 (90)	67	55
VXD <sub>2F</sub> <sup>8</sup>	40A	179.5 (187.5)	70	40	170	24.5	54.5	140	14	105	42	98.5 (106.5)	32	85 (93)	35	90.5 (98.5)	69.5	57.5
VXD <sub>2G</sub> <sup>9</sup>	50A	192.5 (200.5)	77.5	40	180	24.5	59	155	14	120	52	104 (112)	32	90.5 (98.5)	35	96 (104)	69.5	57.5

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

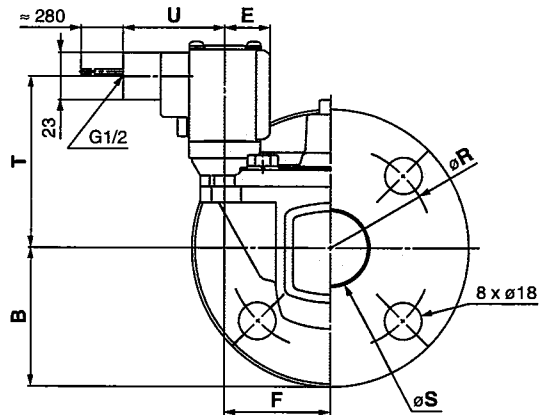
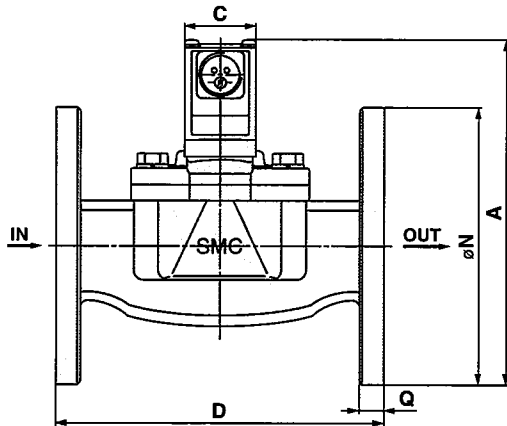


**Dimensions/VXD2<sub>E</sub><sup>7</sup>/2<sub>F</sub><sup>8</sup>/2<sub>G</sub><sup>9</sup> Body Material: CAC407**

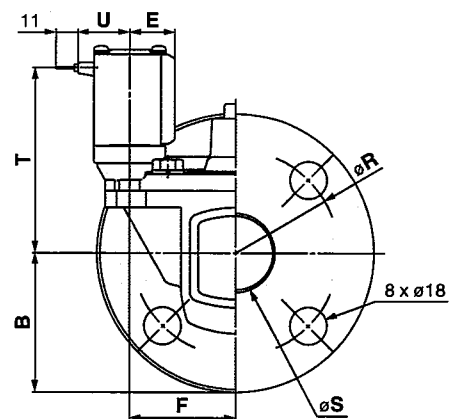
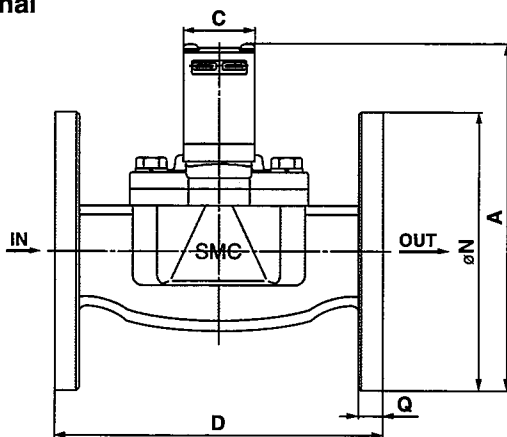
**Conduit terminal**



**Conduit**



**Flat terminal**



(mm)

Model	Applicable flange	A	B	C	D	E	F	N	Q	R	S	Electrical entry						
												Conduit terminal			Conduit		Flat terminal	
												T	U	V	T	U	T	U
VXD2 <sub>E</sub> <sup>7</sup>	32A	168 (176)	67.5	35	160	22	51.5	135	12	100	36	84 (92)	102	71	84 (92)	50	90 (98)	25.5
VXD2 <sub>F</sub> <sup>8</sup>	40A	179.5 (187.5)	70	40	170	24.5	54.5	140	14	105	42	92.5 (100.5)	104.5	73.5	92.5 (100.5)	52.5	98.5 (106.5)	28
VXD2 <sub>G</sub> <sup>9</sup>	50A	192.5 (200.5)	77.5	40	180	24.5	59	155	14	120	52	98 (106)	104.5	73.5	98 (106)	52.5	104 (112)	28

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

**Specifications**  
**For Air**  
**For Water**  
**For Oil**  
**For Heated water**  
**For High temperature oil**  
**Options**  
**Construction**  
**Dimensions**

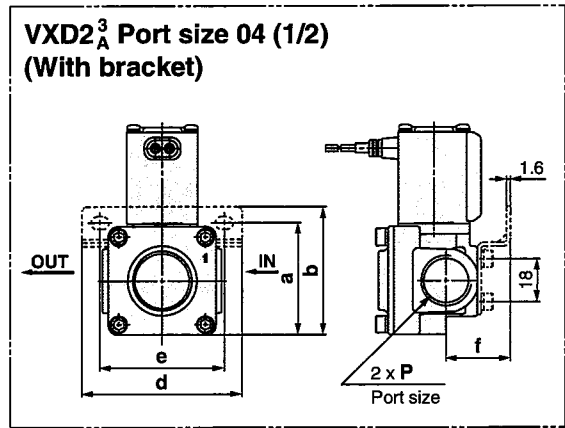
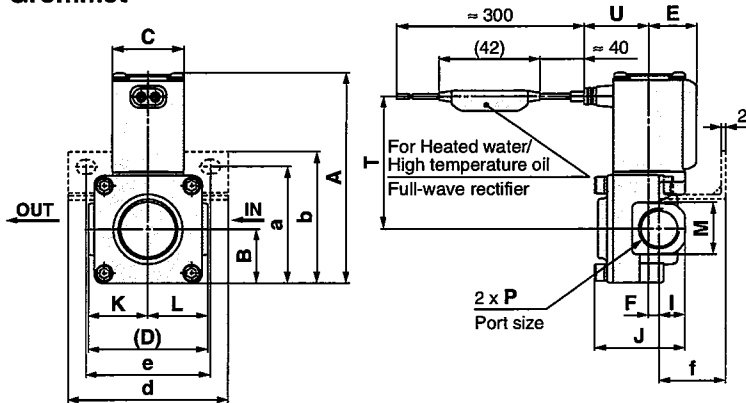
# Series VXD



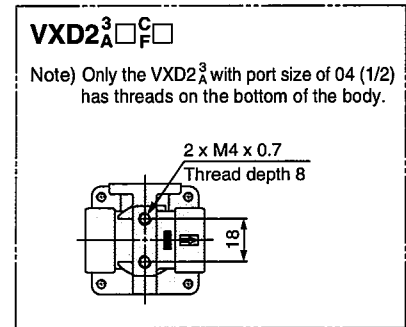
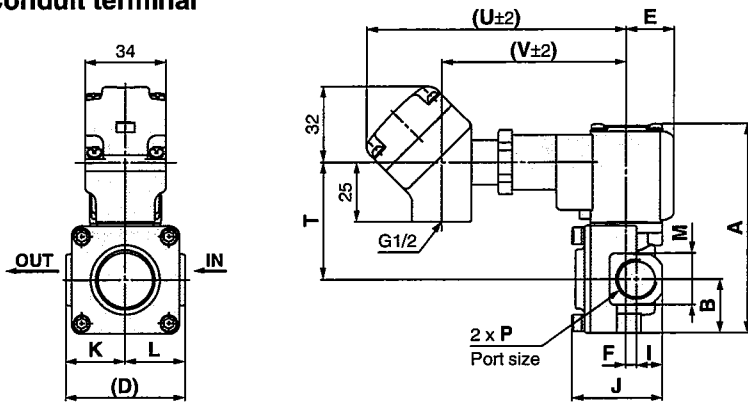
For Heated water/High temperature oil

## Dimensions/VXD<sub>A</sub><sup>3</sup> Body Material: C37, Stainless Steel (1/4, 3/8, 1/2)

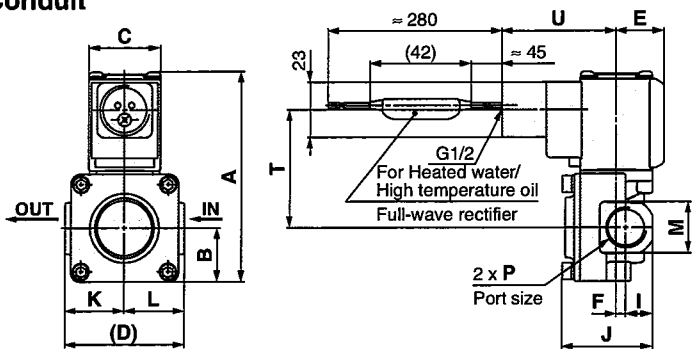
### Grommet



### Conduit terminal



### Conduit

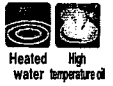


(mm)

Model	Port size P	A	B	C	D	E	F	I	J	K	L	M	Electrical entry						
													Grommet		Conduit terminal		Conduit		
													T	U	T	U	V	T	U
VXD <sub>A</sub> <sup>3</sup>	1/4, 3/8	88	22.5	30	50	20	4.5	11	37.5	25	25	22	55.5	27	49.5	108	77	49.5	47.5
	1/2	(93.5)																	

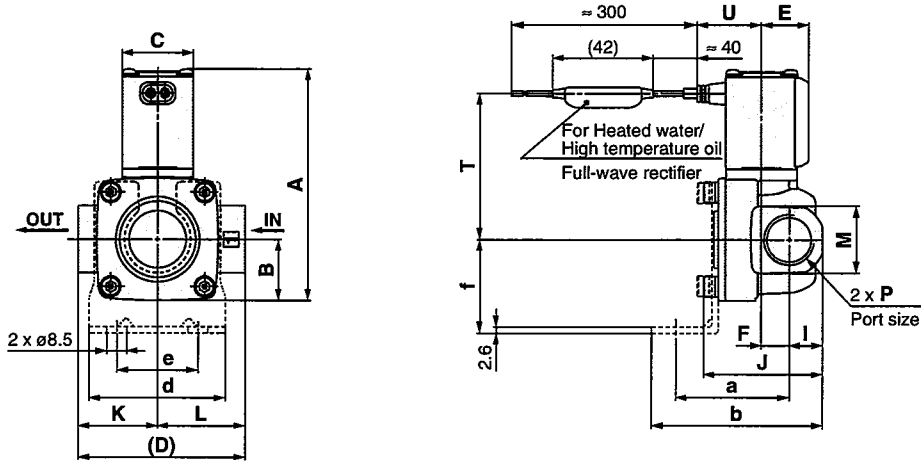
Model	Port size P	Mounting bracket dimensions				
		a	b	d	e	f
VXD <sub>A</sub> <sup>3</sup>	1/4, 3/8	48.5	55	67	52	28
	1/2	47	53.5			27

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

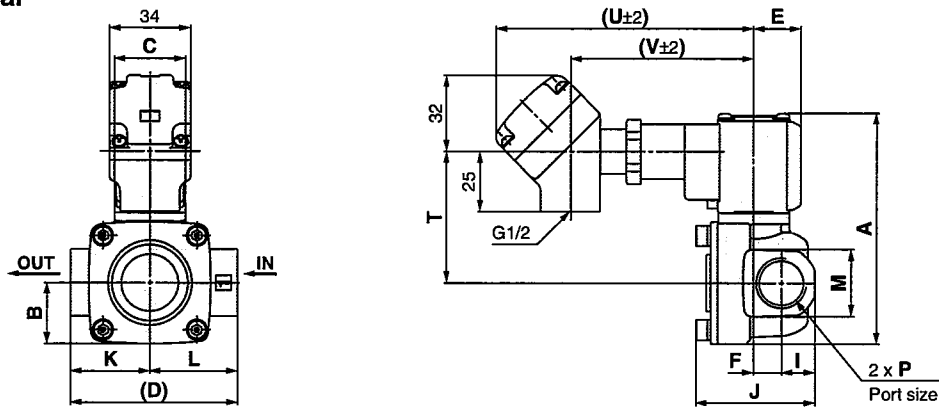


**Dimensions/VXD2<sub>B</sub><sup>4</sup> Body Material: C37, Stainless Steel**

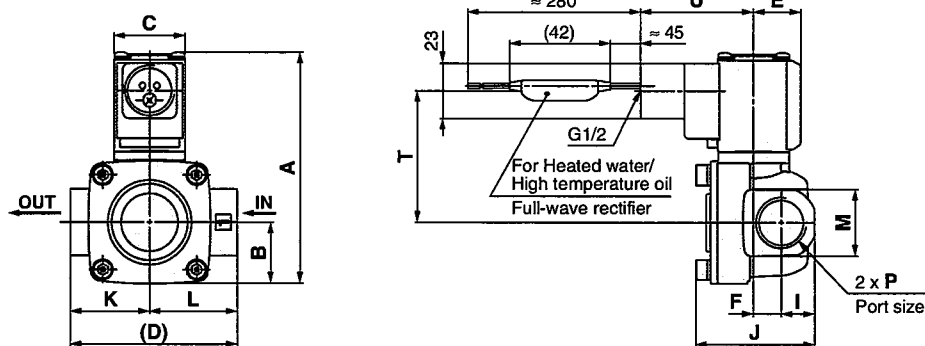
**Grommet**



**Conduit terminal**



**Conduit**



- Specifications
- For Air
- For Water
- For Oil
- For Heated water
- For High temperature oil

- Options
- Construction
- Dimensions

Model	Port size P															Electrical entry					
		A	B	C	D	E	F	I	J	K	L	M	Grommet		Conduit terminal		Conduit				
		T	U	T	U	V	T	U													
VXD2 <sub>B</sub> <sup>4</sup>	3/8, 1/2	96.5 (102.5)	25.5	30	70	20	11.5	14	50	33	37	28	61 (67)	27	55 (61)	108	77	55 (61)	47.5		
Model	Port size P	Mounting bracket dimensions																			
VXD2 <sub>B</sub> <sup>4</sup>	3/8, 1/2	a	b	d	e	f															
		47.5	71.5	57	34	39															

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

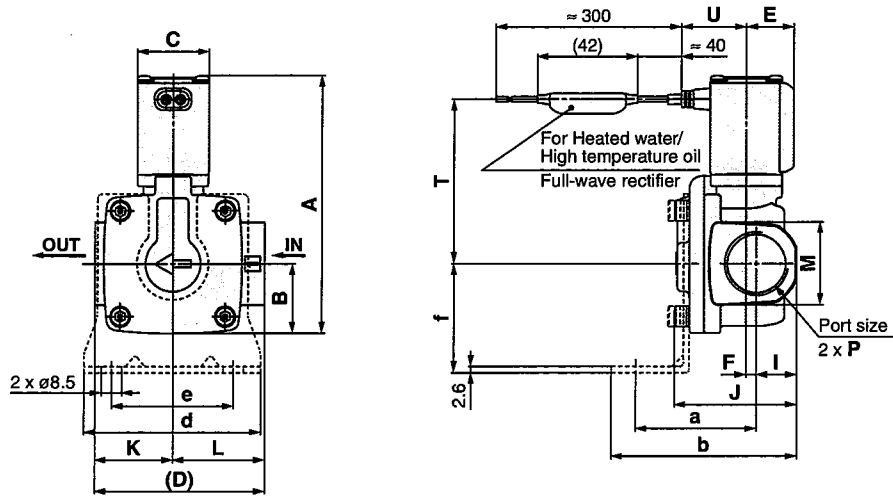
# Series VXD



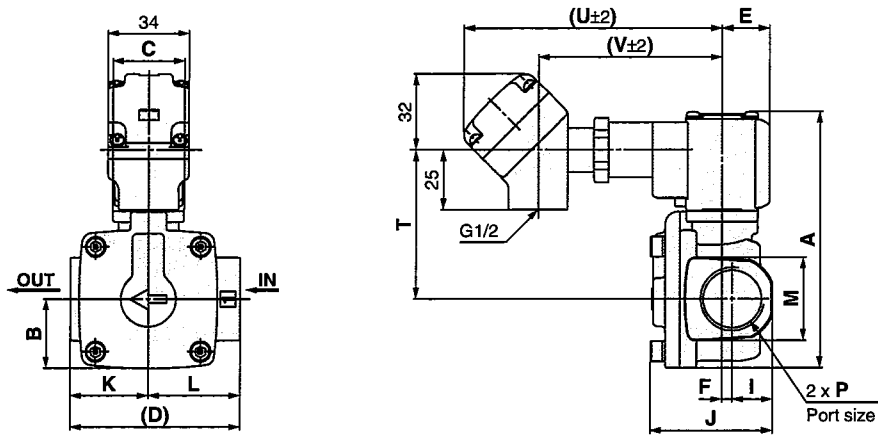
For Heated water/High temperature oil

## Dimensions/VXD2<sub>C</sub><sup>5</sup>/2<sub>D</sub><sup>6</sup> Body Material: C37, Stainless Steel

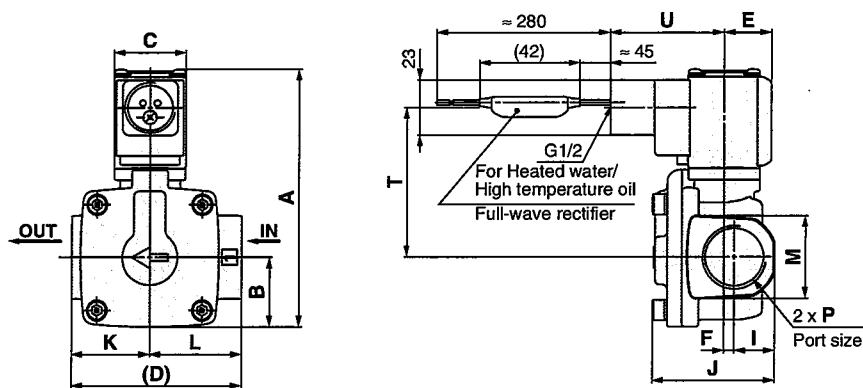
### Grommet



### Conduit terminal



### Conduit



(mm)

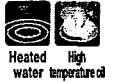
Model	Port size P	A	B	C	D	E	F	I	J	K	L	M	Electrical entry						
													Grommet		Conduit terminal		Conduit		
													T	U	T	U	V	T	U
VXD2 <sub>C</sub> <sup>5</sup>	3/4	107.5 (113.5)	29	30	71	20	4.5	17	51	32.5	38.5	35	68.5 (74.5)	27	62.5 (68.5)	108	77	62.5 (68.5)	47.5
VXD2 <sub>D</sub> <sup>6</sup>	1	126.5 (134.5)	33	35	95	22	4.5	20	59.5	45.5	49.5	42	82.5 (90.5)	29.5	76.5 (84.5)	110.5	79.5	76.5 (84.5)	50

Model	Port size P	Mounting bracket dimensions				
		a	b	d	e	f
VXD2 <sub>C</sub> <sup>5</sup>	3/4	50.5	77.5	74	51	45.5
VXD2 <sub>D</sub> <sup>6</sup>	1	55.5	85.5	81	58	49.5

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

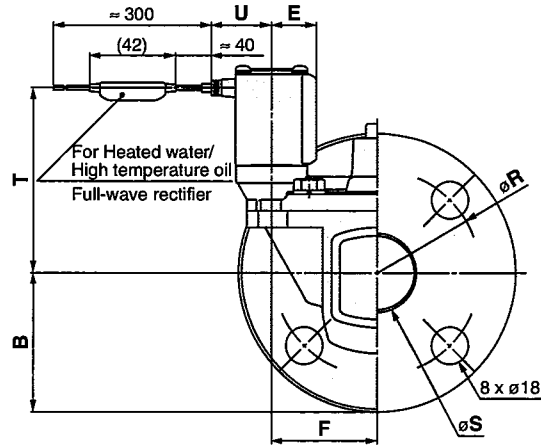
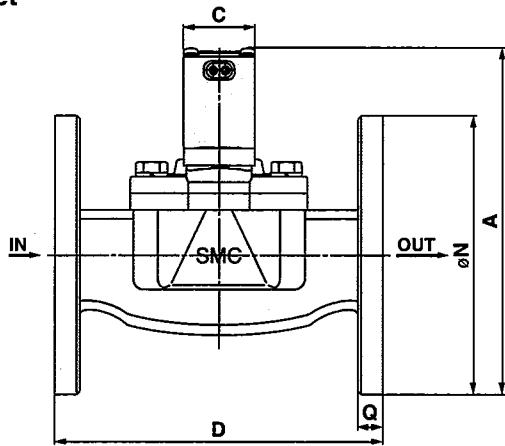


# Pilot Operated 2 Port Solenoid Valve **Series VXD**

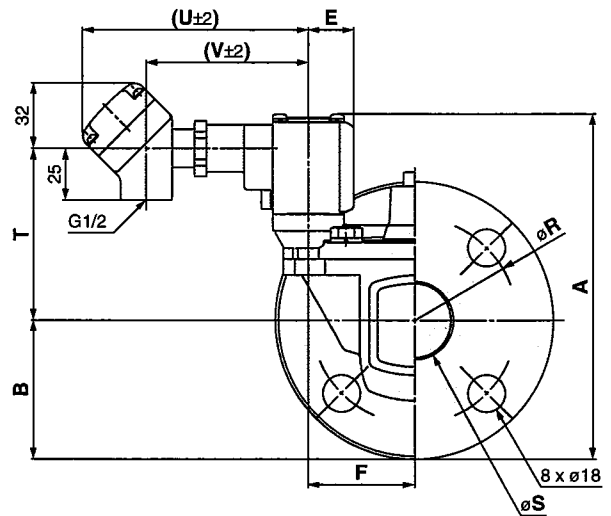
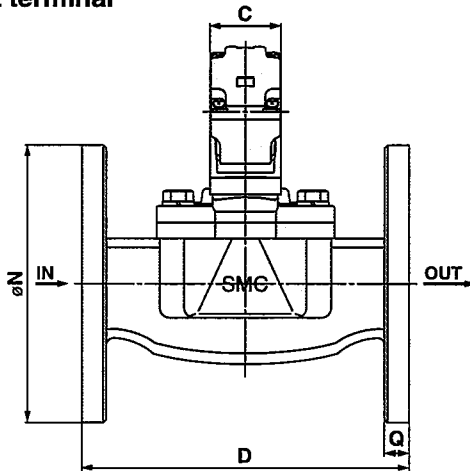


## Dimensions/VXD2<sup>7</sup><sub>E</sub>/2<sup>8</sup><sub>F</sub>/2<sup>9</sup><sub>G</sub> Body Material: CAC407

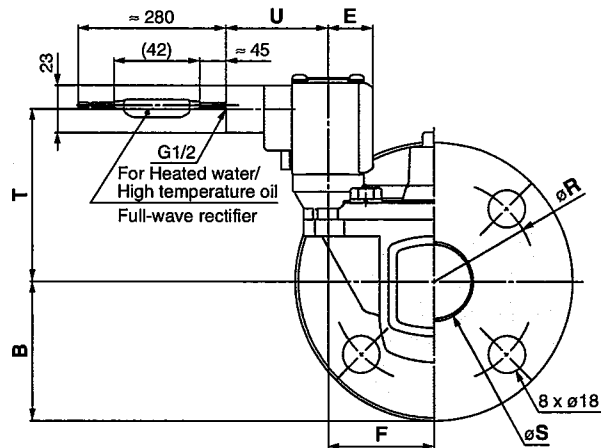
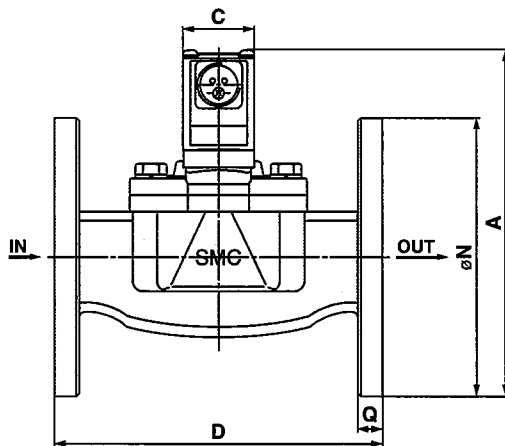
### Grommet



### Conduit terminal



### Conduit



(mm)

Model	Applicable flange	A	B	C	D	E	F	N	Q	R	S	Electrical entry						
												Grommet		Conduit terminal		Conduit		
												T	U	T	U	V	T	U
VXD2 <sup>7</sup> <sub>E</sub>	32A	168 (176)	67.5	35	160	22	51.5	135	12	100	36	90 (98)	29.5	84 (92)	110.5	79.5	84 (92)	50
VXD2 <sup>8</sup> <sub>F</sub>	40A	179.5 (187.5)	70	40	170	24.5	54.5	140	14	105	42	98.5 (106.5)	32	92.5 (100.5)	113	82	92.5 (100.5)	52.5
VXD2 <sup>9</sup> <sub>G</sub>	50A	192.5 (200.5)	77.5	40	180	24.5	59	155	14	120	52	104 (112)	32	98 (106)	113	82	98 (106)	52.5

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

Specifications

For Air

For Water

For Oil

For Heated water

For High temperature oil

Options

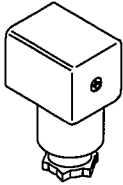
Construction

Dimensions

# Series VXD

## Replacement Parts

- DIN Connector Part No.



### <Coil Insulation Type/Class B>

Electrical option	Rated voltage	Connector part no.
None	24 VDC	C18312G6GCU
	12 VDC	
	100 VAC	
	110 VAC	
	200 VAC	
	220 VAC	
	230 VAC	
	240 VAC	
	24 VAC	
	48 VAC	
	With light	
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

### <Coil Insulation Type/Class H>

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-L15		

- Gasket Part No. for DIN Connector

**VCW20-1-29-1 (for Class B)**

**VCW20-1-29-F (for Class H)**

- Lead Wire Assembly Part No. for Flat Terminal  
(Set of 2 pcs.)

**VX021S-1-16FB**

- Bracket Assembly Part No. for the VXD2<sup>3</sup><sub>A</sub> Metal Body (C37, Stainless steel, Aluminum)

Port size: For 1/4, 3/8

**VXD30S-14A-1**

Port size: For 1/2

**VXD30S-14A-3**

\* 2 mounting screws (M3 hexagon socket head cap screws) are shipped together with the bracket assembly, but not assembled.

# 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 in the solenoid valve portion must be below 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 (static) 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.  $\cos\theta \approx 0.9$

### 2. Surge voltage

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

### 3. Enclosure

A degree of protection 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 mm $\phi$ and greater
2	Protected against solid foreign objects of 12 mm $\phi$ and greater
3	Protected against solid foreign objects of 2.5 mm $\phi$ and greater
4	Protected against solid foreign objects of 1.0 mm $\phi$ 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	Drip-proof type 1
2	Protected against vertically falling water drops when enclosure tilted up to 15°	Drip-proof type 2
3	Protected against rainfall when enclosure tilted up to 60°	Rain-proof type
4	Protected against splashing water	Splash-proof 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	Immersion 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

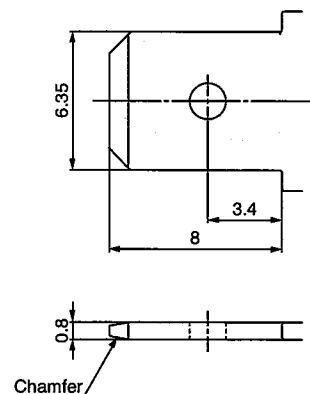
The degreasing and washing of wetted parts

### 3. Symbol

In the symbol ( $\square \square \square \square$ ) Port 1 (IN) and Port 2 (OUT) are shown in a blocked condition ( $\perp$ ), but it is not possible to use the valve in cases of reverse pressure, where the Port 2 pressure is higher than the Port 1 pressure.

## Flat Terminal

### 1. 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	<b>C, b</b>	—	ISO 6358: 1989 JIS B 8390: 2000
	—	<b>S</b>	JIS B 8390: 2000 Equipment: JIS B 8373, 8374, 8375, 8379, 8381
		<b>Cv</b>	ANSI/(NFPA)T3.21.3: 1990
Process fluid control equipment	<b>Av</b>	—	IEC60534-2-3: 1997 JIS B 2005: 1995
	—	<b>Cv</b>	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

Described by the practical units as following.

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

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

When  $\frac{P_2 + 0.1}{P_1 + 0.1} > b$ , 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 [dm<sup>3</sup>/min (ANR)], dm<sup>3</sup> (Cubic decimeter) of SI unit are allowed to be described by L (liter).

1 dm<sup>3</sup> = 1 L

**C** : Sonic conductance [dm<sup>3</sup>/(s·bar)]  
**b** : Critical pressure ratio [—]  
**P<sub>1</sub>** : Upstream pressure [MPa]  
**P<sub>2</sub>** : Downstream pressure [MPa]  
**t** : Temperature [°C]

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

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

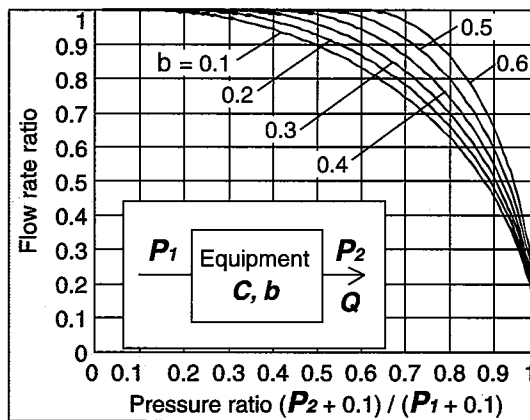
Example)

Obtain the air flow rate for **P<sub>1</sub>** = 0.4 [MPa], **P<sub>2</sub>** = 0.3 [MPa], **t** = 20 [°C] when a solenoid valve is performed in **C** = 2 [dm<sup>3</sup>/(s·bar)] and **b** = 0.3.

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

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

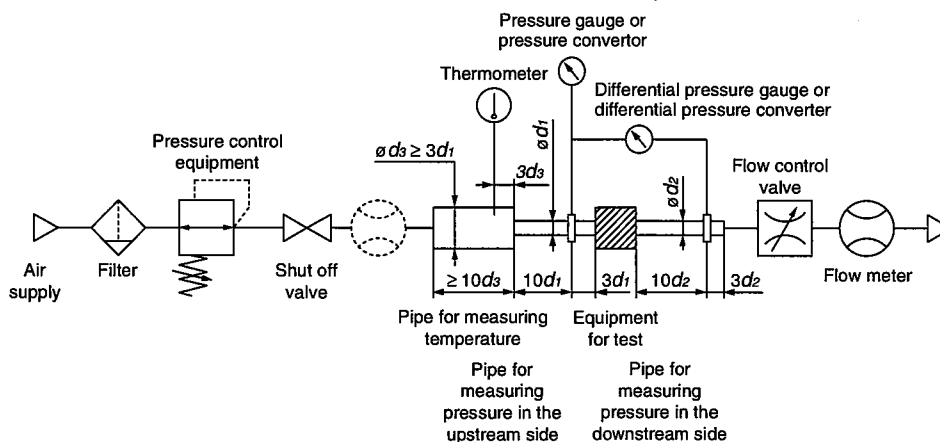
Based on Graph (1), the flow rate ratio will be 0.7 when the pressure ratio is 0.8 and **b** = 0.3. Therefore, flow rate = Maximum flow rate x flow rate ratio = 600 x 0.7 = 420 [dm<sup>3</sup>/min (ANR)]



**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. Besides that, substitute each data of others for the subsonic flow formula to find **b**, then obtain the critical pressure ratio **b** from that average.



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

# Series VXD

## 2.2 Effective area **S**

(1) Conformed standard

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

Effective area **S**: The cross-sectional area having an ideal throttle without friction or without reduced flow. It is deduced from the calculation of the pressure changes inside an air tank 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  $\frac{P_2 + 0.1}{P_1 + 0.1} \leq 0.5$ , **choked flow**

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

When  $\frac{P_2 + 0.1}{P_1 + 0.1} > 0.5$ , **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 [dm<sup>3</sup>/min(ANR)], dm<sup>3</sup> (cubic decimeter) of SI unit are allowed to be described by L (liter).  
1 dm<sup>3</sup> = 1 L

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

**P<sub>1</sub>** : Upstream pressure [MPa]

**P<sub>2</sub>** : Downstream pressure [MPa]

**t** : Temperature [°C]

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

(4) Test method

Attach a test equipment with the test circuit shown in Fig. (2) in order to discharge air into the atmosphere until the pressure inside the air tank goes down to 0.25 MPa (0.2 MPa) from an air tank filled with the compressed air at a certain pressure level (0.5 MPa) which does not go below 0.6 MPa. At this time, measure the discharging time and the residual pressure inside the air tank which had been left until it turned to be the normal values to determine the effective area **S**, using the following formula. The volume of an air tank should be selected within the specified range by corresponding to the effective area of an equipment for test. In the case of JIS B 8373, 8374, 8375, 8379, 8381, the pressure values are in parentheses and the coefficient of the formula is 12.9.

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

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

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

**t** : Discharging time [s]

**P<sub>s</sub>**: Pressure inside air tank before discharging [MPa]

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

**T** : Temperature inside air tank before discharging [K]

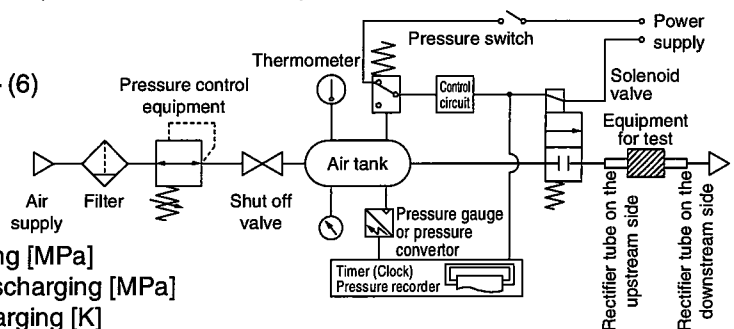


Fig. (2) Test circuit based on JIS B 8390

**2.3 Flow coefficient *Cv* 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 flow coefficient, ***Cv*** factor by the following formula which is based on the test conducted by the test circuit analogous to ISO 6358.

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

**$\Delta P$**  : 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]

**$Pa$**  : Atmospheric pressure [bar absolute]

**$T_1$**  : Upstream absolute temperature [K]

Test conditions are  **$P_1 + Pa = 6.5 \pm 0.2$**  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 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

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

**JIS B 2005: 1995: How to test flow coefficient of a valve**

**Equipment standards: JIS B 8471: Solenoid valve for water**

**JIS B 8472: Solenoid valve for steam**

**JIS B 8473: Solenoid valve for fuel oil**

(2) Definition of flow-rate 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 differential 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 differential [Pa]

**$\rho$**  : Fluid density [kg/m<sup>3</sup>]

(3) Formula for flow rate

Described by the practical units. Also, the flow-rate characteristics are shown in Graph (2).

In the case of liquid:

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

**$Q$**  : Flow rate [L/min]

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

**$\Delta P$** : Pressure differential [MPa]

**$G$**  : Specific gravity [water = 1]

In the case of saturated steam:

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

**$Q$**  : Flow rate [kg/h]

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

**$\Delta P$** : Pressure differential [MPa]

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

**$P_2$**  : Downstream pressure [MPa]

# Series VXD

Conversion of flow coefficient:

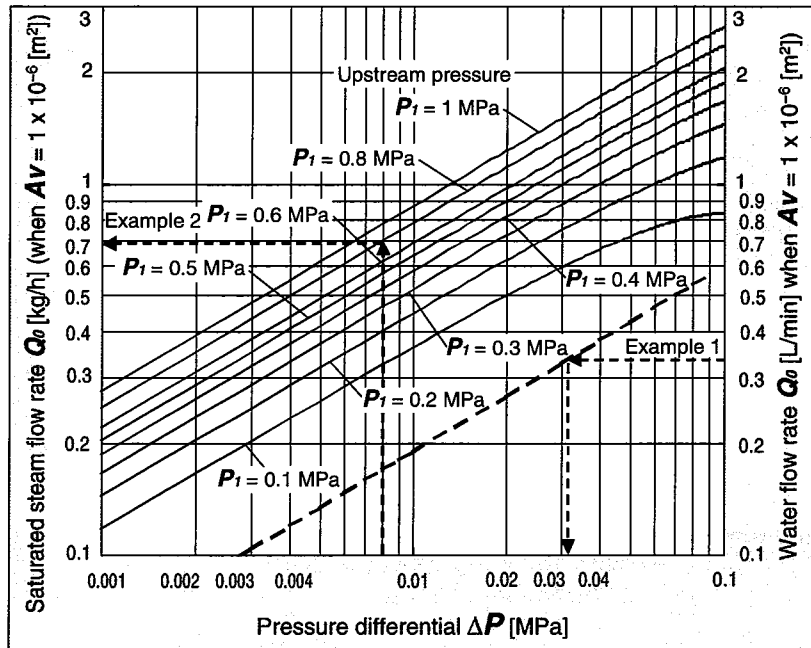
$$Av = 28 \times 10^{-6} Kv = 24 \times 10^{-6} Cv \dots\dots\dots(11)$$

Here,

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

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

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



**Graph (2) Flow-rate characteristics**

Example 1)

Obtain the pressure differential when water 15 [L/min] runs through a solenoid valve with an **Av** = 45 x 10<sup>-6</sup> [m<sup>2</sup>]. Since  $Q_0 = 15/45 = 0.33$  [L/min], according to Graph (2), if reading  $\Delta P$  when  $Q_0$  is 0.33, it will be 0.031 [MPa].

Example 2)

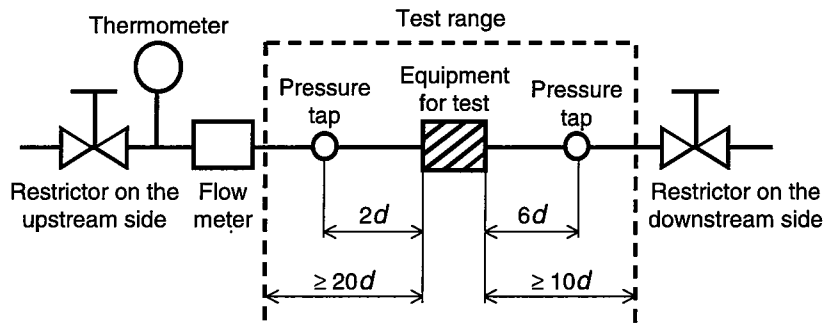
Obtain the saturated steam flow rate when  $P_i = 0.8$  [MPa],  $\Delta P = 0.008$  [MPa] with a solenoid valve with an **Av** = 1.5 x 10<sup>-6</sup> [m<sup>2</sup>].

According to Graph (2), if reading  $Q_0$  when  $P_i$  is 0.8 and  $\Delta P$  is 0.008, it is 0.7 [kg/h]. Therefore, the flow rate  $Q = 0.7 \times 1.5 = 1.05$  [kg/h].

(4) Test method

Attach a test equipment with the test circuit shown in Fig. (3). Next, pour water at 5 to 40°C, then measure the flow rate with a pressure differential of 0.075 MPa. However, the pressure differential needs to be set with a large enough difference so that the Reynolds number does not go below a range of 4 x 10<sup>4</sup>.

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



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

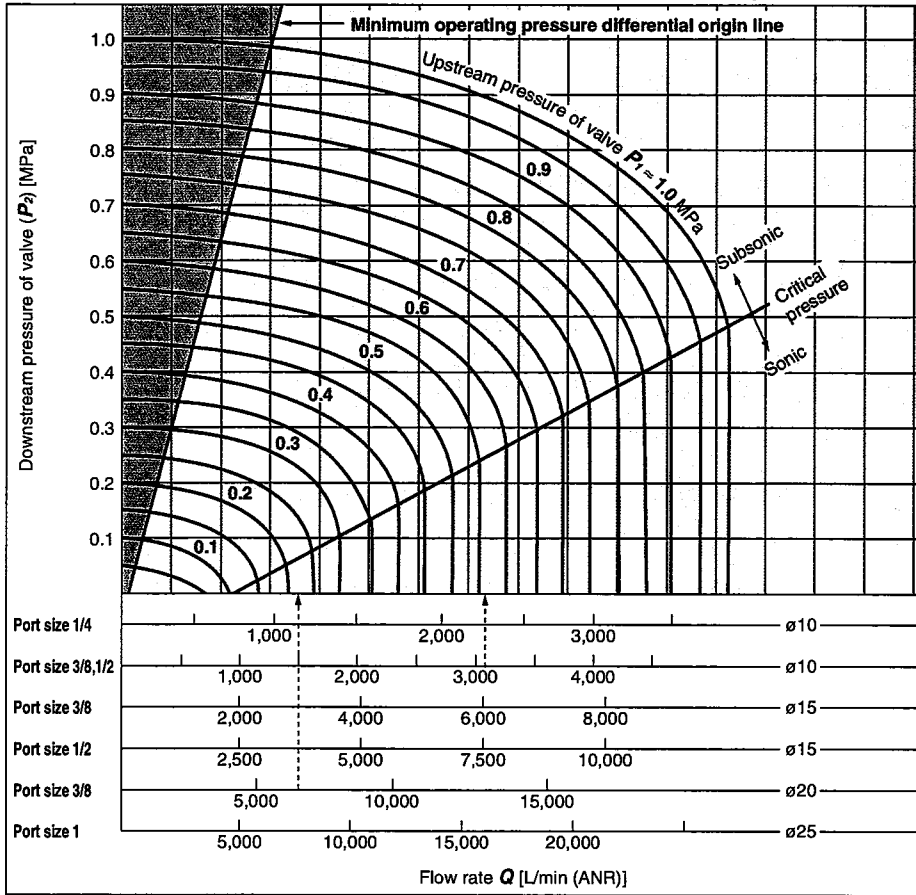


# Series VXD

# Flow-rate Characteristics

Note) Use this graph as a guide. In the case of obtaining an accurate flow rate, refer to pages 41 through to 45.

For Air (Orifice diameter:  $\phi 10$  mm,  $\phi 15$  mm,  $\phi 20$  mm,  $\phi 25$  mm)



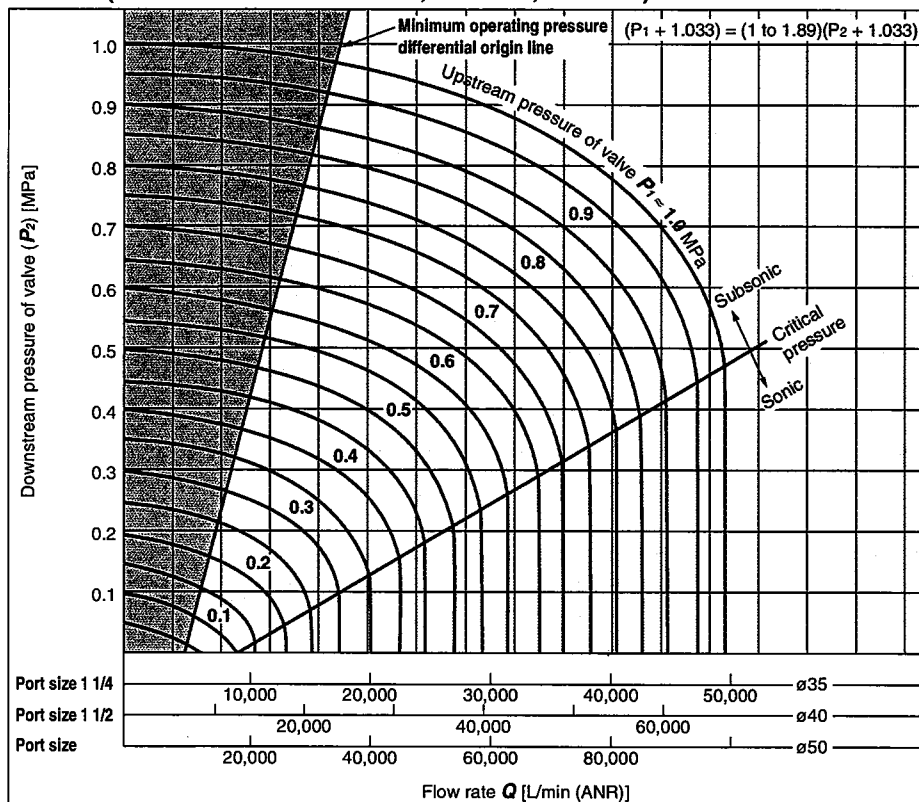
## How to read the graph

The sonic range pressure to generate a flow rate of 6000 L/min (ANR) is as follows. For a  $\phi 15$  orifice (VXD240□□/Port size 3/8),  $P_1 \approx 0.57$  MPa, for a  $\phi 20$  orifice (VXD250□□/Port size 3/4),  $P_1 \approx 0.22$  MPa

## Warning

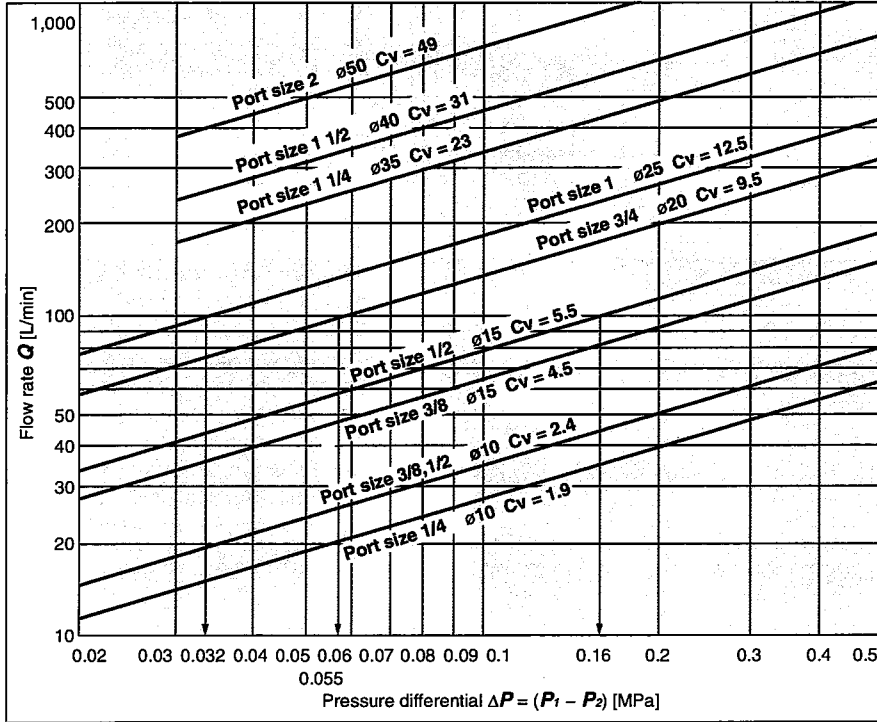
In the area located left to the minimum operating pressure differential origin line in the flow-rate characteristics table, the minimum operating pressure is not generated. Do not use the product in this area as this may cause operation failure (valve opening failure, valve closing failure) or damage of the valve. Select valves with suitable size.

For Air (Orifice diameter:  $\phi 35$  mm,  $\phi 40$  mm,  $\phi 50$  mm)



# Series VXD

## For Water



### How to read the graph

The pressure differential to generate a flow rate of 100 L/min water is as follows.  
 For a  $\phi 15$  orifice (VXD242/Port size 1/2),  $\Delta P = 0.16$  MPa,  
 for a  $\phi 20$  orifice (VXD252),  $\Delta P = 0.055$  MPa,  
 for a  $\phi 25$  orifice (VXD262),  $\Delta P = 0.032$  MPa



# Series VXD Specific Product Precautions 1

Be sure to read before handling. Refer to back cover for Safety Instructions, "Handling Precautions for SMC Products" (M-E03-3) and the Operation Manual for 2 Port Solenoid Valves for Fluid Control Precautions. Please download it via our website, <http://www.smcworld.com>

## Design

### ⚠ Design

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. **Liquid rings**  
In cases with a flowing liquid, provide a bypass valve in the system to prevent the liquid from entering the liquid seal circuit.
4. **Actuator drive**  
When an actuator, such as a cylinder, is to be driven using a valve, take appropriate measures to prevent potential danger caused by actuator operation.
5. **Pressure (including vacuum) holding**  
It is not usable for an application such as holding the pressure (including vacuum) inside of a pressure vessel because air leakage is entailed in a valve.
6. **When the conduit type is used as equivalent to an IP65 enclosure, install a wiring conduit etc.**
7. **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. **Minimum operating pressure differential**  
Be aware that even if the pressure difference is above the minimum operating pressure differential when the valve is closed, the pressure difference may fall below the minimum operating pressure differential when the valve opens, depending on the capacity of the supply source (pumps, compressors, etc.) or the type of pipe restrictions (the piping is bent continuously due to elbow or tee, or narrow tube nozzle is installed in the end). If the product is used below the minimum operating pressure, the operation becomes unstable, which might cause valve opening or closing failure, or oscillation, leading to failure due to insufficient pressure differential. Select an appropriate valve size with reference to the flow-rate characteristics and flow-rate characteristics table (on pages 41 through to 47).

## Selection

### ⚠ Warning

2. **Fluid**
  - 1) **Type of fluid**  
Select an appropriate valve with reference to the table below for the general fluid. Before using a fluid, check whether it is compatible with the materials of each model by referring to the fluids listed in this catalog. Use a fluid with a kinematic viscosity of 50 mm<sup>2</sup>/s or less.  
If there is something you do not know, please contact SMC.  
**Applicable fluid**

For Air	Air
For Water	Air/Water
For Oil	Air/Water/Oil
For Heated water	Air(up to 99°C)/Water/Heated water
For High temperature oil	Air(up to 99°C)/Water/High temperature oil

  - 2) **Flammable oil, Gas**  
Check the specifications for leakage in the interior and/or exterior area.
  - 3) **Corrosive gas**  
Cannot be used since it will lead to cracks by stress corrosion or result in other incidents.
  - 4) Depending on water quality, a brass body can cause corrosion and internal leakage may occur. If such abnormalities occur, exchange the product for a stainless steel body.
  - 5) Use an oil-free specification when any oily particle must not enter the passage.
  - 6) Applicable fluid on the list may not be used depending on the operating condition. Give adequate confirmation, and then determine a model, just because the compatibility list shows the general case.
3. **Fluid quality**

<Air>

  - 1) **Use clean air.**  
Do not use compressed air that contains chemicals, synthetic oils including organic solvents, salt or corrosive gases, etc., as it can cause damage or malfunction.
  - 2) **Install an air filter.**  
Install an air filter close to the valve on the upstream side. A filtration degree of 5 μm or less should be selected.
  - 3) **Install an aftercooler or air dryer, etc.**  
Compressed air that contains excessive drainage may cause malfunction of valves and other pneumatic equipment. To prevent this, install an aftercooler or air dryer, etc.
  - 4) **If excessive carbon powder is generated, eliminate it by installing a mist separator on the upstream side of valves.**  
If excessive carbon powder is generated by the compressor, it may adhere to the inside of the valves and cause a malfunction.  
Refer to Best Pneumatics No.5 for further details on compressed air quality.



# Series VXD Specific Product Precautions 2

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## Selection

### Warning

#### <Water>

The use of a fluid that contains foreign objects can cause problems such as malfunction and seal failure by promoting wear of the valve seat and armature, and by sticking to the sliding parts of the armature etc. Install a suitable filter (strainer) immediately upstream from the valve. As a general rule, use 80 to 100 mesh.

The supply water includes materials that create a hard sediment or sludge such as calcium and magnesium. Sediment and sludge can cause the valve to not operate properly. Therefore, install a water softening device, which removes these materials, and a filter (strainer) directly in front of the valve.

#### <Oil>

Generally, FKM is used as seal material, as it is resistant to oil. The resistance of the seal material may deteriorate depending on the type of oil, manufacturer or additives. Check the resistance before using.

#### 4. Ambient environment

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

#### 5. Countermeasures against static electricity

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

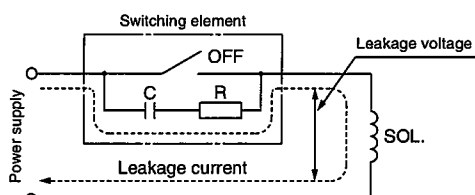
#### 6. Low temperature operation

- 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 warming by a heater, etc., be careful not to expose the coil portion to a heater. Installation of a dryer, heat retaining of the body is recommended to prevent a freezing condition in which the dew point temperature is high and the ambient temperature is low, and the high flow runs.

### Caution

#### 1. Leakage voltage

Particularly when using a resistor in parallel with a switching element and using a C-R element (surge voltage suppressor) to protect the switching element, take note that leakage current will flow through the resistor, C-R element, etc., creating a possible danger that the valve may not turn off.



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

## Selection

### Caution

#### 2. Selecting model

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

#### 3. When the fluid is oil.

The kinematic viscosity must not exceed  $50 \text{ mm}^2/\text{s}$ .

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

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

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



# Series VXD Specific Product Precautions 3

Be sure to read before handling. Refer to back cover for Safety Instructions, "Handling Precautions for SMC Products" (M-E03-3) and the Operation Manual for 2 Port Solenoid Valves for Fluid Control Precautions. Please download it via our website, <http://www.smcworld.com>

## Disassembly/Assembly Procedures

### ⚠ Caution

1. Before disassembling, be sure to shut off the power supply and pressure supply, and then release the residual pressure.

#### Disassembly

##### <N.C.>

- 1) Loosen the mounting screws.  
The coil assembly, stopper, return spring, armature assembly and body can be removed.

##### <N.O.>

- 1) Loosen the mounting screws.  
The coil assembly, push rod assembly, O-rings, adapter and body can be removed.

#### Assembly

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

- 1) Mount the components on the body in the reverse order of disassembly.
- 2) Push the coil assembly against the body and tighten the screws two or more rounds diagonally (Fig. 2) in the status that there are no gaps between the coil assembly and body (Fig. 1).  
Tighten the screws in the order of "1→2→3→4→1→2→3→4".

##### Proper Tightening Torque N·m

VXD2 <sub>A</sub> <sup>3</sup>	0.5
VXD2 <sub>B</sub> <sup>4</sup>	
VXD2 <sub>C</sub> <sup>5</sup>	
VXD2 <sub>E</sub> <sup>7</sup>	0.7
VXD2 <sub>F</sub> <sup>8</sup>	
VXD2 <sub>G</sub> <sup>9</sup>	

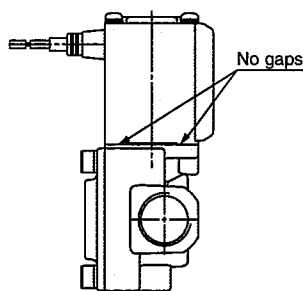


Fig. 1

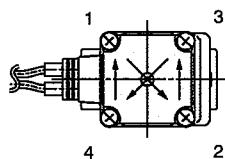
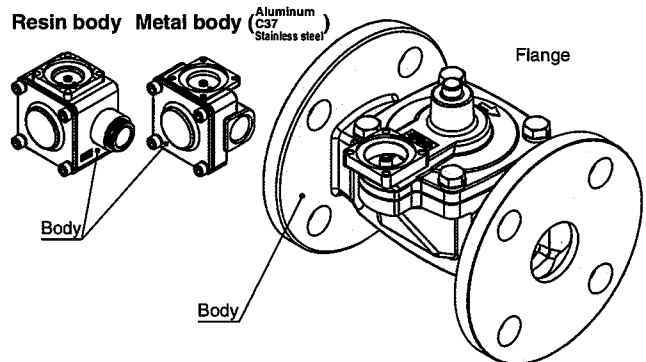
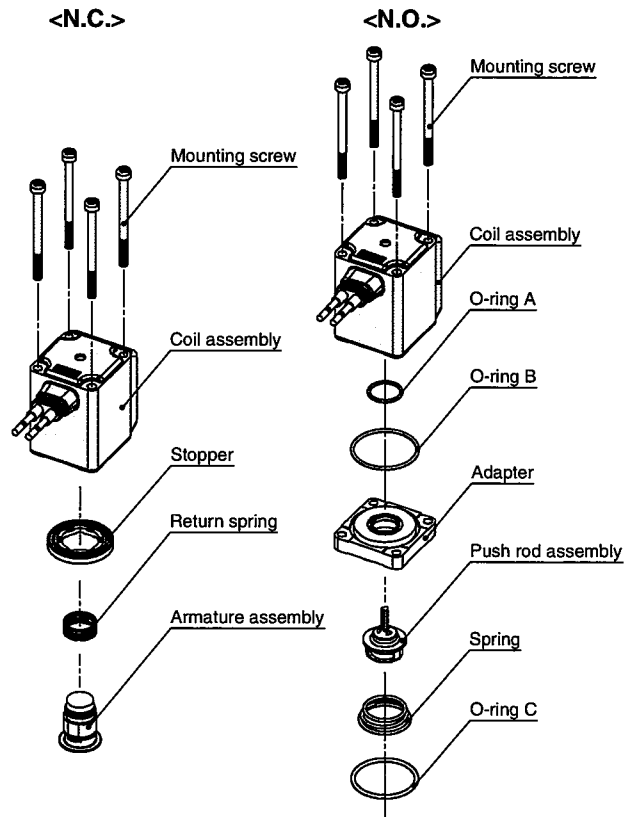


Fig. 2



\* After tightening the screws, make sure that there are no gaps between the coil and body (Fig. 1).

\* After the disassembly and assembly have been completed, make sure that no leak occurs from the seal. Additionally, when restarting the valve, make sure that the valve operates correctly after checking the safety.



# Series VXD Specific Product Precautions 4

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## Piping

### Warning

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

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

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

### Caution

1. Preparation before piping

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

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

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

3. 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 thread	Proper tightening torque (N·m)
Rc1/8	7 to 9
Rc1/4	12 to 14
Rc3/8	22 to 24
Rc1/2	28 to 30
Rc3/4	
Rc1	36 to 38

4. When connecting piping to a product

Avoid mistakes regarding the supply port etc.

5. If the regulator and solenoid valve are connected directly, chattering may occur as both of them generate vibration. Do not connect them.

6. If the effective area of piping on the fluid supply side is restricted, the operation may become unstable due to differential pressure fluctuation during valve operation. The piping on the fluid supply side should match the port size of the valve.

## Recommended Piping Conditions

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

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

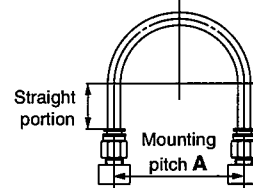
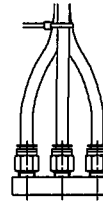
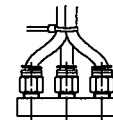


Fig. 1 Recommended piping configuration Unit: mm

Tube size	Mounting pitch A			Straight portion length
	Nylon tube	Soft nylon tube	Polyurethane tube	
ø1/8"	44 or more	35 or more	25 or more	16 or more
ø6	84 or more	66 or more	39 or more	30 or more
ø1/4"	89 or more	70 or more	57 or more	32 or more
ø8	112 or more	88 or more	52 or more	40 or more
ø10	140 or more	110 or more	69 or more	50 or more
ø12	168 or more	132 or more	88 or more	60 or more



Recommended



Unacceptable

Fig. 2 Binding tubes with bands

## Wiring

### Warning

Do not apply AC voltage to Class "H" coil AC type unless it is built in full-wave rectifier, or the coil will be damaged.

### Caution

1. As a rule, use electrical wire with a cross sectional area of 0.5 to 1.25 mm<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 ±10% of the rated voltage. In cases with a DC power supply where importance is placed on responsiveness, stay within ±5% of the rated value. The voltage drop is the value in the lead wire section connecting the coil.
4. When a surge from the solenoid affects the electrical circuitry, install a surge voltage suppressor etc., in parallel with the solenoid. Or, adopt an option that comes with the surge voltage protection circuit. (However, a surge voltage occurs even if the surge voltage protection circuit is used. For details, please consult with SMC.)



# Series VXD Specific Product Precautions 5

Be sure to read before handling. Refer to back cover for Safety Instructions, "Handling Precautions for SMC Products" (M-E03-3) and the Operation Manual for 2 Port Solenoid Valves for Fluid Control Precautions. Please download it via our website, <http://www.smcworld.com>

## Operating Environment

### Warning

1. Do not use in an atmosphere having corrosive gases, chemicals, sea water, water, water vapor, 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.

## Maintenance

### Warning

#### 1. Removing the product

The valve will reach a high temperature when used with high temperature fluids. Confirm that the valve temperature has dropped sufficiently before performing work. If touched inadvertently, there is a danger of being burned.

- 1) Shut off the fluid supply and release the fluid pressure in the system.
- 2) Shut off the power supply.
- 3) Dismount the product.

#### 2. Low frequency operation

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

### Caution

#### 1. Filters and strainers

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

#### 2. Lubrication

When using after lubricating, never forget to lubricate continuously.

#### 3. Storage

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

#### 4. Exhaust the drainage from the air filter periodically.

## Operating Precautions

### Warning

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

## Operating Precautions

### Warning

3. When the pilot type 2 port solenoid valve is closed, and pressure is applied suddenly due to the starting of fluid supply source such as pump and compressor, the valve may open momentarily and fluid may leak.
4. If the product is used in the conditions in which rapid decrease in the inlet pressure of the valve and rapid increase in the outlet pressure of the valve are repeated, excessive stress will be applied to the diaphragm, which causes the diaphragm to be damaged and dropped, leading to the operation failure of the valve. Check the operating conditions before use.

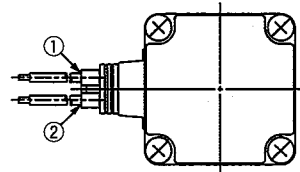
## Electrical Connections

### Caution

#### ■ Grommet

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

Class H coil: AWG18 Insulator O.D. 2.1 mm

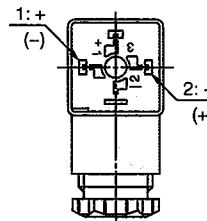


Rated voltage	Lead wire color	
	①	②
DC	Black	Red
100 VAC	Blue	Blue
200 VAC	Red	Red
Other AC	Gray	Gray

\* There is no polarity.

#### ■ DIN terminal

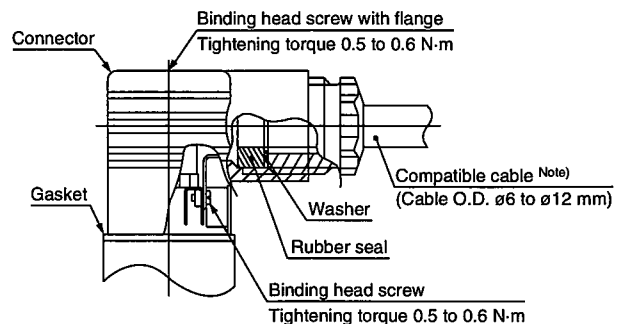
Since internal connections are shown below for the DIN terminal, make connections to the power supply accordingly.



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

\* There is no polarity.

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



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



# Series VXD Specific Product Precautions 6

Be sure to read before handling. Refer to back cover for Safety Instructions, "Handling Precautions for SMC Products" (M-E03-3) and the Operation Manual for 2 Port Solenoid Valves for Fluid Control Precautions. Please download it via our website, <http://www.smcworld.com>

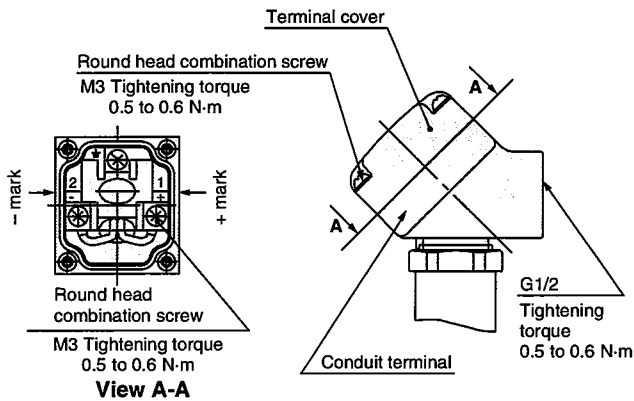
## Electrical Connections

### 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.

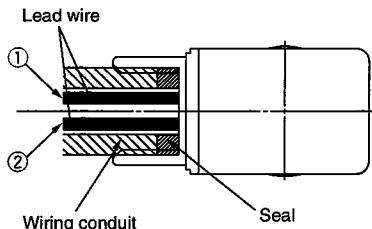


(Internal connection diagram)

#### Conduit

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

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



(Connection 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 the power saving type, there is polarity.)

Description	Part no.
Seal	VCW20-15-6

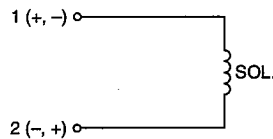
Note) Please order separately.

## Electrical Circuits

### Caution

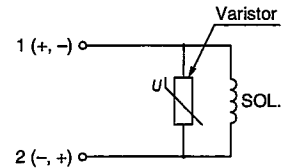
#### [DC circuit]

##### Grommet, Flat terminal



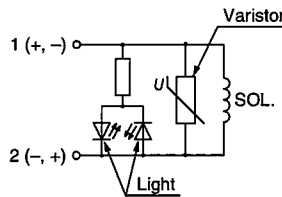
Without electrical option

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



With surge voltage suppressor

##### DIN terminal, Conduit terminal

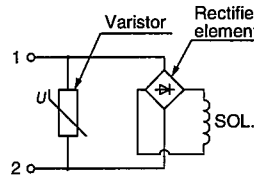


With light/surge voltage suppressor

#### [AC circuit]

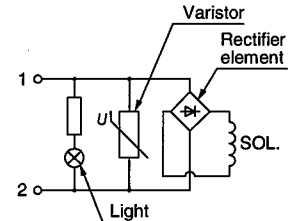
\* For AC, the standard product is equipped with surge voltage suppressor.

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



Without electrical option

##### DIN terminal, Conduit terminal, Conduit



With light/surge voltage suppressor

Note 1) Coil for DIN terminal H type with AC voltage does not have full-wave rectifier. Full-wave rectifier is built in the DIN connector. Refer to page 39 to order it as an accessory.

## One-touch Fitting

### Caution

For information on handling One-touch fittings and appropriate tubing, refer to page 50 and the KQ2 series One-touch fittings in Best Pneumatics No. 6. The KQ2 series information can be downloaded from the following SMC website, <http://www.smcworld.com>



## ⚠ Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of “Caution,” “Warning” or “Danger.” They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)\*1), and other safety regulations.

**⚠ Caution:** Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

**⚠ Warning:** Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

**⚠ Danger :** Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

- \*1) ISO 4414: Pneumatic fluid power – General rules relating to systems.  
 ISO 4413: Hydraulic fluid power – General rules relating to systems.  
 IEC 60204-1: Safety of machinery – Electrical equipment of machines.  
 (Part 1: General requirements)  
 ISO 10218-1: Manipulating industrial robots – Safety.  
 etc.

### ⚠ Warning

- 1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.**  
 Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.
- 2. Only personnel with appropriate training should operate machinery and equipment.**  
 The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.
- 3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.**
  - The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
  - When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
  - Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.
- 4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.**
  - Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
  - Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.
  - An application which could have negative effects on people, property, or animals requiring special safety analysis.
  - Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

### ⚠ Caution

- 1. The product is provided for use in manufacturing industries.**  
 The product herein described is basically provided for peaceful use in manufacturing industries.  
 If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.  
 If anything is unclear, contact your nearest sales branch.

## Limited warranty and Disclaimer/ Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”.  
 Read and accept them before using the product.

### Limited warranty and Disclaimer

- The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.\*2)  
 Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
  - For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.  
 This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
  - Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.
- \*2) Vacuum pads are excluded from this 1 year warranty.  
 A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.  
 Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

### Compliance Requirements

- The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
- The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

### Revision history

- Edition B:**
- \* Added class H (24 VDC, DIN terminal).
  - \* Changed to allowable leakage voltage.
  - \* Added installation options (special electrical entry direction, with bracket, EPDM).
  - \* Added “disassembly/assembly procedures.”

RZ

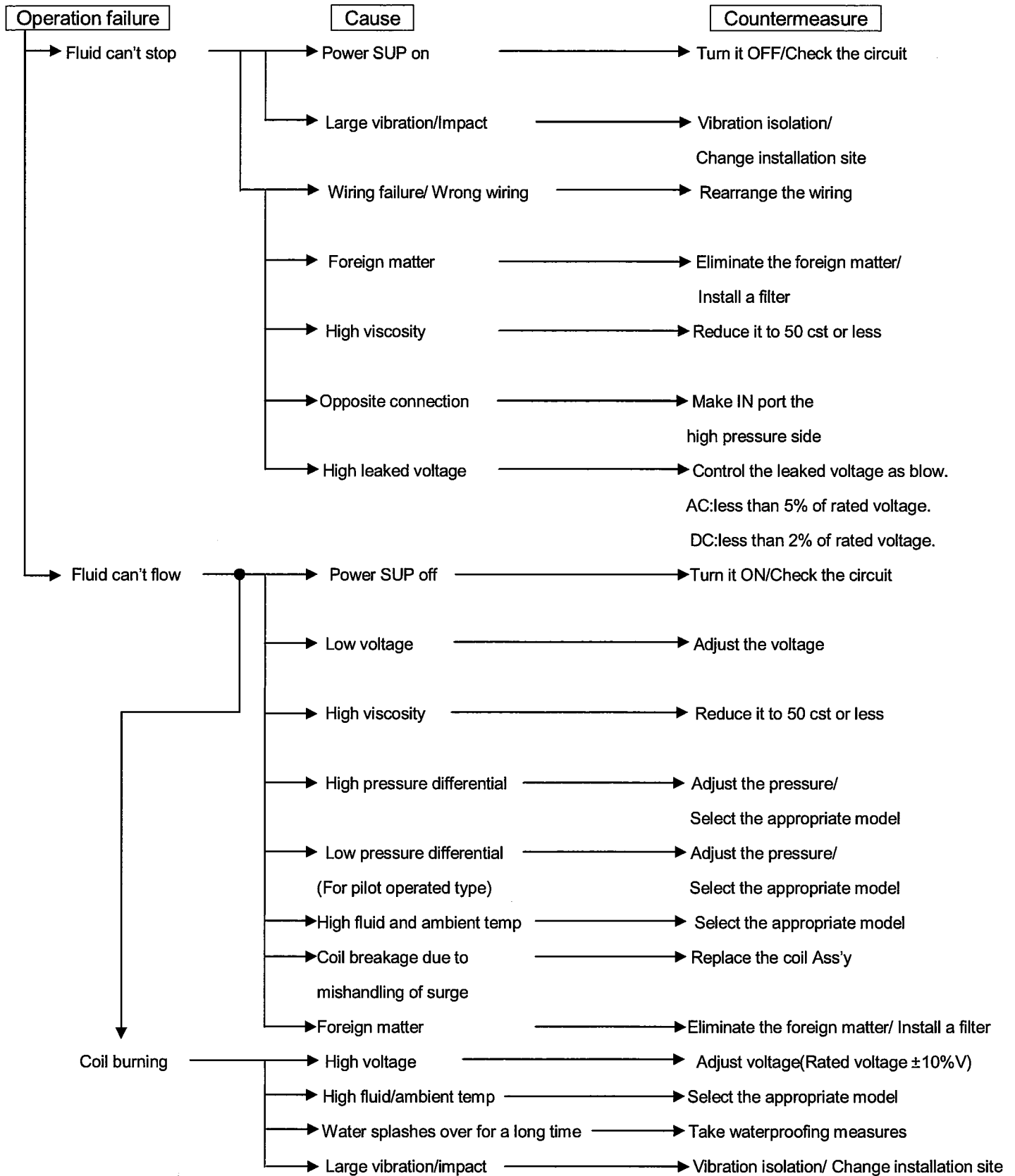
**⚠ Safety Instructions** Be sure to read “Handling Precautions for SMC Products” (M-E03-3) before using.



# Trouble shooting

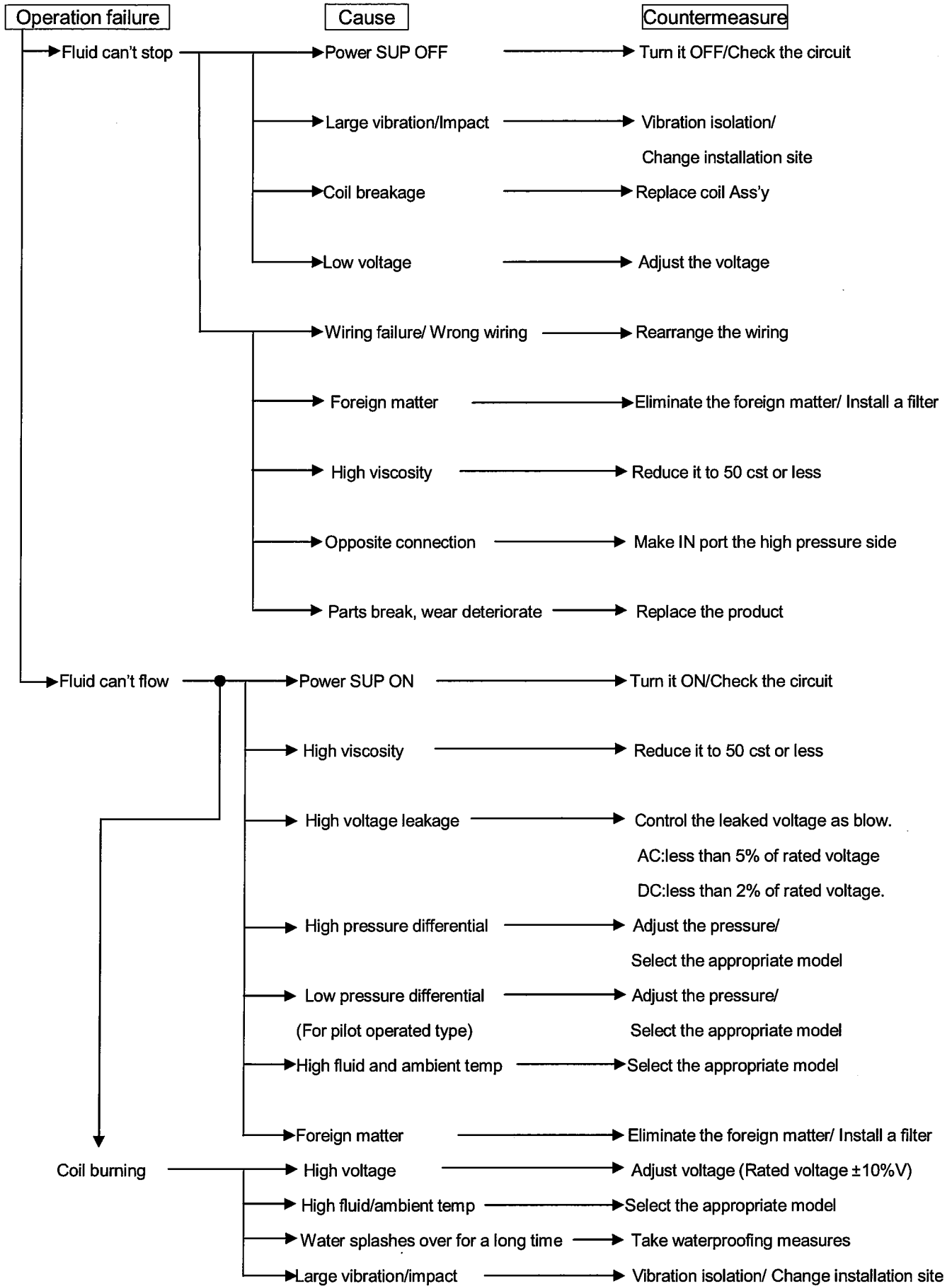
If abnormal operations occur while in use,  
please check the following flowchart and take the appropriate measures.

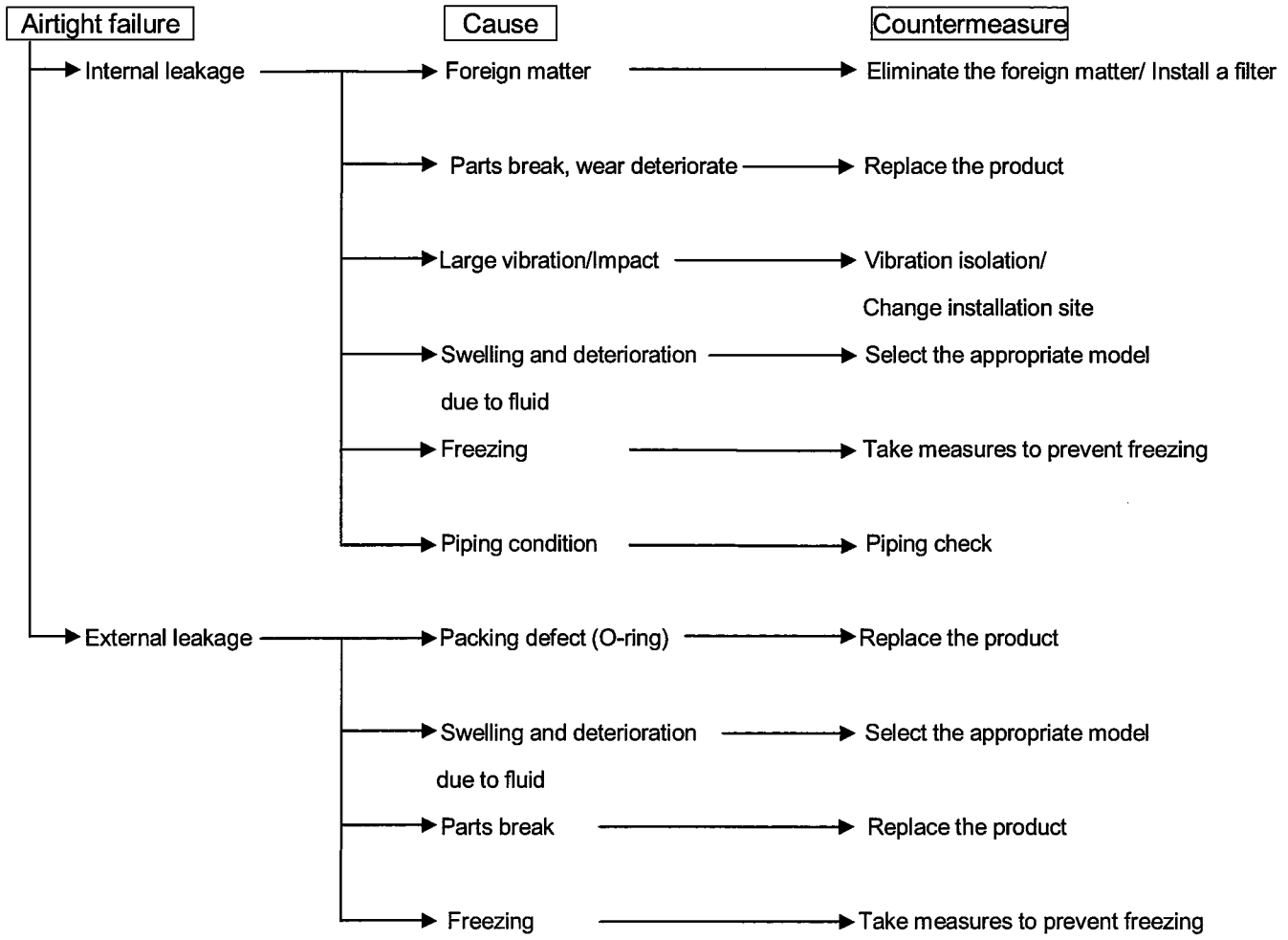
<For Normal Close(N.C.)>



If abnormal operations occur while in use,  
 please check the following flowchart and take the appropriate measures.

<For Normal Close(N.O.)>









Revision history

A: Add to Troubleshooting

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Note: Specifications are subject to change without prior notice and any obligation on the part of the manufacturer.  
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