Fluid Control

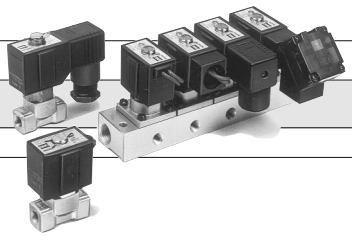
2/3 Port Valve

Solenoid Valve/Air Operated Valve
For Water, Air, Oil, Gas, Vacuum and Steam

2 Port, Direct Operated

Series VX21/22/23

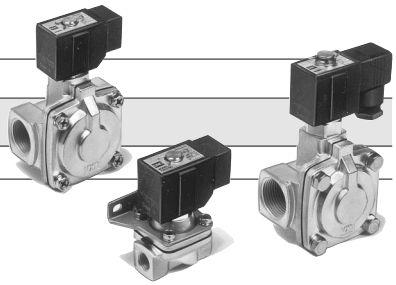
N.C., N.O./Single Unit/Manifold

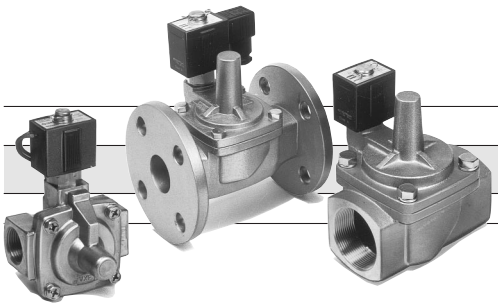


2 Port, Pilot Operated (Diaphragm style)

Series VX21/22/23

N.C., N.O.





2 Port, Pilot Operated (Disk style)

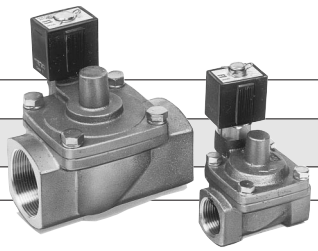
Series VXP21/22/23

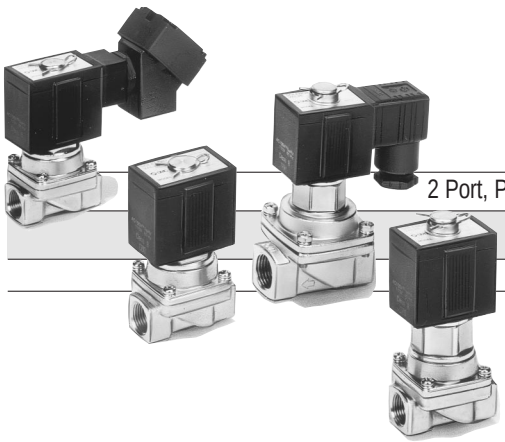
N.C., N.O.

2 Port Pilot Operated

Series VXR21/22/23

<Water hammer relief> N.C., N.O.





2 Port, Pilot Operated (Diaphragm Zero Pressure Differential Operation)

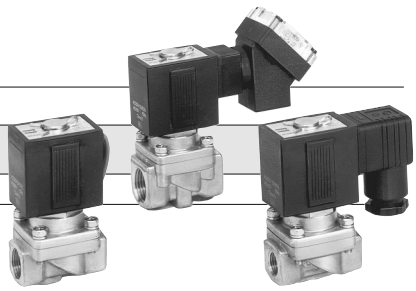
Series VXZ22/23

N.C., N.O./Single Unit

2 Port, Pilot Operated

VXH22

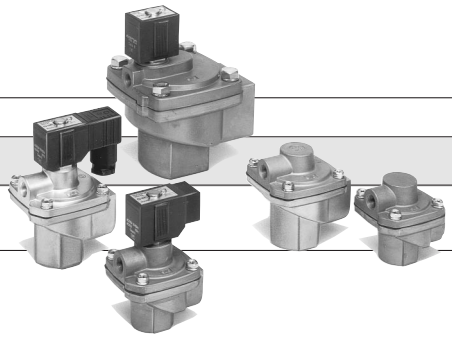
For High Pressure Control N.C./Single Unit



2 Port, Pilot Operated

VXF21/22

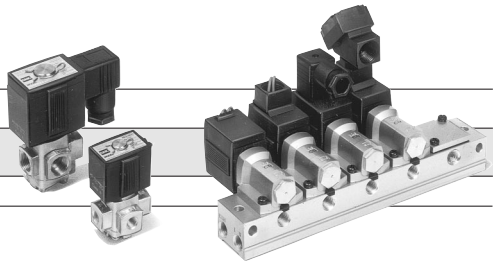
Quick response, Control of
Instantaneous Large Flow N.C./Single Unit



3 Port Direct Operated

Series VX31/32/33

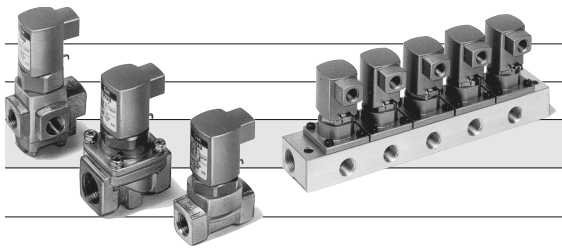
C.O./Single Unit, Manifold



Direct Air Operated
2, 3 Port

Series VXA21/22

Series VXA31/32



Selection procedures for 2, 3 port valve for fluid control

①Selection of series

Select series on referring to the number of ports, valve style (N.C., N.O., C.O.), port size and applied fluid.

②Check the applicable fluid check list

Use the tables on page 4.0-5 through 4.0-13 to check the compatibility of the applicable fluid with the solenoid valve.

③Confirmation of working pressure differential

There are two possibilities for a pressure differential. It is the highest pressure difference allowable between the primary side and the secondary side in an open and closed state. Or, the minimum pressure differential is the lowest required to hold the main valve fully open. Refer to the following pages for each series as the pressure differential varies with the orifice size, power supply, pressure and fluid.

④Flow rate characteristics table

To obtain the flow rate of fluid, refer to the flow rate characteristics table.

⑤Power supply and electrical entry

Select power supply of AC or DC and choose electrical entry.

Solenoid Valve List

Number of ports	2 Port										
Operating system	Direct operated				Pilot operated diaphragm		Pilot operated disk		<Water hammer relief style> Pilot operated		
Series	VX21/22/23				VXD21/22/23		VXP21/22/23		VXR21/22/23		
Body	Single unit		Manifold		Single unit		Single unit		Single unit		
Valve	N.C.	N.O.	N.C.	N.O.	N.C.	N.O.	N.C.	N.O.	N.C.	N.O.	
Applied Fluid — Standard specification: Water	●		—		●		●		●		
Applied Fluid — Standard specification: Air	●		●		●		●		—		
Applied Fluid — Standard specification: Oil	●		●		●		●		●		
Applied Fluid — Standard specification: Low vacuum(1Torr)	●		●		—		—		—		
Applied Fluid — Option Specification: Steam	●		—		—		●		—		
Applied Fluid — Option Specification: Medium vacuum(10^{-3} Torr) Non-leak(10^{-5}atm cc/sec)	●		●		—		—		—		
Applied Fluid — Option Specification: High temperature water High temperature oil	●		—		●		●		●		
Port size — Rc (PT): 1/8 (6A)	●	●	—		—	—	—	—	—	—	
Port size — Rc (PT): 1/4 (8A)	●	●			●	—	●	—	—	—	
Port size — Rc (PT): 3/8 (10A)	●	●			●	—	●	—	—	—	
Port size — Rc (PT): 1/2 (15A)	●	—			●	●	●	●	●	●	
Port size — Rc (PT): 3/4 (20A)	—	—			●	●	●	●	●	●	
Port size — Rc (PT): 1 (25A)	—	—			●	●	●	●	●	●	
Port size — Rc (PT): 11/4 (32A)	—	—			● Flange	● Flange	● Flange Rc(PT)	● Flange Rc(PT)	● Rc(PT)	● Rc(PT)	
Port size — Flange: 11/2 (40A)	—	—			● Flange	● Flange	● Flange Rc(PT)	● Flange Rc(PT)	● Rc(PT)	● Rc(PT)	
Port size — Flange: 2 (50A)	—	—			● Flange	● Flange	● Flange Rc(PT)	● Flange Rc(PT)	● Rc(PT)	● Rc(PT)	
Page	4.1-1 to 4.1-9		4.1-11 to 4.1-16		4.1-17 to 4.1-25		4.1-27 to 4.1-38		4.1-39 to 4.1-46		

Air Operated Valve List

* We have a type that set the orifice in the vacuum side to the maximum bore for the exclusive use, when use with a vacuum pad application.

Number of ports	2 Port				3 Port	
Operating system	Direct operated				Direct operated	
Series	VXA21/22				VXA31/32	
Body	Single unit		Manifold		Single unit	Manifold
Valve	N.C.	N.O.	N.C.	N.O.	C.O.	C.O.
Applied fluid — Standard specification: Water	●		—		●	—
Applied fluid — Standard specification: Air	●		●		●	●
Applied fluid — Standard specification: Oil	●		●		●	●
Applied fluid — Standard specification: Low vacuum(1 Torr)	●		●		●	●
Applied fluid — Option specification: Medium vacuum(10^{-3} Torr) Non-leak(10^{-5}atm cc/sec)	●		●		●	●
Port size — Rc (PT): 1/8 (6A)	●	●	—		●	—
Port size — Rc (PT): 1/4 (8A)	●	●			●	
Port size — Rc (PT): 3/8 (10A)	●	●			●	
Port size — Rc (PT): 1/2 (15A)	●	●			—	
Page	4.1-57 to 4.1-61		4.1-63 to 4.1-66		4.1-67 to 4.1-71	4.1-73 to 4.1-76

	2 Port				3 Port	
	Pilot operated Diaphragm, zero differential pressure operation		<High pressure control> Pilot operated	<Quick response, Instantaneous large flow> Pilot operated	Direct operated	
	VXZ22/23		VXH22	VXF21/22	VX31/32/33	
	Single unit		Single unit	Single unit	Single unit	Manifold
	N.C.	N.O.	N.C.	N.C.	N.C./N.O./C.O.	N.C./N.O./C.O.
	●		●	—	●	—
	●		●	●	●	●
	●		●	—	●	●
	●		—	—	●*	●
	—		—	—	●	—
	—		—	—	●	●
	●		—	—	●	—
	—	—	—	—	●	—
	●	●	●	—	●	
	●	●	●	—	●	
	●	●	●	—	—	
	●	●	—	●	—	
	●	●	—	●	—	
	—	—	—	—	—	
	—	—	—	● Rc(PT)	—	
	—	—	—	—	—	
	4.1-77 to 4.1-85		4.1-87 to 4.1-88	4.1-89 to 4.1-98	4.1-47 to 4.1-52	4.1-53 to 4.1-56

Applicable Fluid Check List 4.0-5 to 4.0-13

Glossary 4.0-14

How to Order Solenoid Coil Assembly 4.0-15

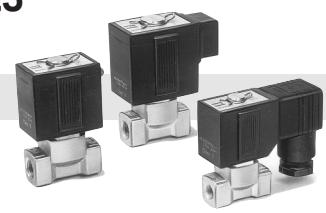
⚠ Caution

Read Safety Instructions on p.0-33 and common precautions on p.0-37 to 0-40.

Applicable Fluid Check List

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

Energized Open (N.C.)



Refer to p.4.1-2, 4.1-3 for specifications and models.

Option Symbol and Configuration

Option symbol	Seal material	Coil insulation	Body, Shading coil material
Standard	NBR	B	Brass, Copper
A	FPM		
B	EPR		
C	PTFE		
D	FPM	H	
E	EPR		
F*	FPM	B	Stainless steel, Silver
G	NBR		
H	FPM		
J	EPR		
K	PTFE		
L*	FPM		
M* (Non-leak)	FPM		
N	FPM	H	
P	EPR		
Q	PTFE(FPM)		
S	PTFE(FPM)	B	Brass, Copper
T*	NBR		
V* (Non-leak)	FPM		
X*	FPM		
Y* (Non-leak)	FPM		

Note) The * mark in the option symbols is for non-lube style. For other options,"–X21"at the end of product number represents non-lube option.

Fluid and Options

Fluid(Application)	Option symbol and body material	
	Brass	SUS304
Argon	F	L
Argon(long life)	X	—
Ethyl Alcohol	F, B	L, J
Ethylene glycol	B	J
Ozone(low concentration)	B	J
Caustic soda	—	J
Air(dry)	T	—
Gas oil	A	H
Silicon oil	A	H
Fuel oil(Up to 60°C)	A	H
Fuel oil(Up to 100°C)	D	N
Steam system(water for boiler)	—	G, J
Steam system(Steam)	S	Q
Steam system(condensate)	E	P
Vacuum(Up to10^{-3}Torr)	V	M
Vacuum(Up to10^{-3}Torr,long life)	Y	—
Insulating coil	A	H
Trichloroethylene	—	K
Trichloro ethane	—	K
Naphtha	A	H
Perchloroethylene	A	H
Brake oil	B	J
Helium	V	M
Non-leak(10^{-5}atm cc/sec)	V	M
Non-leak(10^{-5}atm cc/sec, long life)	Y	—
Water(Up to 99°C)	D, E	N, P
Methyl alcohol	B	J

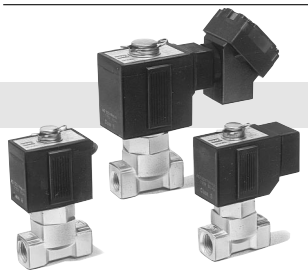
Note 1) The leakage amount (10^{-5}atm cc/sec) of "V", "M", "Y" options are values when differential pressure is 0.1MPa.

Note 2) When using other fluids, contact SMC.

Applicable Fluid Check List

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

Energized Closed (N.O.)



Refer to p.4.1-4, 4.1-5 for specifications and models.

Option Symbol and Configuration

Option symbol	Seal material	Coil insulation	Body, Shading coil material	Holder material (In core assembly)
Standard	NBR	B	Brass, Copper	Polyacetal
A	FPM			
B	EPR			
C	PTFE			Stainless steel
D	FPM	H		
E	EPR			
F*	FPM	B		Polyacetal
G	NBR		Stainless steel, Silver	
H	FPM			
J	EPR			
K	PTFE			Stainless steel
L*	FPM			Polyacetal
M* (Non-leak)	FPM			
N	FPM	H		Stainless steel
P	EPR			
Q	PTFE(FPM)			
S	PTFE(FPM)		Brass, Copper	
T*	NBR	B		Polyacetal
V* (Non-leak)	FPM			
X*	FPM	H		Stainless steel

Note 1) Grease has been applied to the core part of option symbol "D"and standard.
Note 2) The ∗ mark in the option symbols is for non-lube style. For other options, "–X21"at the end of product number represents the non-lube option.

Fluid and Options

Fluid (Application)	Option symbol and body material	
	Brass	Stainless steel
Argon	F	L
Ethyl alcohol	F, B	L, J
Ethylene glycol	B	J
Caustic soda(25%≧)	—	J
Air (Dry)	Standard	—
Gas oil	A	H
Silicon oil	A	H
Fuel oil (Up to 60°C)	A	H
Steam system (Water for boiler)	—	G, J
Steam system (Steam)	S	Q
Steam system (Condensate)	E	P
Vacuum (Up to10^{-3}Torr)	V	M
Insulating oil	A	H
Trichloroethylene	—	K
Trichloro ethane	—	K
Perchloroethylene	A	H
Brake oil	B	J
Helium	V	M
Non-leak (10^{-5}atm cc/sec)	V	M
Water (Up to 99°C)	X, E	N, P

Note 1) The leakage amount (10^{-5}atm cc/sec) of "V", "M", option is value when differential pressure is 0.1MPa.
Note 2) When using other fluids, contact SMC.

Applicable Fluid Check List

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

Energized Open (N.C.)

Refer to p.4.1-12, 4.1-13 for specifications and model.

Option Symbol and Configuration

Option symbol	Seal material	Coil insulation	Body, Shading coil material
Standard	NBR	B	Aluminium, Copper
A	FPM		
B	EPR		
D	FPM	H	
E	EPR		
F*	FPM	B	
R* (Non-leak)	FPM		Aluminium, Silver
T*	NBR		Aluminium, Copper
V* (Non-leak)	FPM		
X*	FPM		
Y* (Non-leak)	FPM		

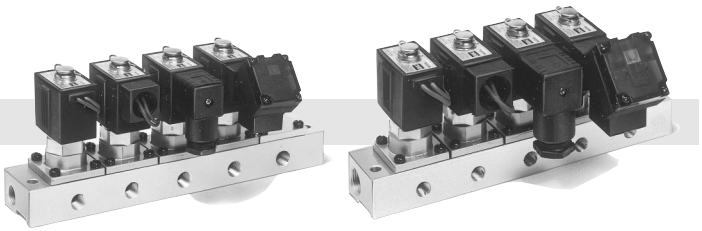
Note) The ∗ mark in the option symbols is for non-lube style. For other options,"–X21" at the end of product number represents the non-lube option.

Fluid and Options

Fluid (Application)	Option symbol
Argon	F
Argon (Long life)	X
Ozone (Low concentration)	B
Air (Dry)	T
Gas oil	A
Silicon oil	A
Fuel oil (up to 60°C)	A
Vacuum (10^{-3}Torr)	V
Vacuum (10^{-3}Torr, long life)	Y, R
Insulating oil	A
Naptha	A
Non-leak (10^{-5}atm cc/sec)	V
Non-leak (10^{-5}atm cc/sec, long life)	Y, R
Perchloroethylene	A
Brake oil	B
Helium	V

Note 1) The leakage amount (10^{-5}atm cc/sec) of "V", "R", "Y" option is value when differential pressure is 0.1MPa.
Note 2) When using other fluids, contact SMC.

Energized Closed (N.O.)



Refer to p.4.1-14, 4.1-15 for specifications and models.

Option Symbol and Configuration

Option symbol	Seal material	Coil insulation	Body, Shading coil material	Holder material (In core assembly)
Standard	NBR	B	Aluminum, Copper	Polyacetal
A	FPM			
B	EPR			
D	FPM	H		Stainless steel
E	EPR			
F*	FPM	B		Polyacetal
R* (Non-leak)	FPM		Aluminum, Silver	
T*	NBR		Aluminum, Copper	
V(Non-leak)	FPM			
X*	FPM	H		Stainless steel

Note 1) Grease has been applied to the core part of option symbol "D" and "Standard".
Note 2) The ∗ mark in the option symbols is for non-lube style. For other options,"–X21" at the end of product number represents the non-lube option.

Fluid and Options

Fluid (Application)	Option symbol
Argon	F
Gas oil	A
Air (Dry)	Standard
Silicon oil	A
Fuel oil (Up to 60°C)	A
Vacuum (Up to 10^{-3}Torr)	V, R
Insulating oil	A
Non-leak (10^{-5}atm cc/sec or less)	V, R
Perchloroethylene	A
Brake oil	B
Helium	V

Note 1) The leakage amount (10^{-5}atm cc/sec) of "V" and "R" option is value when differential pressure is 0.1MPa.
Note 2) When using other fluids, contact SMC.

Applicable Fluid Check List

Pilot Operated 2 Port Solenoid Valve Series VXD21/22/23

Energized Open (N.C.)

Refer p.4.1-18, 4.1-19 for specifications and models.

Option Symbol and Configuration

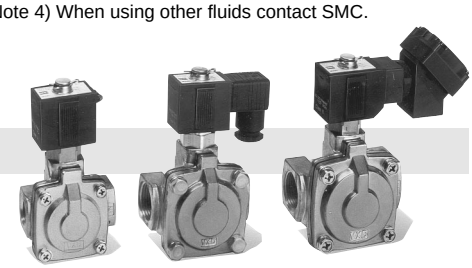
Option symbol	Seal material	Coil insulation	Body, Shading coil material
Standard	NBR	B	Brass, Copper or BC6
A	FPM		
B	EPR		
D	FPM	H	
E	EPR		
F*	FPM	B	Stainless steel Silver(10 to 25A) Not available for 32A to 50A
G	NBR		
H	FPM		
J	EPR		
L*	FPM		
N	FPM	H	
P	EPR		
T*	NBR	B	Brass, Copper or BC6
X*	FPM		

Note) The ∗ mark in the option symbols is for non-lube style. For other options"–X21"at the end of product number represents the non-lube option.

Fluid and Options

Fluid(Application)	Option symbol and body material	
	Brass or BC6	Stainless steel
Applied Valve	10A to 50A	10A to 25A
Argon	F	L
Argon (Long life)	X	—
Ethyl alcohol	F, B	L, J
Ethylene glycol	B	J
Caustic soda (25%≧)	—	J
Air (Dry)	T	—
Gas oil	A	H
Silicon oil		
Fuel oil (Up to 60°C)	A	H
Fuel oil (Up to100°C) (3)	D	N
Steam system (Water for boiler)	—	G, J
Steam system (Condensate)	E	P
Insulating oil	A	H
Naphtha	A	H
Perchloroethylene	A	H
Brake oil	B	J
Water(Up to 99°C) (3)	D, E	N, P

Note 1) The option "T" and "X" are long life core style.
Note 2) 10A to 25A are brass and 32A to 50A are BC6.
Note 3) The highest operating temperature of 32A to 50A is 80°C.
Note 4) When using other fluids contact SMC.



Energized Closed (N.O.)

Refer p.4.1-20, 4.1-21 for specifications and models.

Option Symbol and Configuration

Option symbol	Seal material	Coil insulation	Body, Shading coil material	Holder material (In core assembly)
Standard	NBR	B	Brass or BC6, Copper	Polyacetal
A	FPM			
B	EPR			
D	FPM	H		Stainless steel
E	EPR			
F*	FPM	B	Stainless steel Silver(10 to 25A) Not available for 32A to 50A	Polyacetal
G	NBR			
H	FPM			
J	EPR			
L*	FPM			
N	FPM	H		Stainless steel
P	EPR			
T*	NBR	B	Brass or BC6, Copper	Polyacetal
X*	FPM	H		Stainless steel

Note 1) Grease has been applied to the core part of option symbol "D" and standaard.
Note 2) The ∗ mark in the option symbols is for the non lube style. For other options, "–X21" at the end of the product number represents the non-lube option.

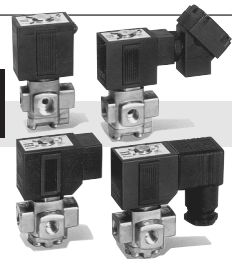
Fluid and Options

Fluid(Application)	Option symbol and body material	
	Brass or BC6	Stainless steel
Applied valve	15A to 50A	15A to 25A
Argon	F	L
Caustic soda(25%≧)	—	J
Air(Dry)	Standard	—
Gas oil	A	H
Silicon oil	A	H
Fuel oil (Up to 60°C)	A	H
Fuel oil (Up to 100°C) (2)	D	N
Steam system (Water for boiler)	—	G, J
Steam system(Condensate)	E	P
Insulation oil	A	H
Perchloroethylene	A	H
Brake oil	B	J
Water (Up to 99°C)	E	N, P

Note 1) 15A to 25A are brass and 32A to 50A are BC6
Note 2) The highest operating temperature of 32A to 50A is 80°C.
Note 3) When using other fluids, contact SMC.

Applicable Fluid Check List

Direct Operated 3 Port Solenoid Valve Series VX31/32/33



Energized Open (N.C.), Energized Closed (N.O.), Common (C.O.)

Refer to p.4.1-48, 4.1-49 for specifications and models.

Option Symbol and Configuration

Option symbol	Seal material	Coil insulation	Body, Shading coil material	Support material (In valve assembly)
Standard	NBR	B	Brass, Copper	Polyacetal
A	FPM			
B	EPR			
C	PTFE			Stainless steel
D	FPM	H		
E	EPR			
F*	FPM	B		Polyacetal
G	NBR		Stainless steel, Silver	
H	FPM			
J	EPR			
K*	PTFE			Stainless steel
L*	FPM			Polyacetal
M* (Non-leak)	FPM			
N	FPM	H		Stainless steel
P	EPR			
Q	PTFE(FPM)			
S	PTFE(FPM)		Brass, Copper	
T*	NBR	B		Polyacetal
V* (Non-leak)	FPM			
X*	FPM	H		Stainless steel

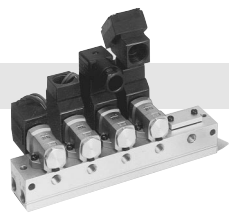
Note 1) Grease has been applied to the core part of option symbol "D" and "Standard".
Note 2) The ∗ mark in the option symbols is for non-lube style. For other options, "–X21" at the end of product number represents the non-lube option.

Fluid and Options

Fluid(Application)	Option symbol and body material	
	Brass	Stainless steel
Argon	F	L
Caustic soda(25%≧)	—	J
Air(Dry)	Standard	—
Gas oil	A	H
Silicon oil	A	H
Vacuum system(for pad)	Standard	—
Vacuum(upto 10^{-3}Torr)	V	M
Fuel oil(upto 60°C)	A	H
Steam System(water for boiler)	—	G, J
Steam System(Steam)	S	Q
Steam System(condensate)	E	P
Trichloroethylene	—	K
Trichloro ethane	—	K
Perchloroethylene	A	H
Brake oil	B	J
Helium	V	M
Non-leak(10^{-5}atm cc/sec)	V	M
Water (High temperature)	E, X	N, P

Note 1) The leakage amount(10^{-5}atm cc/sec) of "V", "M" option is valued when differential pressure is 0.1MPa.
Note 2) When using other fluids, contact SMC.

Manifold Series VVX31/32/33



Energized Open (N.C.), Energized Closed (N.O.), Common (C.O.)

Refer to p.4.1-54, 4.1-55 for specifications and models.

Option Symbol and Configuration

Option symbol	Seal material	Coil insulation	Body, Shading coil material	Support material (In valve assembly)
Standard	NBR	B	Aluminium, Copper	Polyacetal
A	FPM			
B	EPR			
D	FPM	H		Stainless steel
E	EPR			
F*	FPM	B		Polyacetal
R* (Non-leak)	FPM		Brass, Copper (3)	
T*	NBR		Aluminium, Copper	
V* (Non-leak)	FPM		Brass, Copper (3)	
X*	FPM	H	Aluminium, Copper	Stainless steel

Note 1) Grease has been applied to the core part of option symbol "D" and "Standard".
Note 2) The ∗ mark in the option symbols is for non-lube style. For other options, "–X21" at the end of product number represents the non-lube option.
Note 3) Manifold base material:Aluminium.

Fluid and Options

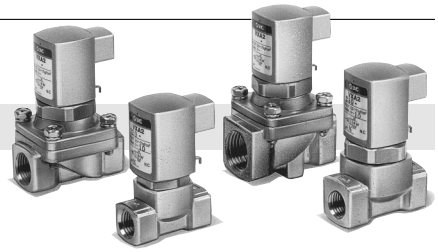
Fluid(Application)	Option symbol
Argon	F
Air(Dry)	Standard
Gas oil	A
Silicon oil	A
Fuel oil (Up to 60°C)	A
Vacuum (For pad)	Standard
Vacuum (Upto 10^{-3}Torr)	V
Perchloroethylene	A
Brake oil	B
Helium	V
Non-leak (10^{-5}atm cc/sec)	V

Note 1) The leakage amount (10^{-5}atm cc/sec)of "V" option is value when differential pressure is 0.1MPa.
Note 2) When using other fluids, contact SMC.

Applicable Fluid Check List

2 Port Direct Air Operated Series VXA21/22

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



Refer to p.4.1-58, 4.1-59 for specifications and models.

Option Symbol and Configuration

Option Symbol	Seal material	Body material	Holder material (Driving parts)
Standard	NBR	Brass	Polyacetal
A	FPM		
B	EPR		
G	NBR	Stainless Steel	
H	FPM		
J	EPR		
M* (Non-leak)	FPM		
N	FPM		Stainless Steel
P	EPR		
V* (Non-leak)	FPM	Brass	Polyacetal

Note) Grease for vacuum has been applied to the sliding part of option symbol "M", "V", silicone grease to the other options.

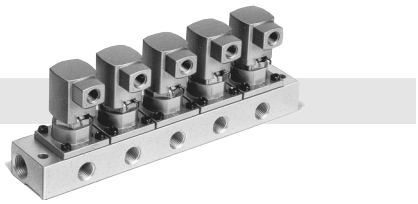
Fluid and Options

Fluid(Application)	Option symbol and body material	
	Brass	Stainless steel
Silicon oil	A	H
Vacuum (Up to 10^{-3}Torr)	V	M
Fuel oil (Up to 60°C)	A	H
Insulating oil	A	H
Non-leak (10^{-5}atm cc/sec)	V	M
Brake oil	B	P
Water (Up to 60°C)	A	H

Note 1) The leakage amount(10^{-5}atm cc/sec)of "V" option is valued when differential pressure is 0.1MPa.
Note 2) When using other fluids, contact SMC.

Manifold Series VVXA21/22

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



Refer to p.4.1-64, 4.1-65 for specifications and models.

Fluid and Option

Option symbol	Seal material	Body material	Holder material (Driving parts)
Standard	NBR	Aluminium	Polyacetal
A	FPM		
B	EPR		
V* (Non-leak)	FPM		

Note) Grease for vacuum has been applied to the sliding part of option symbol "V", silicone grease to the other options.

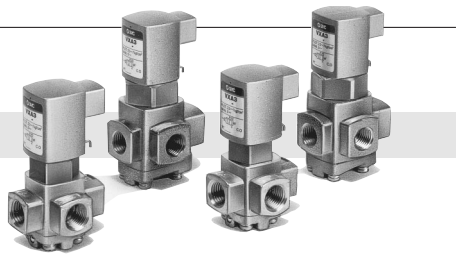
Fluid and Options

Fluid(Application)	Option symbol
Silicone oil	A
Vacuum (Up to 10^{-3}Torr)	V
Fuel oil (Up to 60°C)	A
Insulating oil	A
Brake oil	B
Non-leak (10^{-5}atm cc/sec)	V

Note 1) The leakage amount (10^{-5}atm cc/sec) of "V" option is valued when differential pressure is 0.1MPa.
Note 2) When using other fluids,contact SMC.

Applicable Fluid Check List

3 Port Direct Air Operated Series VXA31/32



Common (C.O.)

Refer to p.4.1-68, 4.1-69 for specifications and models.

Option Symbol and Configuration

Option symbol	Seal material	Body material	Support material (Driving Parts)
Standard	NBR	Brass	Polyacetal
A	FPM		
B	EPR		
G	NBR	Stainless steel	
H	FPM		
J	EPR		
M* (Non-leak)	FPM		
N	FPM		Stainless steel
P	EPR		
V* (Non-leak)	FPM	Brass	Polyacetal

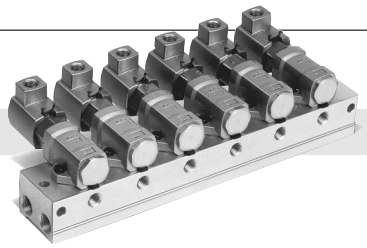
Note) Grease for vacuum has been applied to the sliding part of option symbol "M", "V". Silicone grease to the other options.

Fluid and Options

Fluid(Application)	Option symbol and Body material	
	Brass	Stainless steel
Silicon oil	A	H
Vacuum (Up to 10^{-3}Torr)	V	M
Fuel oil (Up to 60°C)	A	H
Insulating oil	A	H
Non-leak (10^{-5}atm cc/sec)	V	M
Brake oil	B	P
Water (Up to 60°C)	A	H

Note 1) The leakage amount (10^{-5}atm cc/sec) of "V", "M" option is valued when differential pressure is 0.1MPa.
Note 2) When using other fluids, contact SMC.

Manifold Series VVXA31/32



Common (C.O.)

Refer to p.4.1-74, 4.1-75 for specifications and models.

Option Symbol and Configuration

Option symbol	Seal material	Body material	Support material (Driving Parts)
Standard	NBR	Aluminium	Polyacetal
A	FPM		
B	EPR		
V* (Non-leak)	FPM	Brass (2)	

Note 1) Grease for vacuum has been applied to the sliding part of option symbol "V", silicone grease to the other options.
Note 2) Manifold base material: Aluminium

Fluid and Options

Fluid(Application)	Option symbol
Vacuum (Up to 10^{-3}Torr)	V
Vacuum pad	Standard
Non-leak (10^{-5}atm cc/sec)	V
Brake oil	B

Note 1) The leakage amount (10^{-5}atm cc/sec) of "V"option is valued when differential pressure is 0.1MPa.
Note 2) When using other fluids, contact SMC.

Glossary

Pneumatic Terms

① Max. operating pressure differential
This pressure difference is the highest pressure difference allowable to operate (a difference between the pressures in the primary slide and the secondary side) in an open state and the closed state of valve. A case of 0 kgf/cm² in the secondary side results in the highest operating pressure.

② Min. operating pressure differential
This pressure difference is the lowest pressure difference (a difference between the pressures in the primary side and secondary side) required to hold the main valve fully open.

③ Max. system presure
This pressure is the limit of pressure that can be applied to pipe line (Line pressure) [the pressure difference in a solenoid valve must be maintained less than the highest operating pressure difference.]

④ Proof pressure.
This is the pressure that can be withstood without deterioration of the performance when valve returnes within the range of the operating pressure.(A value under a specified condition.)

⑤ Vaccuum pressure (Torr)
The absolute pressure is expressed.
0 Torr=Absolute pressure
0.760 Torr=Atmospheric pressure
(Gauge pressure 0 Kgf/cm2)
(1 torr=1.33 X 102 Pa)

Electrical Terms

① Volt-ampere(VA)
Volt-ampere is the product of voltage (V) and current (A). Power dissipation (W): For AC , W=V/A cosθ. For DC, W=V/A (Note) cosθ
(Note) cosθ shows power factor.

② Surge voltage
The surge voltage is a high voltage generated momentarily when cutting the power supply.

③ Hum sound
The hum sound is a noise generated through repeated adsorption and releasing on an armature adsorption surface. For an AC solenoid, no shading coil allows releasing by spring reaction because of the existance of a 0 point (twice per frequency) of the suction force.

Others

① Material
NBR: Nitrile rubber
FPM: Fluororubber
EPR: Ethylene-propylene rubber (=EPDM)
PTFE: Tetrafluoroethylene reain
Polyacetal (POM)

② Leakage amount
Vacuum leak amount 1atm·cc/sec: The leakage amount is 1cc per second in conversion to atmospheric pressure.
1atm·cc/sec=0.76 Torr·1/sec=760Lu/sec

③ Oil preserve treatment
After assembly, a valve is put through a parts washer to remove any oil used during assembly.

④ Symbol
The JIS symbol is (): this designates the valve to be normally closed. However, in situations where the secondary pressure exceeds the primary side pressure, the resulting back pressure will cause back flow through the valve.

⚠ Caution

Check Safty Instructions on p.0-33 and common precautions on p.0-37 to 0-40.

Solenoid Coil Assembly

How to Order

VX021 — 001 C B T Z — 01

VX Solenoid coil assembly

Size parts No.		Applicable series
001	No.1 Solenoid	Series VX□21
002	No.2 Solenoid	Series VX□22
003	No.3 Solenoid	Series VX□23

Electrical entry

G	Grommet
C	Conduit
D	DIN connector

Coil insulation

B	Class B
H*	Class H

* DIN connector or DC not available.

Terminal box

—	Without terminal box
T	With terminal box

Option

—	Without option
S	With surge voltage suppressor
L	With light
Z	With light and surge voltage suppressor

Rated voltage (1)

01	100V AC 50/60Hz
02	200V AC 50/60Hz
03	110V AC 50/60Hz
04	220V AC 50/60Hz
05	24V DC
06	12V DC
07	240V AC 50/60Hz
08	48V AC 50/60Hz
13	24V AC 50/60Hz
23	440V AC 50/60Hz
51	6V DC
53	48V DC
55	100V DC
56	110V DC

Note 1) The voltage codes, 01 through 08, are the same as the 1 through 8 voltage codes on the solenoid valve how to order.

Ordering Examples

Ex.1) Series VX21, 100V AC, Class B insulation, Grommet,
Part number: "**VX021-001GB-01**"
Ex.1) Series VX22, 220V AC, Class B insulation, DIN connector with terminal box
Part number: "**VX021-002DBT-04**"
Ex.1) Series VX23, 24V DC, Conduit terminal, with light and surge voltage surpressor,
Part number: "**VX021-003CBTZ-05**"

Coil Combination

("Electrical Entry"-"Coil Insulation"-"Electrical Option")

Electrical Entry	Without Option	With Option		
		Surge voltage suppressor	Light (1)	Surge voltage (1) suppressor and light
Grommet	GB	GBS	—	—
	GH	—	—	—
Conduit	CB	—	—	—
	CH	—	—	—
	CBT	CBTS	CBTL	CBTZ
	CHT	CHTS	CHTL (2)	CHTZ (2)
DIN Connector	DB	—	—	—
	DBT	DBTS	DBTL	DBTZ

Note 1) Applicable Voltage: 100V AC, 200V AC, 110V AC, 220V AC, 24V DC
Note 2) Applicable Voltage: 100V AC, 200V AC, 110V AC, 220V AC

Made to Order

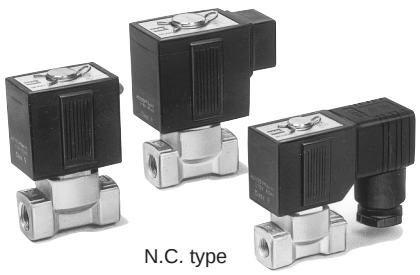
Splash Proof Specification (Based on JIS-C-0920 Based on IEC529IP-X4)

Add "–X36" suffix to the end of solenoid coil part No.

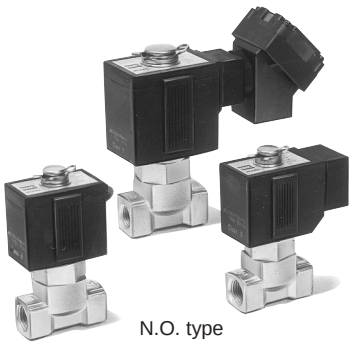
Direct Operated 2 Port Solenoid Valve

Series VX21/22/23

For Air, Gas, Vacuum, Water, Steam and Oil



N.C. type



N.O. type

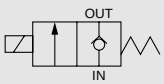
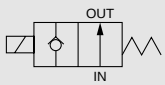
Proper selection of body and sealing materials permits application of a wide variety of fluids.

Application can be matched by simply choosing body materials (brass, Stainless steel), seal materials (NBR, EPR, FPM, PTFE) and the solenoid coil (class B, class H).

Can be quickly disassembled and reassembled.

Variations

Valve

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

Solenoid coil

Coils: Class B, Class H

Voltage

□AC
Standard —— 100V, 200V
Option —— 48V, 110V, 220V, 240V

□DC
Standard —— 24V
Option —— 12V

Material

Body —— Brass, Stainless steel
Seal —— NBR, FPM, EPR, PTFE

Electrical entry

- Grommet
- Conduit
- DIN connector
- Conduit Terminal

Model

Model	Port size Rc(PT)	Orifice size (mmø)
VX211$^{2}_{0}$	1/8, 1/4	2
VX212$^{2}_{0}$	1/8, 1/4	3
VX213$^{2}_{0}$	1/8, 1/4	4.5
VX222$^{2}_{0}$	1/4, 3/8	3
VX223$^{2}_{0}$	1/4, 3/8	4.5
VX224$^{2}_{0}$	1/4, 3/8	6
VX2250	1/4, 3/8	8
VX2260	1/4, 3/8, 1/2	10
VX232$^{2}_{0}$	1/4, 3/8	3
VX233$^{2}_{0}$	1/4, 3/8	4.5
VX234$^{2}_{0}$	1/4, 3/8	6
VX2350	1/4, 3/8	8
VX2360	1/4, 3/8, 1/2	10

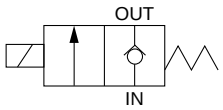
Energized Open (N.C.)

Applicable Fluids

Standard	Option Note)
Water (Standard Up to 60°C) Air (Standard, Dry), Turbine oil Vacuum (Up to 1 Torr) Carbon dioxide (CO_2), Nitrogen gas (N_2) Freon 11, 113, 114	Steam ····· (S, Q) Vacuum (Up to 10^{-3} Torr) ····· (V, M) Non-leak (10^{-5} atm cc/sec or less) ····· (V, M) High temperature water ····· (D, E, N, P) High temperature oil ····· (D, N) Argon, Helium ····· (F) Others

Note) Refer to "Applicable Fluid Check List" p.4.0-5 for detail of a special fluid out of the standard and the option specifications.

Symbol



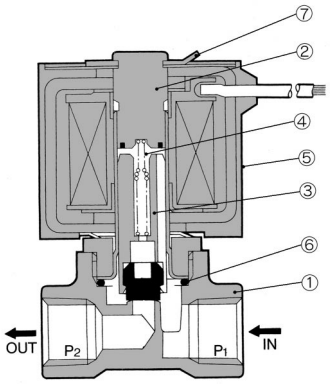
Model/Valve Specifications <Energized open>

Port Size	Orifice size ø (mm)	Flow rate Cv	Flow rate Effective area (mm²)	Model	Max. operating pressure differential (MPa) Water AC	Water DC	Air AC	Air DC	Oil AC	Oil DC	Steam AC	Max. system pressure (MPa)	Proof pressure (MPa)	(1) Weight (g)
1/8 (6A)	2	0.17	3	**VX2110-01**	2.0	1.5	2.0	1.5	1.5	1.5	1.0	Water oil air 3.0 Steam 1.0	5.0	260
	3	0.33	6	**VX2120-01**	0.9	0.5	1.1	0.6	0.5	0.5	1.0			
	4.5	0.61	11	**VX2130-01**	0.4	0.2	0.45	0.2	0.2	0.15	0.45			
1/4 (6A)	2	0.17	3	**VX2110-02**	2.0	1.5	2.0	1.5	1.5	1.5	1.0			
	3	0.33	6	**VX2120-02**	0.9	0.5	1.1	0.6	0.5	0.5	1.0			
				VX2220-02	1.7	1.5	2.0	1.5	1.2	1.2	1.0			400
				VX2320-02	2.5	3.0	3.0	3.0	1.7	2.0	—			540
	4.5	0.61	11	**VX2130-02**	0.4	0.2	0.45	0.2	0.2	0.15	0.45			260
				VX2230-02	0.6	0.35	0.75	0.35	0.35	0.3	0.75			400
				VX2330-02	0.85	0.9	1.0	0.9	0.55	0.85	1.0			540
	6	1.05	19	**VX2240-02**	0.35	0.15	0.4	0.15	0.2	0.1	0.4			400
				VX2340-02	0.55	0.3	0.5	0.35	0.35	0.3	0.5			540
	8	1.7	31	**VX2250-02**	0.13	0.08	0.15	0.08	0.1	0.08	0.15	Water oil air 1.0 Steam 0.5	3.0	510
				VX2350-02	0.17	0.2	0.2	0.2	0.14	0.2	0.2			650
	10	1.9	34	**VX2260-02**	0.08	0.03	0.08	0.03	0.05	0.03	0.08			510
				VX2360-02	0.1	0.07	0.1	0.07	0.08	0.07	0.1			650
3/8 (10A)	3	0.33	6	**VX2220-03**	1.7	1.5	2.0	1.5	1.2	1.2	1.0	Water oil air 3.0 Steam 1.0	5.0	400
				VX2320-03	2.5	3.0	3.0	3.0	1.7	2.0	—			540
	4.5	0.61	11	**VX2230-03**	0.6	0.35	0.75	0.35	0.35	0.3	0.75			400
				VX2330-03	0.85	0.9	1.0	0.9	0.55	0.85	1.0			540
	6	1.05	19	**VX2240-03**	0.35	0.15	0.4	0.15	0.2	0.1	0.4			400
				VX2340-03	0.55	0.3	0.5	0.35	0.35	0.3	0.5			540
	8	1.7	31	**VX2250-03**	0.13	0.08	0.15	0.08	0.1	0.08	0.15	Water oil air 1.0 Steam 0.5	3.0	510
				VX2350-03	0.17	0.2	0.2	0.2	0.14	0.2	0.2			650
	10	2.4	43	**VX2260-03**	0.08	0.03	0.08	0.03	0.05	0.03	0.08			510
				VX2360-03	0.1	0.07	0.1	0.07	0.08	0.07	0.1			650
1/2 (15A)	10	2.4	43	**VX2260-04**	0.08	0.03	0.08	0.03	0.05	0.03	0.08			590
				VX2360-04	0.1	0.07	0.1	0.07	0.08	0.07	0.1			730

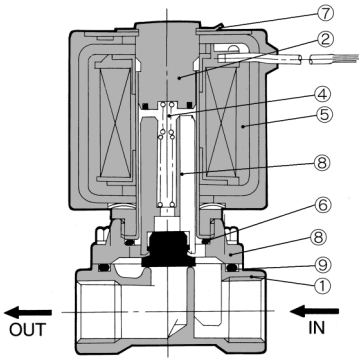
Note 1) Weight of grommet style. Add 10g for conduit style, 30g for DIN connector style, 60g for conduit terminal style respectively.
- Refer to the glossary p.4.0-14 for detail of max. operating pressure differential and max. system

Construction/Components

VX21/22/23 (Orifice size 2, 3, 4.5, 6mmø)



VX22/23 (Orifice size 8, 10mmø)



No.	Description	Material Standard	Material Option
①	Body	Brass	Stainless steel
②	Core assembly	Stainless steel/Copper	Stainless steel Silver
③	Armature assembly	Stainless steel/NBR	SUSF, PM/Stainless steel, PTFE/ Stainless steel, EPR
④	Return spring	Stainless steel	—
⑤	Coil assembly	Class B molded	Class H molded
⑥	O ring	NBR	FPM/EPR/PTFE
⑦	Retainer	Stainless steel	—
⑧	Bonnet	Brass	Stainless steel
⑨	O Ring	NBR	FPM/EPR/PTFE

Solenoid Specifications

Type	Power	Freq. Hz	Apparent Power VA Inrush	Apparent Power VA Holding	Power consumption W (Holding)	Temp. rise °C (Rated voltage)
VX21	AC	50	20	11	4.5	45
		60	17	7	3.2	35
	DC	—	—	—	6	55
VX22	AC	50	40	18	7.5	60
		60	35	12	6	50
	DC	—	—	—	8	60
VX23	AC	50	50	21	11	65
		60	45	17	9.5	60
	DC	—	—	—	11.5	65

Note)
- They are values in an ambient temperature of 20°C ± 5°C and application of rated voltage.
- Possible to exchange a coil from AC to DC during operation, but impossible to change from DC to AC. (Hum sound may generate because of no shading coil for DC.)
- Return voltage is 20% or more of the rated value at AC power and 2% or more at the DC power.
- Allowable voltage fluctuation is ±10% of the rated voltage.

Ambient and Fluid Temperature

Temp.	Power	Fluid Temperature Water (Std.)	Air (Std.)	Oil (Std.)	High temp. water (D, E, N, P)	(3) Oil (D, N)	(3) Steam (S, Q)	(3) Vacuum (V, M)	Ambient Temp. (°C)
Max.	AC	60	80	60	99	120	183	60	60
	DC	40	60	40	—	—	—	40	40
Min.	AC DC	1	(1) –10	(2) –5	—	—	—	—	—

Note 1) Dew point –10°C or less. Note 2) 50 cSt or less.
Note 3) Valve on option "V", "M", "Y" (Non-leak, vacuum).

Tightness of Valve(Leakage)

Seal \ Fluid	Air	Liquid	(3) Non-Leak Vacuum	Steam
NBR, FPM, EPR	$1cm^3/min$ or less	(1) $0.1cm^3/min$ or less	$10^{-5}atm^{cc}/sec$ or less	—
PTFE	(1) $150cm^3/min$ or less	(1) $5cm^3/min$ or less	—	(2) $50cm^3/min$ or less

Note 1) Differ from the operating conditions of pressure.
Note 2) Heat loss at 0.5 MPa is about 5kcal/h.
Note 3) Valve on option "V", "M", "Y" (Non-leak, Vacuum).

How to Order (Energized Open)

VX21 / VX22 / VX23 □ 0 □ □ □ □ □ □ □

Model
Select a model from the highest operating pressure difference and the characteristic figure of flow rate in p.4.1-6 and 4.1-7.

Orifice No.
1 — 2mmø
2 — 3mmø
3 — 4.5mmø
4 — 6mmø
5 — 8mmø
6 — 10mmø
∗ Refer to table ① for configuration.

Valve/Body
0 — Energized open/ single unit

Options
— — Standard
V — For vacuum/non-leak
S — For steam
Select an option symbol by the "Applicable Fluid Check List p.4.0-5 " for a special fluid out of the standard.

Port size
01 — 1/8
02 — 1/4
03 — 3/8
04 — 1/2
∗ Refer to table ① for configuration.

Thread
— — Rc(PT)
T — NPTF
F — G(PF)
N — NPT

Voltage
1 — 100V AC 50/60Hz
2 — 200V AC 50/60Hz
3 — 110V AC 50/60Hz
4 — 220V AC 50/60Hz
5 — 24V DC
6 — 12V DC
7 — 240V AC 50/60Hz
8 — 48V AC 50/60Hz
9 — Other (Contact SMC separately)
∗ Refer to table ② for configuration.
Refer to p.4.0-15 for ordering coil only.

Electrical entry
G — Grommet
C — Conduit
D — DIN connector
T — Conduit terminal
∗ Refer to table ② for configuration.

Options
— — None
S — With surge voltage suppressor
L — With indicator light
Z — With indicator light and surge voltage suppressor
∗ Refer to table ② for configuration.

Bracket
— — Without bracket
B — With bracket
∗ Refer to table ③ if bracket is separately ordered.

Table ① Port/Orifice Size

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

Table ② Voltage-Electrical Entry-Options

Insulation		Class B				Class H		
Electrical entry		G	C	D, T		G, C	T	
Options		S(1)	—	S	L, Z	—	S	L, Z
AC	**1** (100V)	●	●	●	●	●	●	●
	2 (200V)	●	●	●	●	●	●	●
	3 (110V)	●	●	●	●	●	●	●
	4 (220V)	●	●	●	●	●	●	●
	7 (240V)	●	●	●	—	●	●	—
	8 (48V)	●	●	●	—	—	●	—
DC	**5** (24V)	●	●	●	●	—	—	—
	6 (12V)	●	●	●	—	—	—	—

Note 1) Surge Voltage suppressor is attached to the lead wire.

Ordering Example

(Example) Series VX21, Orifice size 2 mmø, Rc(PT)1/8, 100V AC Grommet.
With surge voltage suppressor.
(Part number) **"VX2110-01-1G"**

Made to Order

Splash Proof Specification (Based on JIS-C-0920 / Based on IEC529IP-X4)

VX2 Model — Port size — Electrical entry - X36
DIN Connector or class H coil not available.

Table ③ Bracket Part Number

Type	Part number
VX21 1/3 0	VX070-020
VX22 2/4 0 VX23 3/4 0	VX070-022
VX22 5/6 0 VX23 5/6 0	VX070-029

VX
VN□
VQ

Energized Closed (N.O.)

Applicable Fluids

Standard	Option (1)
Water (Standard, Up to 60°C) Air (Standard, Dry), Turbine oil Vacuum (Up to 1 Torr) Carbon dioxide (CO_2), Nitrogen gas (N_2) Freon 11, 113, 114	Steam ····· (S, Q) Vacuum (10^{-3} Torr) ····· (V, M) Non-leak (10^{-5} atm cc/sec or less) ····· (V, M) High temperature water ····· (X, E, N, P) High temperature oil ····· (D, N) Others

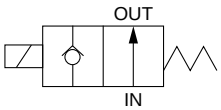
Note 1) Refer to "Applicable Fluid Check List" p.4.0-6 for detail of a special fluid out of the standard and the option specifications.
The standard product and the option "D" have application of grease on the armature.

Model/Valve Specifications <Energized closed>

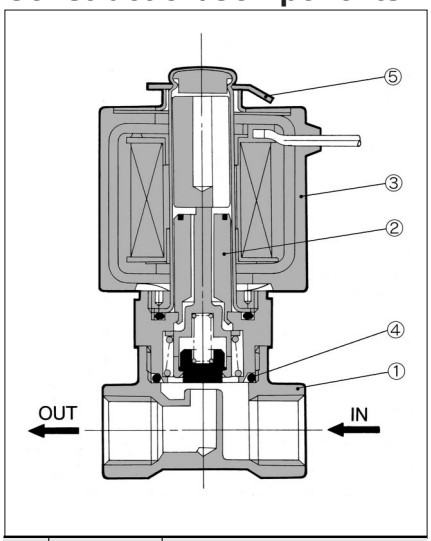
Port Size	Orifice size (mm)	Flow rate Cv	Flow rate Effective area (mm^2)	Model	Max.operating pressure differential (MPa) Water	Air	Oil	Steam	Max. system pressure (MPa)	Proof pressure (MPa)	(1) Weight (g)
1/8 (6A)	2	0.17	3	**VX2112-01**	0.9	1.5	0.8	1.0	Water oil air 3.0 Steam 1.0	5.0	280
	3	0.33	6	**VX2122-01**	0.45	0.7	0.45	0.7			
	4.5	0.61	11	**VX2132-01**	0.2	0.3	0.2	0.3			
1/4 (8A)	2	0.17	3	**VX2112-02**	0.9	1.5	0.8	1.0			
	3	0.33	6	**VX2122-02**	0.45	0.7	0.45	0.7			
				VX2222-02	0.8	1.0	0.7	1.0			440
				VX2322-02	1.2	1.6	1.0	–			580
	4.5	0.61	11	**VX2132-02**	0.2	0.3	0.2	0.3			280
				VX2232-02	0.3	0.45	0.3	0.45			440
				VX2332-02	0.6	0.8	0.6	0.8			580
	6	1.05	19	**VX2242-02**	0.15	0.25	0.15	0.25			440
				VX2342-02	0.35	0.45	0.35	0.45			580
3/8 (10A)	3	0.33	6	**VX2222-03**	0.8	1.0	0.7	1.0			440
				VX2322-03	1.2	1.6	1.0	–			580
	4.5	0.61	11	**VX2232-03**	0.3	0.45	0.3	0.45			440
				VX2332-03	0.6	0.8	0.6	0.8			580
	6	1.05	19	**VX2242-03**	0.15	0.25	0.15	0.25			440
				VX2342-03	0.35	0.45	0.35	0.45			580

Note 1) Weight of grommet style. Add 10g for conduit style, 30g for Din connector style ,60g for conduit terminal style, respectively.
- Refer to the glossary p.4.0-14 for detail of max. operating pressure differential and max. system pressure.

Symbol



Construction/Components



No.	Description	Material Standard	Material Option
①	Body	Brass	Stainless steel
②	Core assembly	Stanless steel, Copper, Polyacetal NBR, PTFE	Stainless steel, Silver, EPR, FPM, PTFE
③	Coil Assembly	Class B molded	Class H molded
④	O ring	NBR	EPR/FPM/PTFE
⑤	Retainer	Stainless steel	—

Solenoid Specification

Model	Power	Freq. Hz	Apparent power VA Inrush	Apparent power VA Holding	Power consumption W (Holding)	Temp. risc °C (Rated voltage)
VX21	AC	50	25	12	5	50
		60	20	8	3.5	35
	DC	—	—	—	6	50
VX22	AC	50	45	20	8	55
		60	40	15	6.5	45
	DC	—	—	—	8	50
VX23	AC	50	60	25	10.5	60
		60	50	20	9.5	50
	DC	—	—	—	11.5	55

Note)
- They are values in an ambient temperature of 20°C ± 5°C and application of rated voltage.
- Exchange from AC to DC and DC to AC is impossible because of a different core shape.
- Return voltage is 20% or more of the rated value at AC power and 5% or more at the DC power.
- Allowable voltage fluctuation is ± 10% of the rated voltage.

Ambient and Fluid Temperature

Temp.	Power	Fluid temperature Water (Std.)	Air (Std.)	Oil (Std.)	High temp. water (X, E, N, P) (3)	Oil (D, N) (3)	Steam (S, Q) (3)	Vacuum (V, M) (3)	Ambient temp. (°C)
Max.	AC	60	80	60	99	120	183	60	60
	DC	40	60	40	—	—	—	40	40
Min.	AC, DC	1	(1) –10	(2) –5	—	—	—	–10	–20

Note 1) Dew point –10°C or less
Note 2) 50 cST or less
Note 3) "X", "E", "N", "P" etc. in the parenthesis are option symbols.

Tightness of Valve (Leakage)

Seal \ Fluid	Air	Liquid	Non-leak Vacuum (3)	Steam
NBR, FPM EPR	$1cm^3$/min or less	$0.1cm^3$/ (1) min or less	$10^{-5}atm^{cc}$/ sec or less	—
PTFE	$150cm^3$/ (1) min or less	$5cm^3$/ (1) min or less	—	$50cm^3$/ (2) min or less

Note 1) Differ from the operating condition of pressure.
Note 2) Heat loss at 0.5 MPa is about 5kcal/h.
Note 3) Value on option "V", "M" (Non-leak, vacuum).

How to Order (Energized Closed)

VX21 / VX22 / VX23 □ 2 □ □ □ □ □ □ □

Model

Select a model from the highest operating pressure difference and the characteristics figure of flow rate in p.4.1-6 and 4.1-7.

Orifice No.
1 — 2mmø
2 — 3mmø
3 — 4.5mmø
4 — 6mmø

∗Refer to table ① for configuration.

Valve/Body
2 — Energized closed/single

Options
— — Standard
V — For vacuum, non-leak
S — For steam

Select an option symbol by the "Applicable Fluid Check List p.4.0-6 for a special fluid out of the standard.

Port size
01 — 1/8
02 — 1/4
03 — 3/8

∗Refer to table ① for configuration.

Thread
— — Rc(PT)
T — NPTF
F — G(PF)
N — NPT

Voltage
1 — 100V AC 50/60Hz
2 — 200V AC 50/60Hz
3 — 110V AC 50/60Hz
4 — 220V AC 50/60Hz
5 — 24V DC
6 — 12V DC
7 — 240V AC 50/60Hz
8 — 48V AC 50/60Hz
9 — Others (Contact SMC separately)

∗ Refer to table ② for configuration

Refer to p.4.0-15 for ordering coil only.

Electrical entry
G — Grommet
C — Conduit
D — DIn connector
T — Conduit terminal

∗ Refer to table ② for configuration.

Options
— — None
S — With surge voltage suppressor
L — With indicator light
Z — With indicator light and surge voltage suppressor

∗ Refer to table ② for configuration.

Bracket
— — Without bracket
B — with bracket

∗ Refer to table ③ if ordering for bracket separately.

Table ① Port/Orifice Size

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

Table ② Voltage-Electrical Entry

Insulation		Class B				Class H		
Electrical entry		G	C	D, T		G, C	T	
Options		S(1)	—	S	L, Z	—	S	L, Z
AC	1 (100V)	●	●	●	●	●	●	●
	2 (200V)	●	●	●	●	●	●	●
	3 (110V)	●	●	●	●	●	●	●
	4 (220V)	●	●	●	●	●	●	●
	7 (240V)	●	●	●	—	●	●	—
	8 (48V)	●	●	●	—	—	●	—
DC	5 (24V)	●	●	●	●	—	—	—
	6 (12V)	●	●	●	—	—	—	—

Note 1) Surge voltage suppressor is attached to the lead wire.

Ordering Example

(Example) Series VX22, Orifice size 4.5mmø, Rc(PT)1/4, 100V AC conduit (Part number) **"VX2232-02-1C"**

Made to Order

Splash Proof Specification (Based on JIS-C-0920 / Based on IEC529IP-X4)

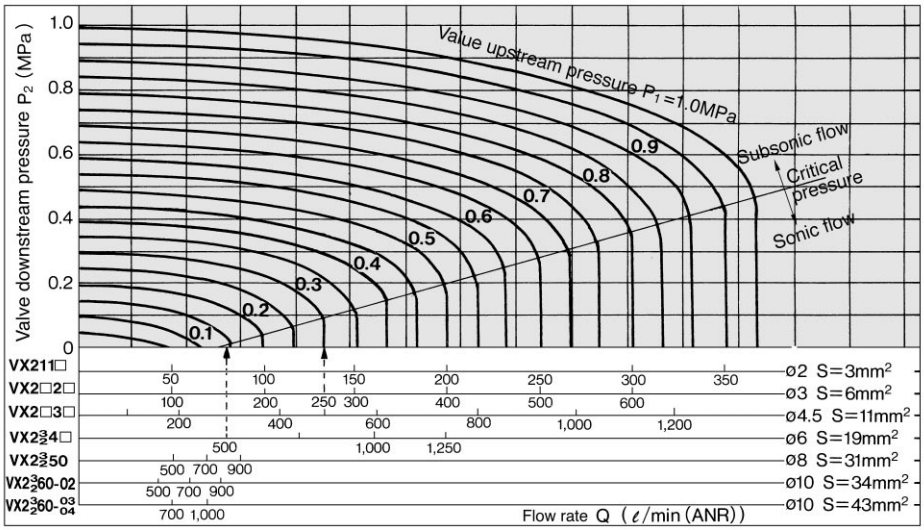
VX2 Model — Port size — Electrical entry - X36

DIN Connector or class H coil not available.

Table ③ Bracket Part Number

Type	Part number
VX21 1/2/3 0	VX070-020
VX22 2/3/4 0	VX070-022
VX23 2/3/4 0	

Air



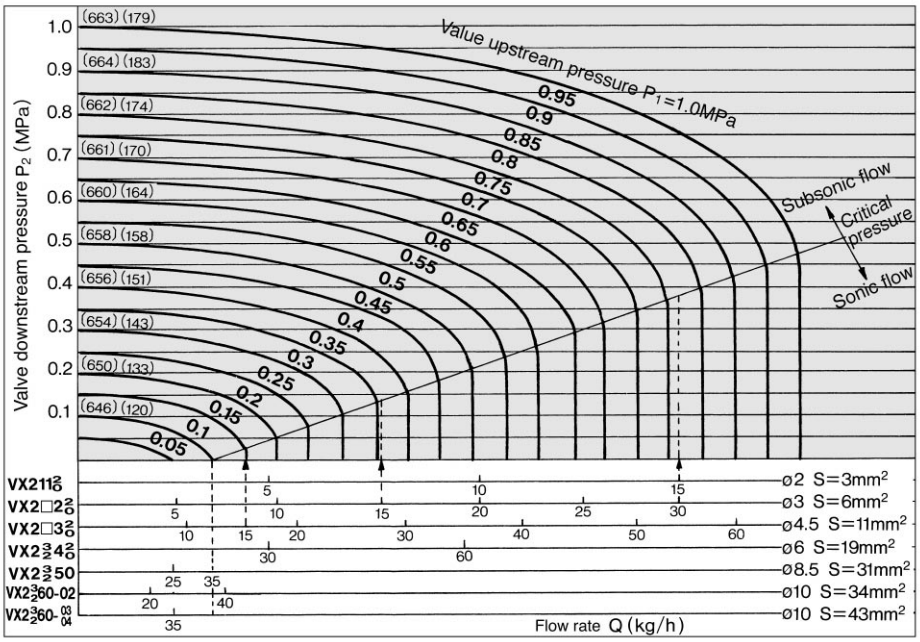
How to Read the Graph

In the sonic flow region:
For a flow of 500 ℓ/min.(ANR)
Orifice ø6(VX2240, 2340)···$P_1 \cong 0.14$MPa
Orifice ø4.5 valve(VX2□30, 2□31)
···$P_1 \cong 0.3$MPa

①Equation in the domain of subsonic flow
$P_1+0.1013=(1 \text{ to } 1.8941)(P_2+0.1013)$
- Calculation by Cv factor
$Q=4073.4 \cdot Cv \cdot \sqrt{\triangle P(P_2+0.1013)} \cdots$ ℓ/min(ANR)
- Calculation by Effective area
$Q=226.3 \cdot S \sqrt{\triangle P(P_2+0.1013)} \cdots\cdots$ ℓ/min(ANR)

②Equation in the domain of sonic flow
$P_1+0.1013 \geqq 1.8941(P_2+0.1013)$
- Calculation by Cv factor
$Q=1972.8 \cdot Cv \cdot (P_1+0.1013) \cdots$ ℓ/min(ANR)
- Calculation by effective area
$Q=109.6 \cdot S \cdot (P_1+0.1013) \cdots\cdots$ ℓ/min(ANR)

Saturated Steam



The figures in parentheses indicate a potential heat (kcal/kg) of saturated steam and a saturation temperature °C

How to Read the Graph

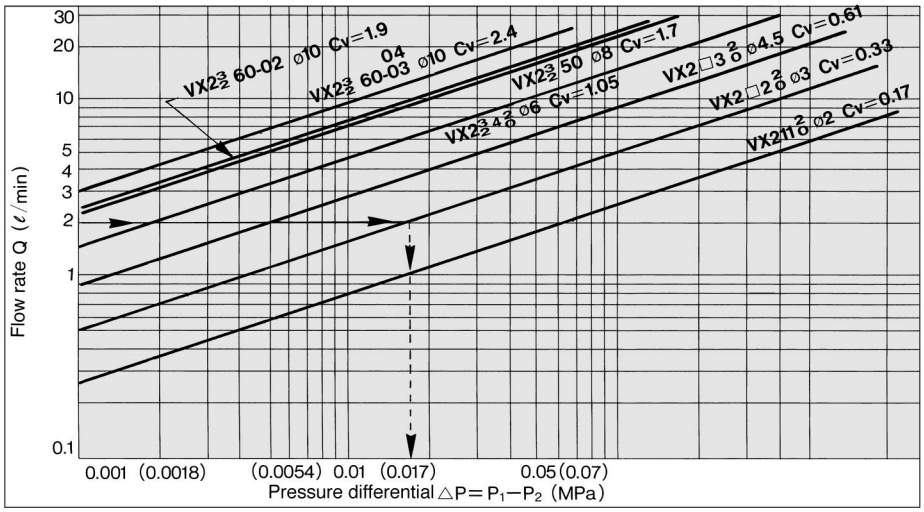
In the sonic flow region:
For a flow of 15kg/h
Orifice ø4.5 valve(VX2□3□S)···$P_1 \cong 0.15$MPa
Orifice ø3 valve(VX2□2□S)···$P_1 \cong 0.37$MPa
Orifice ø2 valve(VX211□S)···$P_1 \cong 0.82$MPa
Heat content will differ somewhat depending upon the pressure P_1, in the case of 15kgf/h heat transfer of about 9700 kcal/h is possible.

How to Calculate Flow/Saturated Steam

①Equation in the domain of subsonic flow
$P_1+0.1013=(1 \text{ to } 2)(P_2+0.1013)$
- Calculation by Cv factor
$Q=197.8 \cdot Cv \cdot \sqrt{\triangle P(P_2+0.1013)} \cdots\cdots$ kg/h
- Calculation by effective area
$Q=11.0 \cdot S \cdot \sqrt{\triangle P(P_2+0.1013)} \cdots\cdots$ kg/h

②Equation in the domain of sonic flow
$P_1+0.1013 \geqq 2(P_2+0.1013)$
- Calculation by Cv factor
$Q=98.9 \cdot Cv \cdot (P_1+0.1013) \cdots\cdots$ kg/h
- Calculation by effective area
$Q=5.5 \cdot S \cdot (P_1+0.1013) \cdots\cdots$ kg/

Water



How to Read the Graph

In the sonic flow of 2 ℓ/min.
Orifice ø3Valve(VX212□, 222□, 232□)
···△P ≅ 0.017MPa

How to Calculate Flow/Water

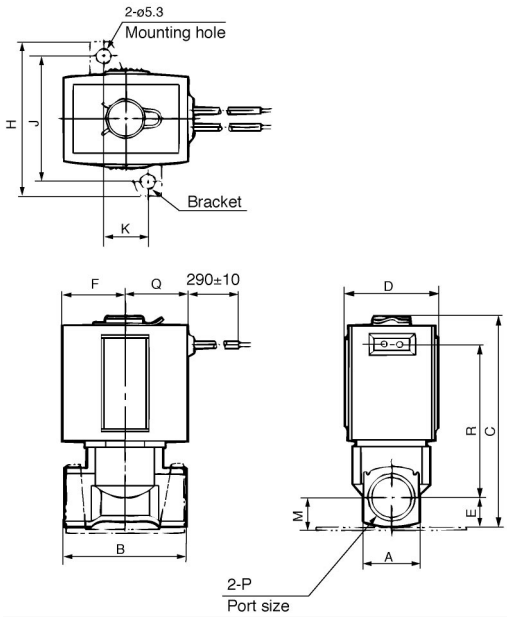
- Calculation by Cv
  $Q=14.2 \cdot Cv \cdot \sqrt{10.2 \cdot \triangle P}$ ·····ℓ/min
- Calculation by effective area[S mm²]
  $Q=0.8 \cdot S \cdot \sqrt{10.2 \cdot \triangle P}$ ·····ℓ/min

Q : Flow (Air ℓ/min(ANR)), (Steam kg/h), (Water ℓ/min)
△P : Pressure differential (P_1–P_2)
P_1 : Upstream pressure (MPa)
P_2 : Downstream pressure (MPa)
θ : Fluid temperature (°C)
S : Effective area (mm²)
Cv : Cv factor (/)

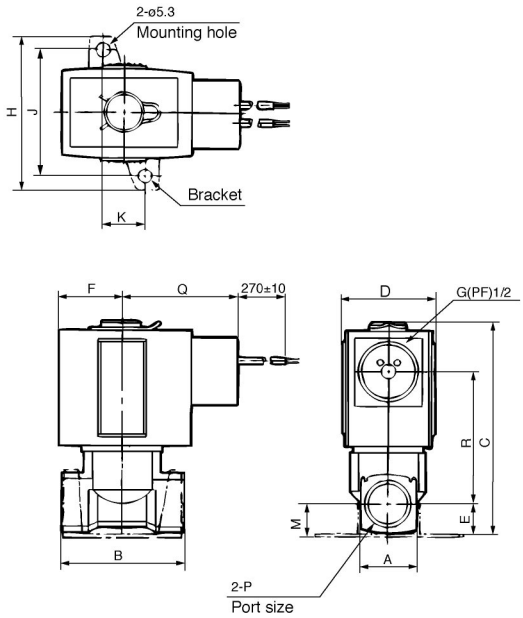
Dimensions (Orifice size 2mmø, 3mmø, 4.5mmø, 6mmø)

Energized Open/VX21$\frac{1}{3}$0, 22$\frac{2}{4}$0, 23$\frac{2}{4}$0, Energized Closed/VX21$\frac{1}{3}$2, 22$\frac{2}{4}$2, 23$\frac{2}{4}$2

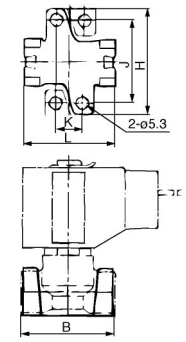
Grommet: G



Conduit: C

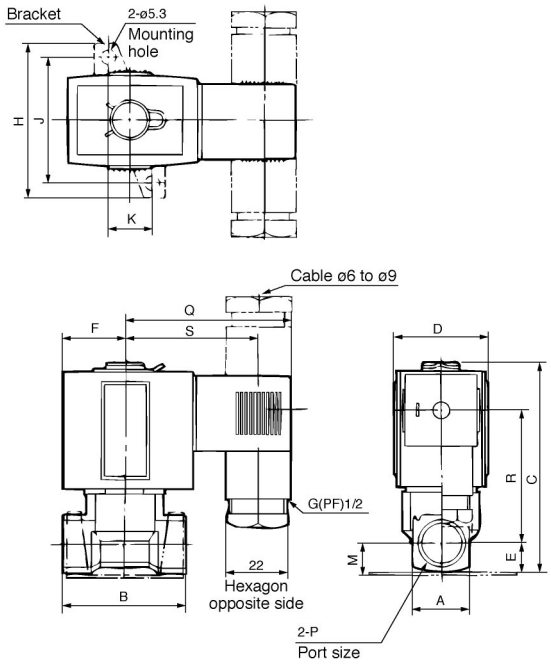


Option (Bracket)

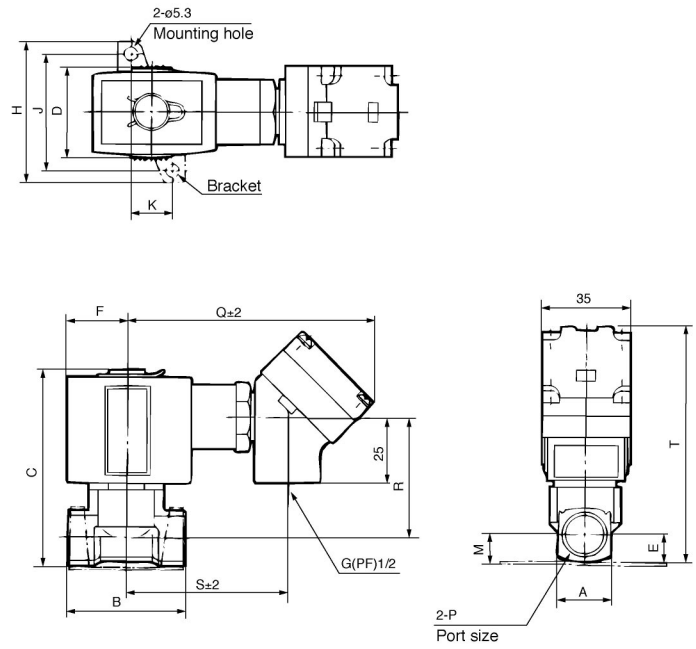


∗ Min. pitch for bracket is "H" mm.

DIN connector: D



Conduit terminal: T

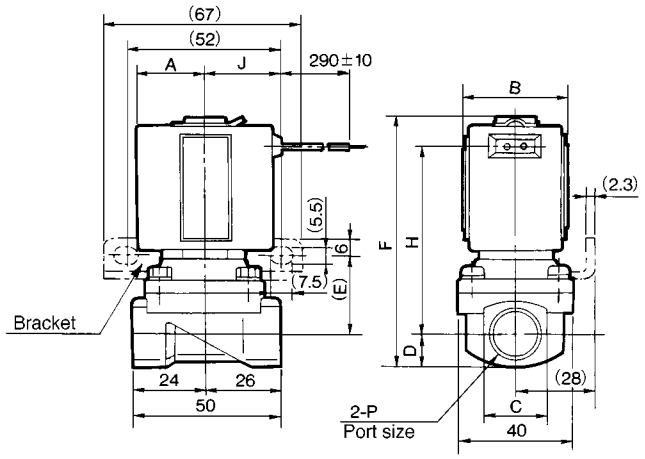


Model		P	A	B	C	D	E	F	Measurement for connection					Electrical entry									
														Grommet		Conduit		DIN connector			Conduit terminal			
Energized open	Energized closed	Port size Rc(PT)							H	J	K	L	M	Q	R	Q	R	Q	R	S	Q	R	S	T
VX21□0	**VX21□2**	1/8, 1/4	18	40	68 (78)	30	9	20	46	36	11	39	10	23	48 (55)	39	40 (47)	59	40 (47)	47	92	40 (47)	59	84 (91)
VX22□0	**VX22□2**	1/4, 3/8	21	45	76 (93)	35	10.5	23	56	46	13	44	11.5	25	56 (66)	41	47 (57)	60	47 (57)	48	95	47 (57)	62	94 (104)
VX23□0	**VX23□2**	1/4, 3/8	21	45	84 (99)	40	10.5	25.5	56	46	13	44	11.5	28	63 (73)	44	55 (65)	62	55 (65)	50	97	55 (65)	64	101 (111)

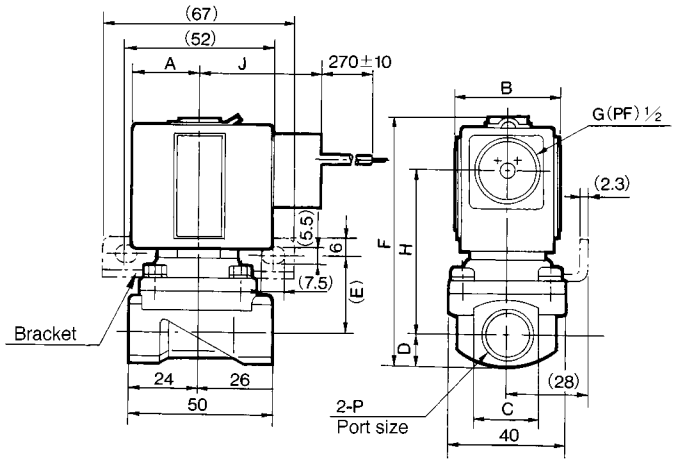
The figures in parentheses are when closed at energizing.

Dimensions (Orifice size 8mmø, 10mmø)
Energized Open/VX2250, 2260, 2350, 2360

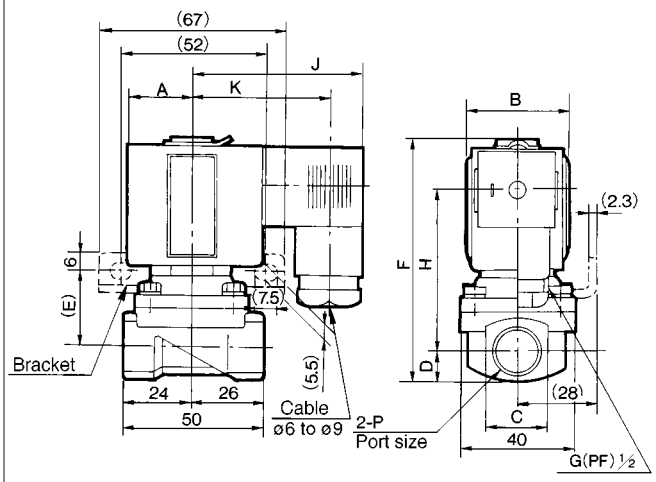
Grommet: G



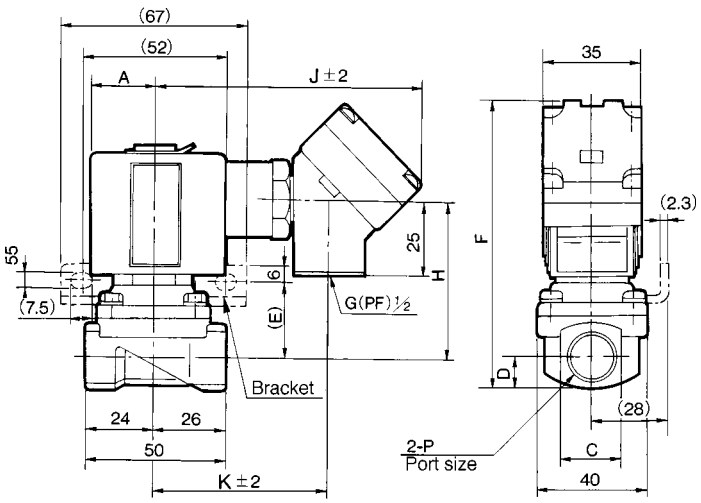
Conduit: C



DIN connector: D

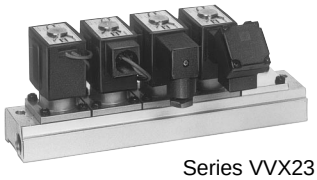


Conduit terminal: T

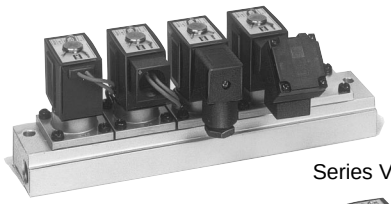


Model	P Port size Rc(PT)	A	B	C	D	E	Electrical entry													
							Grommet			Conduit			DIN connector				Conduit terminal			
Energized open							F	H	J	F	H	J	F	H	J	K	F	H	J	K
VX22$^{5}_{6}$0-$^{02}_{03}$	1/4	23	35	22	11	27	83	62	25.5	83	54	41	83	54	60	48	100	54	95	62
VX23$^{5}_{6}$0-$^{02}_{03}$	3/8	25.5	40				91	69	28	91	62	44	91	62	62	50	108	62	97	64
VX2260-04	1/2	23	35	28	14.5	30	89	65	25.5	89	57	41	89	57	60	48	106	57	95	62
VX2360-04		25.5	40				97	72	28	97	65	44	97	65	62	50	114	65	97	64

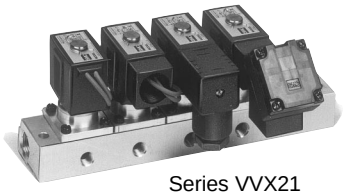
Direct Operated 2 Port Solenoid Valve/Manifold
Series VVX21/22/23
For Air, Gas, Vacuum and Oil



Series VVX23



Series VVX22



Series VVX21

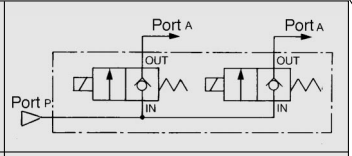
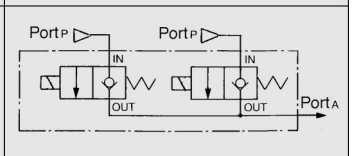
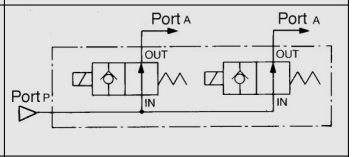
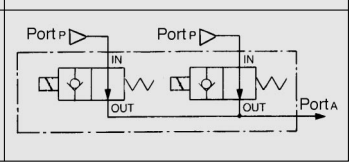
- **Common SUP style and individual SUP style (for vaccuum use) standard models.**
- **Extensive applicable fluid compatibility.**

  Application can be matched by simply choosing the correct seal materials (NBR, FRM or EPR).
- **It is possible to replace valve without changing existing piping.**
- **Weight-saving aluminium base and body.**
- **Brass base and stainless steel base are now available.**

  Contact SMC sales representative for the detail.

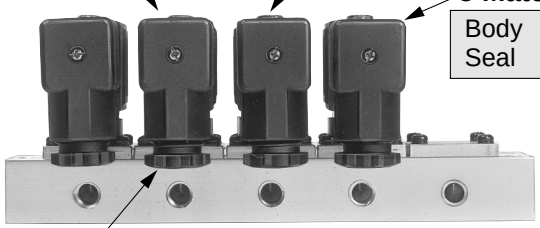
Variations

Valve

Energized open (N.C.)	Common SUP	
	Individual SUP	
Energized closed (N.O.)	Common SUP	
	Individual SUP	

Electrical entry

- Grommet
- Conduit
- DIN connector
- Conduit terminal



Voltage

☐AC	
Standard	100V, 200V
Option	48V, 110V, 220V, 240V
☐DC	
Standard	24V
Option	12V

Material

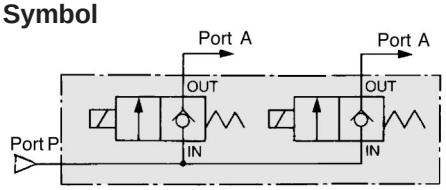
Body	Aluminium
Seal	NBR, FPM, EPR

Model

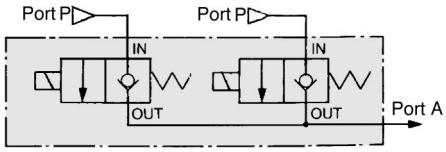
Manifold base model	Individual port Rc(PT)	Common port Rc(PT)
VVX211-stations	1/8	3/8
VVX212-stations	1/4	
VVX221-stations	1/8	
VVX222-stations	1/4	
VVX231-stations	1/8	
VVX232-stations	1/4	

Energized Open (N.C.)

Symbol



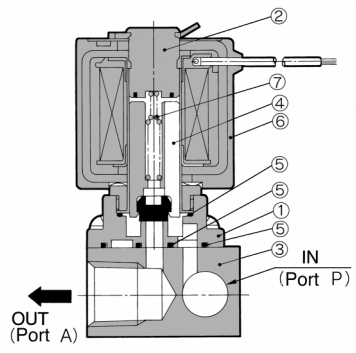
Common SUP style



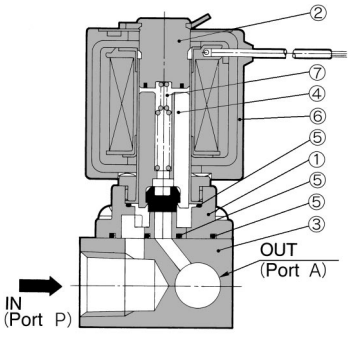
Individual SUP style

Construction/Components

Common SUP



Individual SUP



No.	Description	Material	
		Standard	Option
①	Body	Aluminium	—
②	Core assembly	Stainless steel, Copper	Stainless steel, silver
③	Base	Aluminium	—
④	Armature assembly	Stainless steel, NBR	Stainless steel, FPM/ Stainless steel, EPR
⑤	O ring	NBR	FPM/EPR
⑥	Coil assembly	Class B molded	Class H molded
⑦	Return spring	Stainless steel	—

Applicable Fluids

Standard	Option (1)
Air(Standard, dry), Turbin oil Vacuum (Up to 1 Torr) Carbon dioxide (CO_2), Nitrogen gas (N_2) Freon 11, 113, 114	Vacuum (Up to 10^{-3} Torr) ·····(V, R, Y) Non-leak (10^{-5} atm cc/sec or less) ·····(V, R, Y) Argon, Helium ·····(F) ⋮ Others

Note 1) Refer to p.4.0-7 "Applicable Fluid Check List" for detail of a special fluid out of the standard and the option specifications.

Manifold Specifications

Manifold	B Mount
Manifold base	Common pressure supply, Individual pressure supply (1)
Number of valves	2 to 10 stations
Blank plate(With O rings, screws)	VVX21···VX011-001, VVX22/23····VX011-006

Note 1) Common port is placed on vacuum side.

Manifold Base and Applicable Solenoid Valve

n: Station

Manifold Base	Individual port	Applicable solenoid valve	Base weight (g)
VVX211-stations	1/8	**VX21□1-00-□□**	n X 70+50
VVX212-stations	1/4		
VVX221-stations	1/8	**VX22□1-00-□□**	n X 130+110
VVX222-stations	1/4		
VVX231-stations	1/8	**VX23□1-00-□□**	n X 130+110
VVX232-stations	1/4		

Solenoid Valve for Manifold/Valve Specifications<Energized open>

Orifice size (mm)	Flow rate		Model	Max. operating pressuredifferential MPa				Max.system Pressure (MPa)	Proof pressure (MPa)	(1) Weight (g)
	Cv	Effective area (mm^2)		Air		Oil				
				AC	DC	AC	DC			
2	0.17	3	**VX2111-00**	2.0	1.5	1.5	1.5	3.0	5.0	220
3	0.33	6	**VX2121-00**	1.1	0.6	0.5	0.5			220
			VX2221-00	2.0	1.5	1.2	1.2			350
			VX2321-00	3.0	3.0	1.7	2.0			490
4.5	0.61	11	**VX2131-00**	0.45	0.2	0.2	0.15			220
			VX2231-00	0.75	0.35	0.35	0.3			350
			VX2331-00	1.0	0.9	0.55	0.85			490
6	1.05	19	**VX2241-00**	0.4	0.15	0.2	0.1			350
			VX2341-00	0.5	0.35	0.35	0.3			490

Note 1) It is a grommet value. Add the conduit 10g, the DIN connector 30g, and the terminal 60g respectively.
- Refer to p.4.0-14 the glossary for detail of max. operating pressure differential and max.system pressure.

Solenoid Specifications

Model	Power	Freq. Hz	Apparent power VA		Power Consumption W (Holding)	Temp. rise °C (Rated voltage)
			Inrush	Holding		
VX21	AC	50	20	11	4.5	45
		60	17	7	3.2	35
	DC	—	—	—	6	55
VX22	AC	50	40	18	7.5	60
		60	35	12	6	50
	DC	—	—	—	8	60
VX23	AC	50	50	21	11	65
		60	45	17	9.5	60
	DC	—	—	—	11.5	65

Note)
- They are values in an ambient temperature of 20°C ± 5°C and application of rated voltage.
- Possible to exchange a coil from AC to DC during operation,but impossible to exchange from DC to AC. (Hum sound may generate because of no shading coil for DC).
- Return voltage is 20% or more of the rated value at AC power and 2% or more at the DC power.
- Allowable voltage fluctuation is ± 10% of the rated voltage.

Ambient and Fluid Temperature

Temp.	Power	Fluid temperature				Ambient temp. °C
		Air (Std.)	Oil (Std.)	Oil (D, N)	Vacuum (V, R, Y)	
Max.	AC	80	60	100	60	60
	DC	60	40	—	40	40
Min.	AC DC	–10 (1)	–5 (2)	—	–10	–20

Note 1) Dew point: –10°C or less.
Note 2) 50cSt or less
Note 3) "D", "N", "V", etc. in the parenthesis are option symbols.

Tightness of Valve (Leakage)

Seal \ Fluid	Air	Liquid	Non-leak vacuum (2)
NBR, FPM, EPR	≤1cm³/min	≤0.1cm³/min (1)	≤10^{-5}atm cc/sec

Note 1) Differ from the operating condition of pressure.
Note 2) Value on option "V", "R", "Y" (Non-leak, Vacuum).

Solenoid Valve for Manifold/How to Order (Energized Open)

VX21 / VX22 / VX23 □ 1 ■ — 00 — □ □ ■

Model
Select a model from the highest operating pressure difference and the characteristic figure of flow rate in p.4.1-6 and 4.1-7.

Orifice No.
1 — 2mmø
2 — 3mmø
3 — 4.5mmø
4 — 6mmø
∗ Refer to table ① for configuration.

Valve/Body
1 — Energized open/ for manifold

Options
— — Standard
V, R — For vacuum, non-leak
Select an option symbol by the "Applicable Fluid Check List" p.4.0-7 for a special fluid outside of standard.

Connection
00 — (No connection screw) For manifold

Voltage
1 — 100V AC 50/60Hz
2 — 200V AC 50/60Hz
3 — 110V AC 50/60Hz
4 — 220V AC 50/60Hz
5 — 24V DC
6 — 12V DC
7 — 240V AC 50/60Hz
8 — 48V AC 50/60Hz
9 — Other (Contact SMC separately)
Refer to p.4.0-15 for ordering coil only.

Electrical entry
G — Grommet
C — Conduit
D — DIN connector
T — Conduit terminal
∗ Refer to table ② for configuration.

Options
— — None
S — With surge voltage suppressor
L — With light
Z — With indicator light and surge voltage suppressor
∗ Refer to table ② for configuration.

Table ① Orifice Size

Solenoid valve	Orifice size (No.)			
	1 (2mmø)	2 (3mmø)	3 (4.5mmø)	4 (6mmø)
VX21	●	●	●	—
VX22	—	●	●	●
VX23	—	●	●	●

Table ② Voltage-Electrical Entry Options

Insulation		Class B				Class H		
Electrical		G	C	D, T		G, C	T	
Options		S(1)	–	S	L, Z	–	S	L, Z
AC	**1** (100V)	●	●	●	●	●	●	●
	2 (200V)	●	●	●	●	●	●	●
	3 (110V)	●	●	●	●	●	●	●
	4 (220V)	●	●	●	●	●	●	●
	7 (240V)	●	●	●	—	●	●	—
	8 (48V)	●	●	●	—	—	●	—
DC	**5** (24V)	●	●	●	●	—	—	—
	6 (12V)	●	●	●	—	—	—	—

Note 1) Surge voltage suppressor is attached to the lead wire.

How to Order Manifold Base

VVX21 / VVX22 / VVX23 ■ ■ — ■

Manifold base

Mark	Applicable valve
VVX21	VX21□1-00
VVX22	VX22□1-00
VVX23	VX23□1-00

Stations
02 — 2 stations
⋮
10 — 10stations

Manifold base
— — Common SUP
V — Individual SUP (For vacuum)

Port size
1 — Rc(PT) 1/8
2 — Rc(PT) 1/4
∗ All common ports are 3/8. The common SUP is indicated as "P" on the common port and the individual SUP is indicated as "VAC".

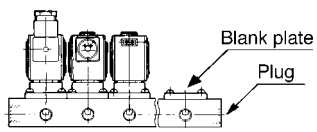
How to Order Manifold

■ **Write both the base style and the style of solenoid or blank manifold.**

(Example) 7 stations of VX21 common SUP, Individual port 1/8.

(Base P/N) VVX211-07·····1 pc
(Solenoid valve P/N) VVX2111-00-1G·····6 pcs
(Blank plate P/N) VVX011-001·····1 pc

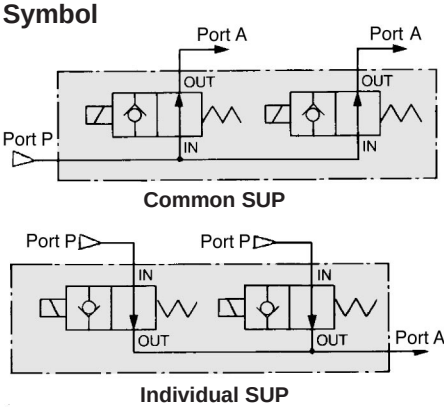
■ **Arrangement of solenoid valve**



The standard arrangement of manifolds should be placed an individual port in this side, each solenoid valve from the left side and a blanking plate in the right side. The right side of the common port provides plug.

Energized Closed (N.O.)

Symbol



Applicable Fluids

Standard	Option (1)
Air (Standard, dry) Turbine oil Vacuum (Up to 1 Torr) Carbon dioxide (CO_2), Nitrogen (N_2) Freon11, 113, 114	Vacuum (10^{-3} Torr) ·····(V, R, Y) Non-leak (10^{-5} atm cc/sec or less) ·····(V, R, Y) Argon, Helium ·····(F) ⋮ Others

Note 1) Refer to p.4.0-7 "Applicable Fluid Check List" for detail of a special fluid out of the standard and the option specifications.
The standard product and the option "D" have application of greace on the armature.

Manifold Specifications

Manifold	B Mount
Manifold base	Common pressure supply, Individual pressure supply (1)
Number of valves	2 to10 stations
Blanking plate (With O rings, screws)	VVX21···VX011-001, VVX22/23···VX011-006

Note 1) Common port is placed on vacuum side.

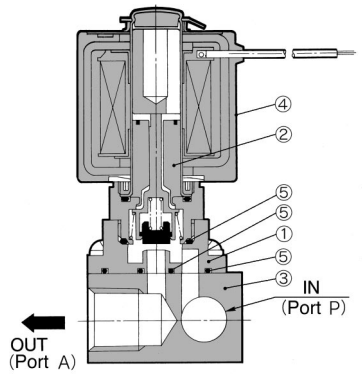
Manifold Base and Applicable Solenoid Valve

n: stations

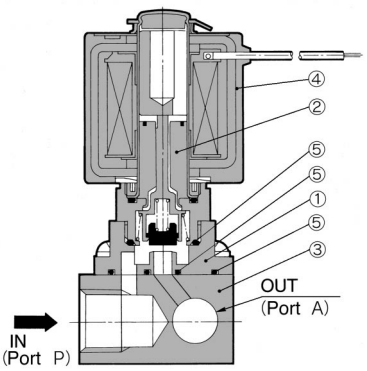
Manifold base	Individual port	Applicable fluid valve	Base weight
VVX211-stations	1/8	**VX21□3-00-□□**	n X 70+50
VVX212-stations	1/4		
VVX221-stations	1/8	**VX22□3-00-□□**	n X 130+110
VVX222-stations	1/4		
VVX231-stations	1/8	**VX23□3-00-□□**	n X 130+110
VVX232-stations	1/4		

Construction/Components

Common pressure



Individual pressure



No.	Description	Material	
		Standard	Option
①	Body	Aluminium	—
②	Core assembly	Stainless steel, Copper, Polyacetal, NBR, PTFE	Stainless steel, Silver, EPR, PTFE, FPM
③	Base	Aluminium	—
④	Coil assembly	Class B molded	Class H molded
⑤	O ring	NBR	FPM/EPR

Solenoid Valve for Manifold/Valve Specifications <Energized closed>

Orifice size (mmø)	Flow rate		Model	Max. operating pressure MPa		Max. system pressure (MPa)	Proof pressure (MPa)	(1) Weight (g)
	Cv	Effective area (mm^2)		Air	Oil			
2	0.17	3	**VX2113-00**	1.5	0.8	3.0	5.0	240
3	0.33	6	**VX2123-00**	0.7	0.45			240
			VX2223-00	1.0	0.7			390
			VX2323-00	1.6	1.0			530
4.5	0.61	11	**VX2133-00**	0.3	0.2			240
			VX2233-00	0.45	0.3			390
			VX2333-00	0.8	0.6			530
6	1.05	19	**VX2243-00**	0.25	0.15			390
			VX2343-00	0.45	0.35			530

Note 1) It is a grommet valve. Add the conduit 10g, the DIN connector 30g and the terminal 60g respectively.
- Refer to p.4.0-14 the glossary for detail of max. operating pressure differential and max. system pressure.

Solenoid Specifications

Model	Power	Freq. Hz	Power VA		Power consumption W (Holding)	Temp. rise °C (Rated voltage)
			Inrush	Holding		
VX21	AC	50	25	12	5	50
		60	20	8	3.5	35
	DC	—	—	—	6	50
VX22	AC	50	45	20	8	55
		60	40	15	6.5	45
	DC	—	—	—	8	50
VX23	AC	50	60	25	10.5	60
		60	50	20	9.5	50
	DC	—	—	—	11.5	55

Note)
- They are values in an ambient temperature 20°C ± 5°C and application of rated voltage.
- Possible to exchange a coil from AC to DC during operation.
- Return voltage is 20% or more of the rated value at AC power and 5% or more at DC power.
- Allowable voltage fluctuation is ±10% of rated voltage.

Ambient and Fluid Temperature

Temp.	Power	Fluid temperature				Ambient temp. °C
		Air (Std.)	Oil (Std.)	(3) Oil (D, N)	(3) Vacuum (V, R, Y)	
Max.	AC	80	60	100	60	60
	DC	60	40	–	40	40
Min.	AC, DC	–10 (1)	–5 (2)	–	–10	–20

Note 1) Dew point –10°C or less.
Note 2) 50cSt or less.
Note 3) "D", "N", etc. in the parenthesis are option symbols.

Tightness of Valve(Leakage)

Seal \ Fluid	Air	Liquid	(2) Non-leak vacuum
NBR, FPM, EPR	1cm³/min or less	0.1cm³/min (1) or less	10^{-5}atm cc/sec or less

Note 1) Differ from the operating condition of pressure.
Note 2) Value on option "V", "R", "Y" (Non-leak vacuum).

Solenoid Valve for Manifold/How to Order (Energized Closed)

VX21 / VX22 / VX23 □ 3 □ — 00 — □ □ □

Model
Select a model from the highest operating pressure difference and the characteristic figure of flow rate in p.4.1-6 and 4.1-7.

Orifice size
1 — 2mmø
2 — 3mmø
3 — 4.5mmø
4 — 6mmø
∗ Refer to table ① for configuration.

Valve/Body
3 — Energized closed/ for manifold

Options
— — Standard
V, R — For vacuum, non-leak
Select an option symbol by the "Applicable Fluid Check List" p.4.0-7 for a special fluid outside of standard.

Connection
00 — (No connection screw) For manifold

Voltage
1 — 100V AC 50/60Hz
2 — 200V AC 50/60Hz
3 — 110V AC 50/60Hz
4 — 220V AC 50/60Hz
5 — 24V DC
6 — 12V DC
7 — 240V AC 50/60Hz
8 — 48V AC 50/60Hz
9 — Other (Contact SMC separately)
Refer to p.4.0-15 for ordering coil only.

Electrical entry
G — Grommet
C — Conduit
D — DIN connector
T — Conduit terminal
∗ Refer to table ② for configuration.

Options
— — None
S — With surge voltage suppressor
L — With indicator light
Z — With indicator light and surge voltage suppressor
∗ Refer to table ② for configuration.

Table ① Orifice Size

Solenoid valve	Orifice size (No.)			
	1 (2mmø)	2 (3mmø)	3 (4.5mmø)	4 (6mmø)
VX21	●	●	●	—
VX22	—	●	●	●
VX23	—	●	●	●

Table ② Voltage-Electrical Entry Options

Insulation		Class B				Class H		
Electrical entry		G	C	D, T		G, C	T	
Options		S(1)	–	S	L, Z	–	S	L, Z
AC	**1** (100V)	●	●	●	●	●	●	●
	2 (200V)	●	●	●	●	●	●	●
	3 (110V)	●	●	●	●	●	●	●
	4 (220V)	●	●	●	●	●	●	●
	7 (240V)	●	●	●	—	●	●	—
	8 (48V)	●	●	●	—	—	●	—
DC	**5** (24V)	●	●	●	●	—	—	—
	6 (12V)	●	●	●	—	—	—	—

Note 1) Surge voltage suppressor is attached to the lead wire.

How to Order Manifold Base

VVX21 / VVX22 / VVX23 □ □ — □

Manifold base

Mark	Applicable solenoid valve
VVX21	VX21□3-00
VVX22	VX22□3-00
VVX23	VX23□3-00

Stations
02 — 2
⋮
10 — 10

Manifold base
— — Common SUP
V — Individual SUP (For vacuum)

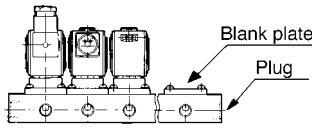
Port size(Individual Port)
1 — Rc(PT) 1/8
2 — Rc(PT) 1/4
∗ All common ports are 3/8 Rc(PT).
The common SUP is indicated as "P" on the common port and the individual SUP is indicated as "VAC".

How to Order Manifold

■ **Write both the base style and the style of solenoid or blanking plate manifold.**
(Example) 7 stations of VX21 common pressure, individual port 1/8.

(Base P/N) VVX211-07·····1 pc
(Solenoid valve P/N) VVX2113-00-1G····6 pcs
(Blank plate P/N) VVX011-001·····1 pc

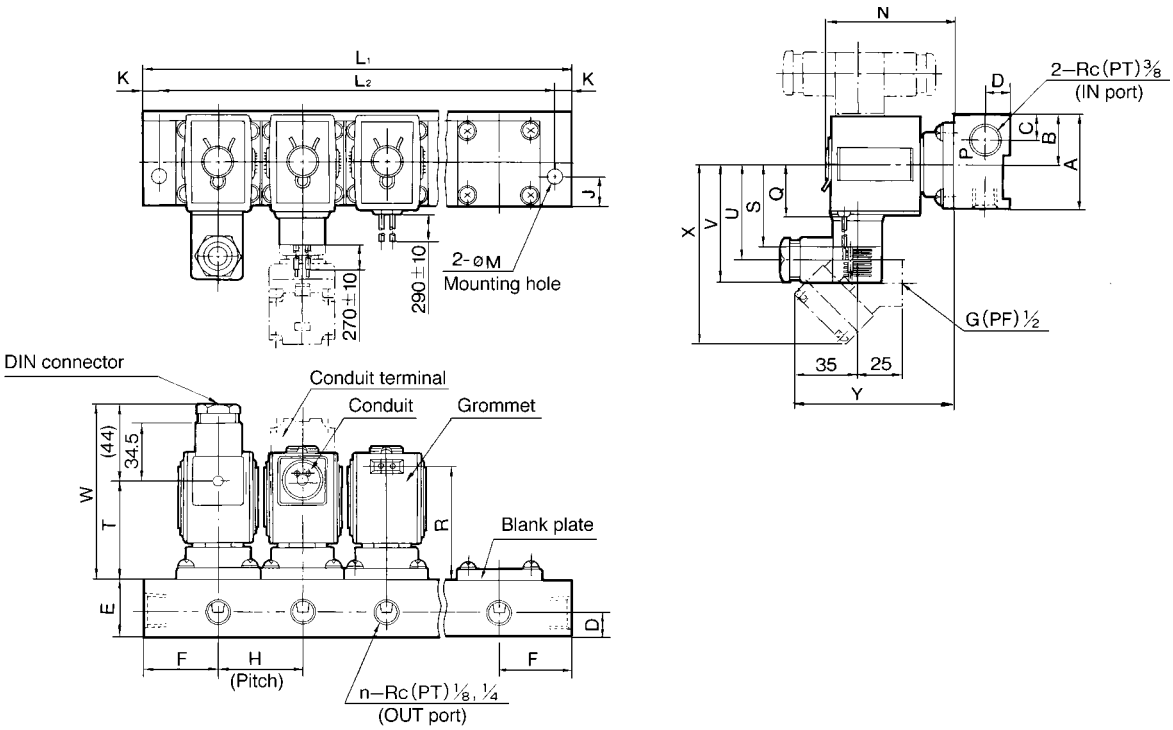
■ **Arrangement of solenoid valve**



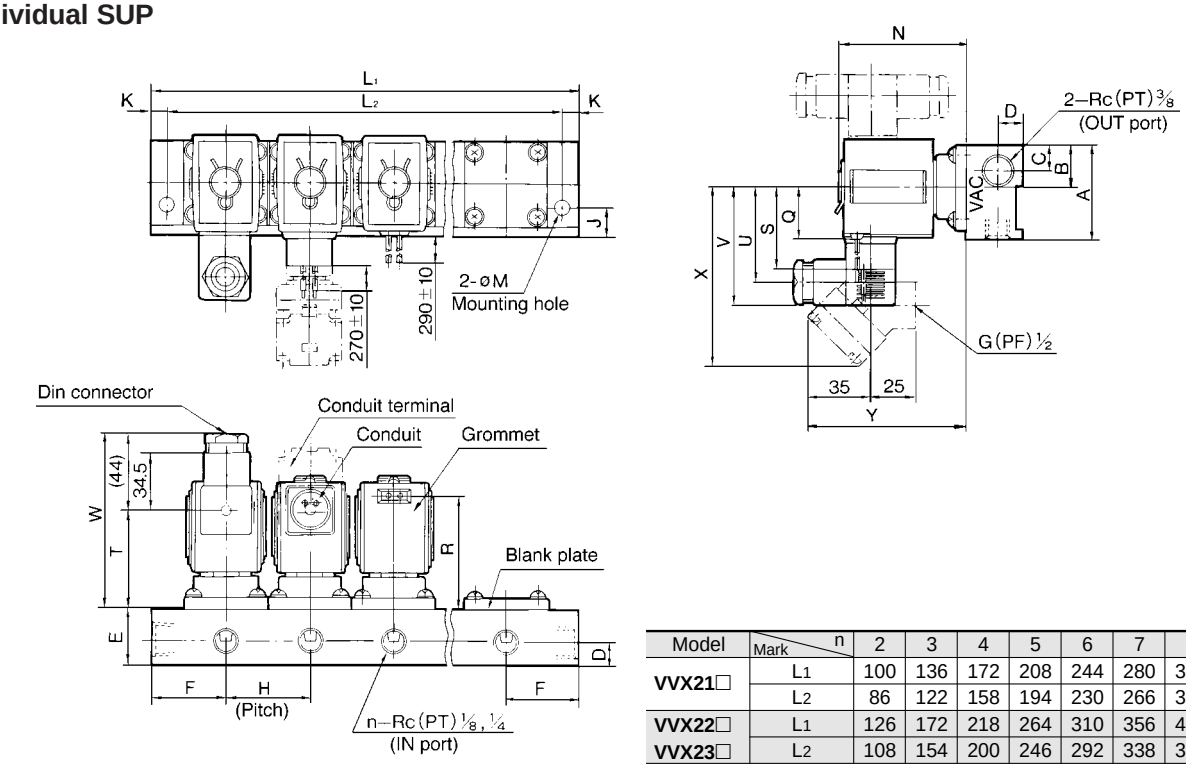
The standard arrangement of manifolds should be placed an individual port in this side, each solenoid valve from the left side and a blank plate in the right side. The right side of the common port provides plug.

Dimensions

Common SUP



Individual SUP



Model	Mark \ n	2	3	4	5	6	7	8	9	10
VVX21□	L1	100	136	172	208	244	280	316	352	388
	L2	86	122	158	194	230	266	302	338	374
VVX22□	L1	126	172	218	264	310	356	402	448	494
VVX23□	L2	108	154	200	246	292	338	384	430	476

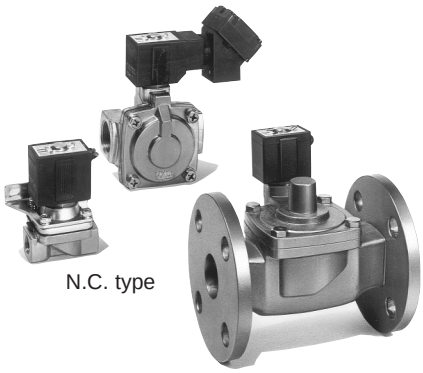
Model	A	B	C	D	E	F	H	J	K	M	N	Electrical entry								
												Grommet		Conduit		DIN connector			Conduit terminal	
												Q	R	S	T	U	V	W	X	Y
VVX21□	38	20.5 (17.5)	10.5	11	25	32	36	12	7	6.5	56 (67)	23	47 (54)	39	40 (47)	47	59	84 (91)	92	74 (81)
VVX22□	49	26.5 (22.5)	13	13	30	40	46	15	9	8.5	64 (81)	25.5	54 (64)	41.5	46 (56)	48	60	90 (100)	94	81 (91)
VVX23□	49	26.5 (22.5)	13	13	30	40	46	15	9	8.5	72 (87)	28	61 (71)	44	54 (64)	51	63	98 (108)	97	88 (98)

The figures in parentheses are a closed style at energizing ( ): Individual pressure

Pilot 2 Port Solenoid Valve

Series VXD21/22/23

For Air, Gas, Water and Oil



N.C. type

N.O. type

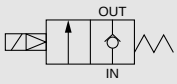
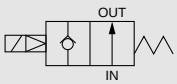
Proper selection of body and sealing materials permits application of a wide variety of fluids.

Valve can be matched to a particular application through selection of body material (Brass, BC6 or stainless steel), seal material (NBR, EPR or FPM) and solenoid coil (Class B or H)

Can be quickly disassembled and reassembled.

Variations

Valve

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

Solenoid coil

Coil: Class B, class H

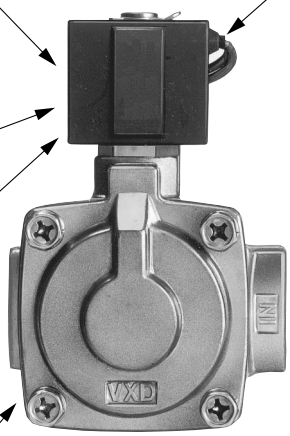
Voltage

□AC
Standard —— 100V, 200V
Option —— 48V, 110V, 220V, 240V

□DC
Standard —— 24V
Option —— 12V

Material

Body —— Brass/BC6, Stainless steel
Seal —— NBR, FPM, EPR



Electrical entry

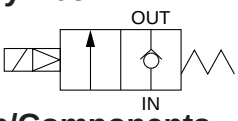
- Grommet
- Conduit
- DIN connector
- Conduit terminal

Model

Model	Port size	Orifice size (mmø)
VXD2130	Rc(PT)1/4, 3/8, 1/2	10
VXD214□	Rc(PT)3/8, 1/2	15
VXD215□	Rc(PT)3/4	20
VXD226□	Rc(PT)1	25
VXD227□	32A	35
VXD238□	40A	40
VXD239□	50A	50

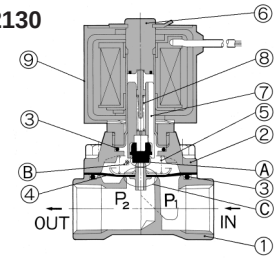
Energized Open (N.C.)

Symbol

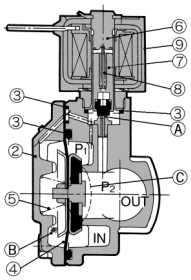


Construction/Components

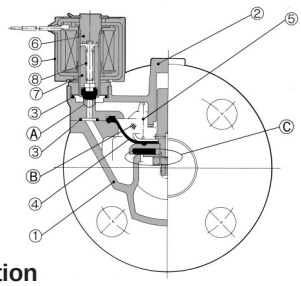
VXD2130



VXD2140/2150/2260



VXD2270/2380/2390



Operation

<Valve opened> When the coil ⑨ is energized, the armature assembly ⑦ is attracted into the core of the core assembly ⑥ and the pilot valve Ⓐ opens.
Then the pressure in the pressure operated chamber Ⓑ falls to open the main valve Ⓒ.

<Valve closed>
When the coil ⑨ is not energized, the pilot valve Ⓐ is closed and the pressure in the pressure operated chamber Ⓑ rises and the main valve Ⓒ closes.

No.	Description	Size	Material	
			Standard	Option
①	Body	10A to 25A	Brass	Stainless steel
		32A to 50A	BC6	—
②	Bonnet	10A to 25A	Brass	Stainless steel
		32A to 50A	BC6	—
③	O ring	—	NBR	FPM/EPR
④	Diaphragm assembly	10A to 25A	Stainless steel, Brass NBR	Stainless steel, FPM Stainless steel, EPR
		32A to 50A		Stainless steel, Brass FPM/EPR
⑤	Valve spring	—	Stainless steel	—
⑥	Core assembly	10A to 25A	Stainless steel, Copper	Stainless steel, Silver
		32A to 50A		—
⑦	Armature Assembly	—	Stainless steel, NBR	Stainless steel, FPM Stainless steel, EPR
⑧	Return spring	—	Stainless steel	—
⑨	Coil assembly	—	Class B molded	Class H molded

Applicable Fluids

Standard	Option (1)
Water (Standard, Up to 60ºC), Air (Standard, Dry) Turbine oil, Carbon dioxide (CO_2) Nitrogen gas (N_2) Freon 11, 113 , 114	High temperature water·····(D, E, N, P) High temperature oil ····· (D, N) Argon ····· (F) ⋮ Others

Note 1) Refer to p.4.0-8 "Applicable Fluid Check List" for detail of a special fluid out of the standard and the option specifications.

Model/Valve Specifications <Energized open>

Connection		Orifice size (mmø)	Flow rate		Model	Min. operating pressure differential (MPa)	Max. operating pressure differential (MPa)						Max. system pressure (MPa)	(1) Weight (g)
Thread	Flange		Cv	Effective area (mm²)			Water		Air		Oil			
							AC	DC	AC	DC	AC	DC		
1/4	–	10	1.9	34	**VXD2130-02**	0.02	0.7	0.5	0.9	0.7	0.5	0.4	1.5	420
3/8	–	10	2.4	43	**VXD2130-03**	0.02	0.7	0.5	0.9	0.7	0.5	0.4		420
	–	15	4.5	80	**VXD2140-03**	0.02	1.0	1.0	1.0	1.0	0.7	0.7		670
1/2	–	10	2.4	43	**VXD2130-04**	0.02	0.7	0.5	0.9	0.7	0.5	0.4		500
	–	15	5.5	100	**VXD2140-04**	0.02	1.0	1.0	1.0	1.0	0.7	0.7		670
3/4	–	20	9.5	170	**VXD2150-06**	0.02	1.0	1.0	1.0	1.0	0.7	0.7		1150
1	–	25	12.5	225	**VXD2260-10**	0.02	1.0	1.0	1.0	1.0	0.7	0.7		1650
–	32A	35	23	415	**VXD2270-32**	0.03	1.0	1.0	1.0	1.0	0.7	0.7		5400
–	40A	40	31	560	**VXD2380-40**	0.03	1.0	1.0	1.0	1.0	0.7	0.7		6800
–	50A	50	49	880	**VXD2390-50**	0.03	1.0	1.0	1.0	1.0	0.7	0.7		8400

Note 1) It is a grommet value. Add the conduit 10g, the DIN connector 30g, and the terminal 60g respectively.
- Refer to p.4.0-14 the glossary for detail of max. operating pressure differential and max. system

Solenoid Specifications

Model	Power	Frequency Hz	Apparent power VA		Power consumption W (Holding)	Temperature rise °C (Rated voltage)
			Inrush	Holding		
VXD21	AC	50	20(32)	11	4.5	45
		60	17(28)	7	3.2	35
	DC	–	–	–	6	55
VXD22	AC	50	40	18	7.5	60
		60	35	12	6	50
	DC	–	–	–	8	60
VXD23	AC	50	50	21	11	65
		60	45	17	9.5	60
	DC	–	–	–	11.5	65

Note)
- They are values in ambient temperature of 20°C ±5°C and application of rated voltage.
- Return voltage is 20% or more of the rated value at AC power and 2% or more at the DC power.
- Allowable voltage fluctuations is ±10% of the rated voltage.
- Exchange from AC to DC and DC to AC is impossible because of a different core shape. VXD21$^{5}_{4}$0, 22$^{7}_{6}$0, 23$^{9}_{8}$0 are possible to exchange coil from AC to DC, but impossible from DC to AC. (DC may generates hum sound because of a shading coil.)
- The voltampere in parentheses: the value of VXD2130.

Ambient and Fluid Temperature

Temperature	Power	Fluid temperature °C					Ambient temp. °C
		Water (Standard)	Air (Standard)	Oil (Standard)	High temp. (3) water(D, E, N, P)	High temp. (3) oil (D, N)	
Max.	AC	60	80	60	99 (4)	100 (4)	60
	DC	40	60	40	–	–	40
Min.	AC/DC	1	–10 (1)	–5 (2)	–	–	–10

Note 1) Dew point: –10°C or less.
Note 2) 50cSt or less.
Note 3) "D", "E", "N", "P" etc. in the parenthesis are option symbols.
Note 4) 32A to 50A are 80°C.

How to Order (Energized Open)

VXD21 / VXD22 / VXD23 □ 0 □ — □ □ □ □ □ □

Model
Select a model from connection size and the characteristics figure of flow rate in p.4.1-22.

Body size
3 — 10A
4 — 15A
5 — 20A
6 — 25A
7 — 32A
8 — 40A
9 — 50A

Valve/Body
0 — Energized open/ single

Options
— — Standard
Select an option symbol by the "Applicable Fluid Check List" p.4.0-8 for a special fluid outside of the standard.

Connection
Thread
02 — 1/4
03 — 3/8
04 — 1/2
06 — 3/4
10 — 1
Flange
32 — For 32A
40 — For 40A
50 — For 50A
∗ Refer to table ① for configuration.

Thread
— — Rc(PT)
T — NPTF
F — G(PF)
N — NPT

Voltage
1 — 100V AC 50/60Hz
2 — 200V AC 50/60Hz
3 — 110V AC 50/60Hz
4 — 220V AC 50/60Hz
5 — 24V DC
6 — 12V DC
7 — 240V AC 50/60Hz
8 — 48V AC 50/60Hz
9 — Other (Contact SMC separately)
∗ Refer to table ② for configuration.
Refer to p.4.0-15 for ordering coil only.

Electrical entry
G — Grommet
C — Conduit
D — DIN connector
T — Conduit Terminal
∗ Refer to table ② for configuration.

Options
— — None
S — With surge voltage suppresso
L — With indicator light
Z — With indicator light and surge voltage suppressor
∗ Refer to table ② for configuration.

Bracket
— — Without bracket
B — With bracket
Available on thread connection model size 02 to 10.

Table ① Connection Size and Applicable Model

Connection	Size	Applicable model
Thread	1/4	VXD2130-02
	3/8	VXD2130-03, VXD2140-03
	1/2	VXD2130-04, VXD2140-04
	3/4	VXD2150-06
	1	VXD2260-10
Flange	32A	VXD2270-32
	40A	VXD2380-40
	50A	VXD2390-50

Table ② Voltage-Electrical Entry-Options

Insultation		B Class				H Class		
Electrical entry		G	C	D, T		G, C	T	
Options		S(1)	—	S	L, Z	—	S	L, Z
AC	**1** (100V)	●	●	●	●	●	●	●
	2 (200V)	●	●	●	●	●	●	●
	3 (110V)	●	●	●	●	●	●	●
	4 (220V)	●	●	●	●	●	●	●
	7 (240V)	●	●	●	—	●	●	—
	8 (48V)	●	●	●	—	—	●	—
DC	**5** (24V)	●	●	●	●	—	—	—
	6 (12V)	●	●	●	—	—	—	—

Note 1) Surge voltage suppressor is attached to the lead wire.

Ordering Example

(Example) Series VXD21, Rc(PT)3/4, 200V AC, DIN connector. With surge voltage suppressor.
(Part number) **VXD2150-06-2DS**

Made to Order

Splash Proof Specification (Based on JIS-C-0920 / Based on IEC529IP-X4)

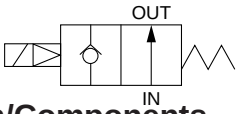
VXD Model — Port size — Electrical entry **- X36**

DIN Connector or class H coil not available.

VX
VN□
VQ

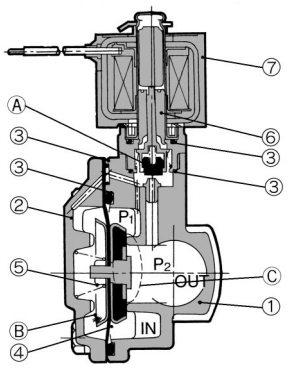
Energized Closed (N.O.)

Symbol

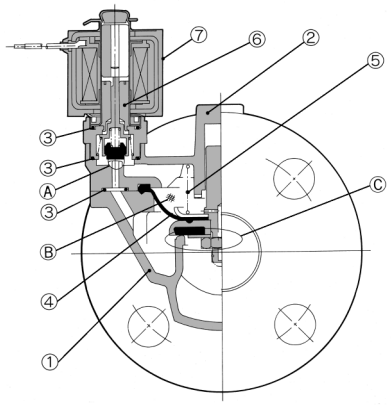


Construction/Components

VXD2142/2152/2262



VXD2272/2382/2392



Operation

<Valve opened> When the ciol ⑦ is energized, the opened pilot Ⓐ closes , the pressure in pressure operated chamber Ⓑ rises and the main valve Ⓒ closes.

<Valve closed>

When coil ⑦ is not energized , the closed pilot valve Ⓐ opens , the pressure in pressure operated chamber Ⓑ drops and the main valve Ⓒ opens.

No.	Description	Size	Material	
			Standard	Option
①	Body	15A to 25A	Brass	Stainless steel
		32A to 50A	BC6	—
②	Bonnet	15A to 25A	Brass	Stainless steel
		32A to 50A	BC6	—
③	O ring	—	NBR	FPM/EPR
④	Diaphragm assembly	15A to 25A	Stainless steel, Brass, NBR	Stainless steel, FPM, Stainless steel, EPR
		32A to 50A		Stainless steel, Brass FPM/EPR
⑤	Valve spring	—	Stainless steel	—
⑥	Core assembly	15A to 25A	Stainless steel Copper NBR Polyacetal PTFE	Stainless steel, Silver FPM/EPR, PTFE
		32A to 50A		Stainless steel,Copper FPM/EPR, PTFE
⑦	Coil assembly	—	Class B molded	Class H molded

Applicable Fluids

Standard	Options (1)
Water (Standard Up to 60°C) Air (Standard, Dry), Turbime oil Carbon dioxide (CO_2) Nitrogen (N_2) Freon 11, 113, 114	High temperature water ····· (D, E, N, P) High temperature oil ····· (D, N) Argon ····· (F) ⋮ Others

Note 1) Refer to p.4.0-8 "Applicable Fluid Check List" for detail of a special fluid out of the standard and the option specifications.
The standard product and the option "D" have application of grease on the armature.

Model/Valve Specifications <Energized closed>

Connection		Orifice size (mmø)	Flow rate		Model	Min.operating pressure differential (MPa)	Min.operating pressure differential (MPa)		Max.system pressure (MPa)	(1) Weight (g)
Thread	Flange		Cv	Effective area (mm^2)			Water,Air	Oil		
3/8	–	15	4.5	80	**VXD2142-03**	0.02	0.7	0.6	1.5	690
1/2	–	15	5.5	100	**VXD2142-04**	0.02	0.7	0.6		690
3/4	–	20	9.5	170	**VXD2152-06**	0.02	0.7	0.6		1170
1	–	25	12.5	225	**VXD2262-10**	0.02	0.7	0.6		1690
–	32A	35	23	415	**VXD2272-32**	0.03	0.7	0.6		5400
–	40A	40	31	560	**VXD2382-40**	0.03	0.7	0.6		6800
–	50A	50	49	880	**VXD2392-50**	0.03	0.7	0.6		8400

Note 1) Weight of grommet style. Add 10g for conduit style, 30g for DIN connector, 60g for conduit terminal respectively.
- Refer to p.4.0-14 the glossary for detail of max. operating pressure differential and max.system pressure.

Solenoid Specifications

Model	Power	Frequency Hz	Apparent power VA		Power consumption W (Holding)	Temp. rise °C (Rated voltage)
			Inrush	Holding		
VXD21	AC	50	25	12	5	50
		60	20	8	3.5	35
	DC	—	—	—	6	50
VXD22	AC	50	45	20	8	55
		60	40	15	6.5	45
	DC	—	—	—	8	50
VXD23	AC	50	60	25	10.5	60
		60	50	20	9.5	50
	DC	—	—	—	11.5	55

Note)
- These are values in ambient temperatures of 20°C ± 5°C and application of rated voltage.
- Exchange from AC to DC and DC to AC is impossible because of a different core shape.
- Return voltage is 20% or more of the rated value at AC power and 5% or more at the DC power.
- Allowable voltage fluctuation is ±10% of the rated voltage.

Ambient and Fluid Temperature

Temperature	Power	Fluid temperature °C					Ambient temperature °C
		Water (Standard)	Air (Standard)	Oil (Standard)	(3) High temp. water (D, E, N, P)	(3) High temp. oil (D, N)	
Max.	AC	60	80	60	99 (4)	100 (4)	60
	DC	40	60	40	—	—	40
Min.	AC/DC	1	–10 (1)	–5 (2)	—	—	–10

Note 1) Dew point: –10°C or less Note 2) 50cSt or less
Note 3) "D", "E", "N", "P" etc. in the parenthesis are option symbols.
Note 4) 32A to 50A are 80°C.

How to Order (Energized Closed)

VXD21 / VXD22 / VXD23 — 2 — [ ] [ ] [ ] [ ] [ ] [ ] [ ]

Model

Select a model from connection size and the characteristic figure of flow rate in p.4.1-22.

Valve/Body
- **2** — Energized closed/ single

Body size
- **4** — 15A
- **5** — 20A
- **6** — 25A
- **7** — 32A
- **8** — 40A
- **9** — 50A

Options
- **—** — Standard

Select an option symbol by the "Applicable Fluid Check List" p.4.0-8 for a special fluid outside of standard.

Connection

Thread
- **03** — 3/8
- **04** — 1/2
- **06** — 3/4
- **10** — 1

Flange
- **32** — For 32A
- **40** — For 40A
- **50** — For 50A

∗ Refer to table ① for configuration.

Thread
- **—** — Rc(PT)
- **T** — NPTF
- **F** — G(PF)
- **N** — NPT

Voltage
- **1** — 100V AC 50/60Hz
- **2** — 200V AC 50/60Hz
- **3** — 110V AC 50/60Hz
- **4** — 220V AC 50/60Hz
- **5** — 24V DC
- **6** — 12V DC
- **7** — 240V AC 50/60Hz
- **8** — 48V AC 50/60Hz
- **9** — Other (Contact SMC separately)

∗ Refer to table ② for configuration.

Refer to p.4.0-15 for ordering coil only.

Electrical entry
- **G** — Grommet
- **C** — Conduit
- **D** — DIN connector
- **T** — Conduit terminal

∗ Refer to table ② for configuration.

Options
- **—** — None
- **S** — With surge voltage suppressor
- **L** — With indicator light
- **Z** — With indicator light and surge voltage suppressor

∗ Refer to table ② for configuration.

Bracket
- **—** — Without bracket
- **B** — With bracket

Available on thread connection model: size 03 to 10.

Table ① Connection Size and Applicable Model

Connection	Size	Applicable model
Thread	3/8	VXD2142-03
	1/2	VXD2142-04
	3/4	VXD2152-06
	1	VXD2262-10
Flange	32A	VXD2272-32
	40A	VXD2382-40
	50A	VXD2392-50

Table ② Voltage-Electrical Entry-Options

Insulation		Class B				Class H		
Electrical entry		G	C	D, T		G, C	T	
Options		S(1)	–	S	L, Z	–	S	L, Z
AC	**1** (100V)	●	●	●	●	●	●	●
	2 (200V)	●	●	●	●	●	●	●
	3 (110V)	●	●	●	●	●	●	●
	4 (220V)	●	●	●	●	●	●	●
	7 (240V)	●	●	●	–	●	●	–
	8 (48V)	●	●	●	–	–	●	–
DC	**5** (24V)	●	●	●	●	–	–	–
	6 (12V)	●	●	●	–	–	–	–

Note 1) Surge voltage suppressor is attached to the lead wire

Ordering Example

(Example) Series VXD21, Rc(PT)1/2, 100V AC, with terminal surge voltage suppressor and indicator light.
(Part number) **VXD2142-04-1TZ**

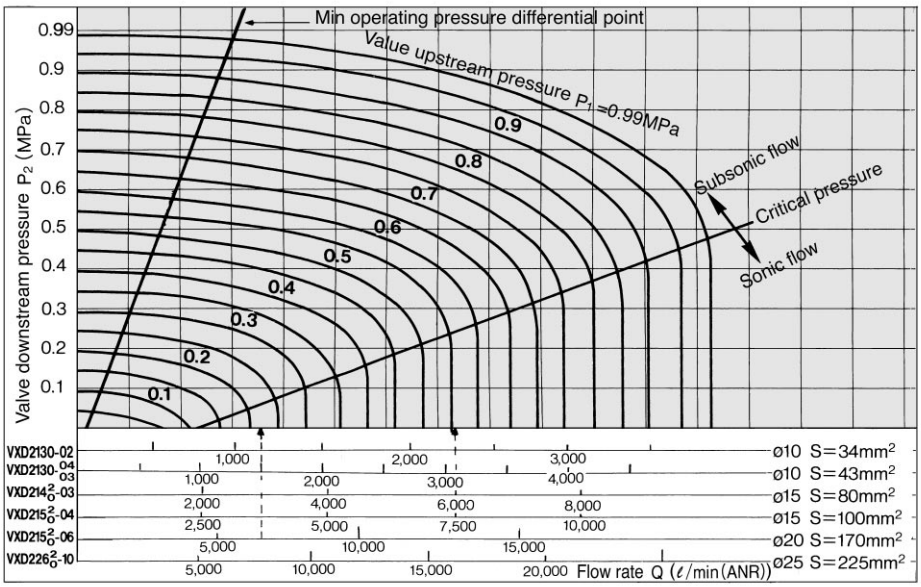
Made to Order

Splash Proof Specification (Based on JIS-C-0920 / Based on IEC529IP-X4)

VXD [Model] — [Port size] — [Electrical entry] **- X36**

DIN Connector or class H coil not available.

Air (Orifice size: 10mmø, 15mmø, 20mmø, 25mmø)



How to Read the Graph

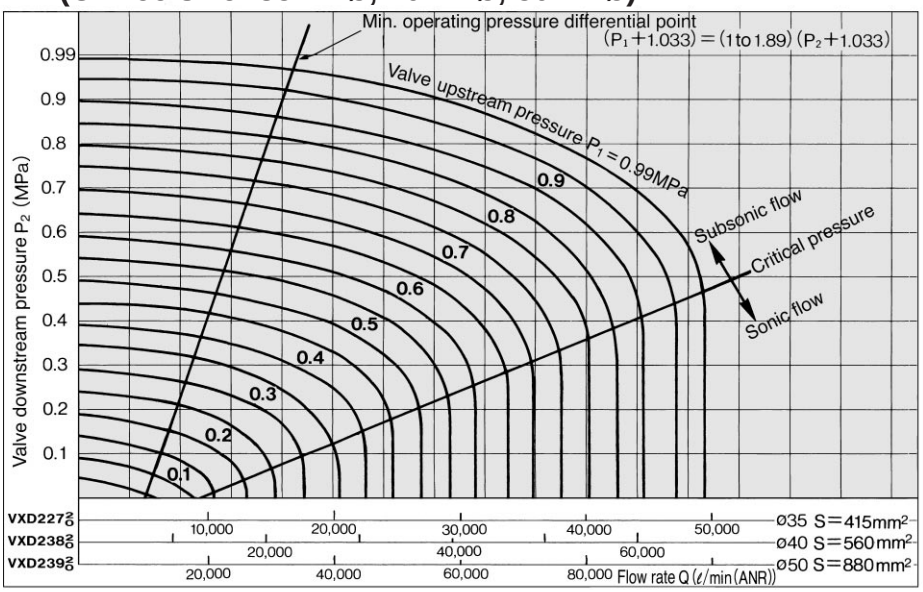
In the sonic flow region:
For a flow of 6000 ℓ/min.(ANR)
Orifice ø15(VXD214□-03)···P2 ≅ 0.57MPa
Orifice ø20 valve(VXD215□-06)
···P1 ≅ 0.3MPa

How to Calculate Flow/Air

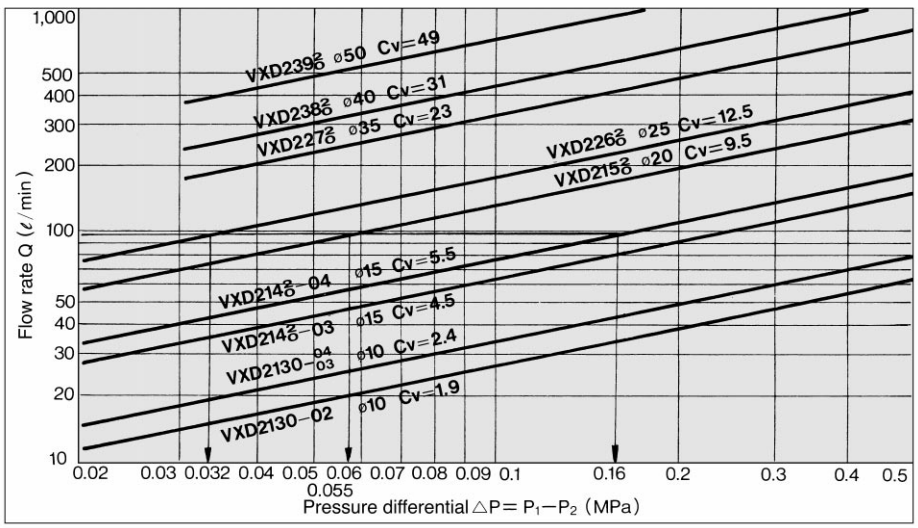
①Equation in the domain of subsonic flow
P1+0.1013=(1 to 1.8941)(P2+0.1013)
- Calculation by Cv factor
  $Q=4073.4 \cdot Cv \sqrt{\triangle P(P_2+0.1013)} \cdots$ ℓ/min(ANR)
- Calculation by effective area
  $Q=226.3 \cdot S \cdot \sqrt{\triangle P(P_2+0.1013)}$ ····· ℓ/min(ANR)

②Equation in the domain of sonic flow
P1+0.1013 ≧1.8941(P2+0.1013)
- Calculation by Cv factor
  $Q=1972.8 \cdot Cv \cdot (P_1+0.1013)$ ····· ℓ/min(ANR)
- Calculation by effective area
  $Q=109.6 \cdot S \cdot (P_1+0.1013)$ ····· ℓ/min(ANR)

Air (Orifice size: 35mmø, 40mmø, 50mmø)



Water



How to Read the Graph

For a flow of 100 ℓ/min.
Orifice ø15(VXD214□-04)···△P ≅ 0.16MPa
Orifice ø20(VXD215□)···△P ≅ 0.055MPa
Orifice ø15(VXD226□)···△P ≅ 0.032MPa

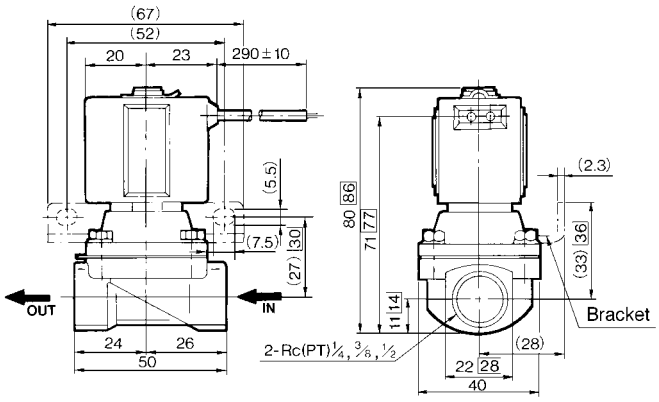
How to Calculate Flow/Water

- Calculation by Cv factor
  $Q=14.2 \cdot Cv \cdot \sqrt{10.2 \cdot \triangle P} \cdots$ ℓ/min
- Calculation by effective area[Smm²]
  $Q=0.8 \cdot S \cdot \sqrt{10.2 \cdot \triangle P} \cdots$ ℓ/min

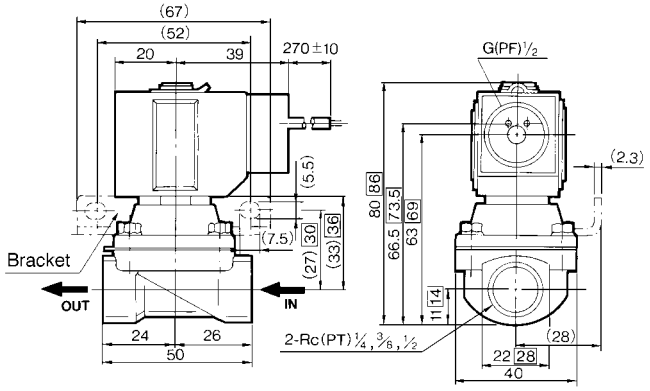
Dimensions (Orifice size 10mmø)

Energized Open/VXD2130

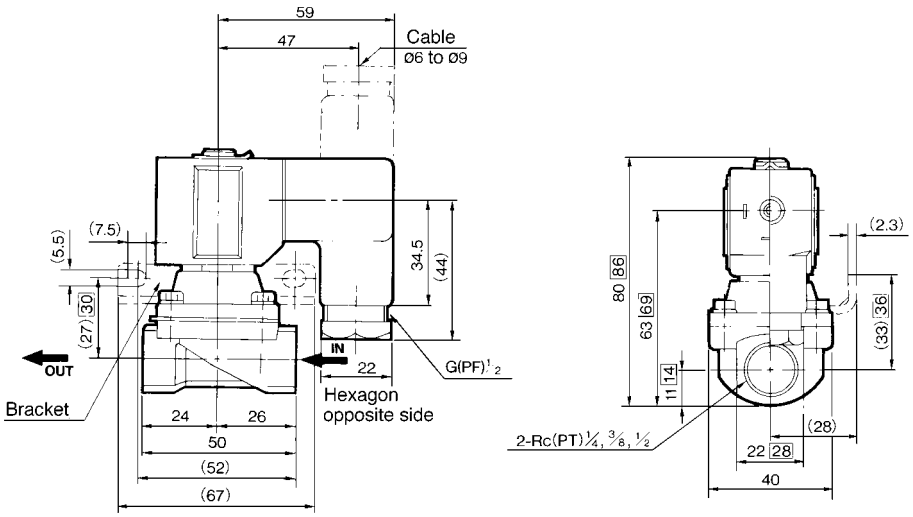
Grommet: G



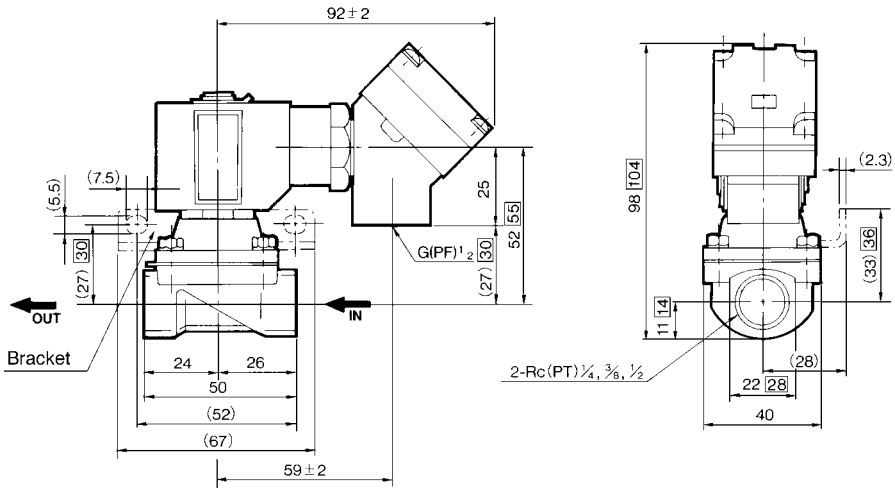
Conduit: C



Din connector: D



Conduit terminal: T

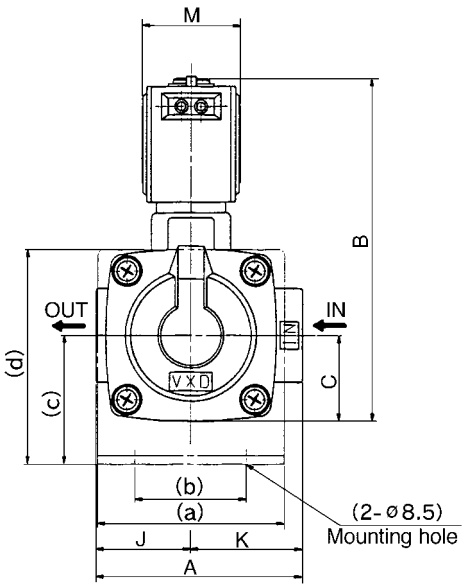


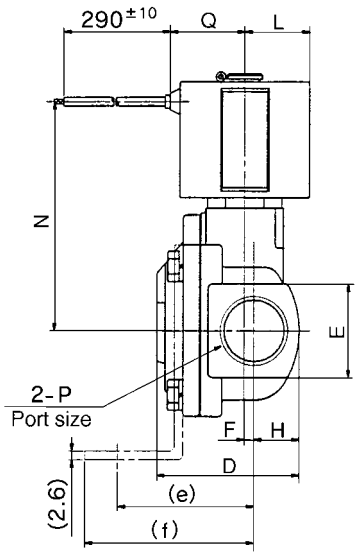
□: Port size 1/2

Dimensions (Orifice size 15mmø, 20mmø, 25mmø)

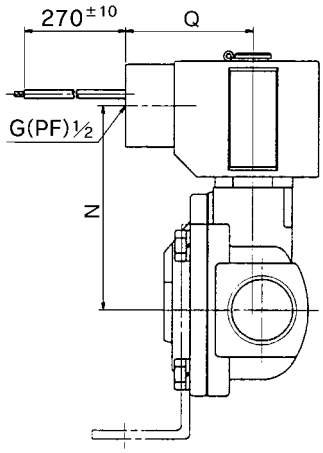
Energized Open/VXD2140, 2150, 2160 Energized Closed/VXD2142, 2152, 2262

Grommet: G

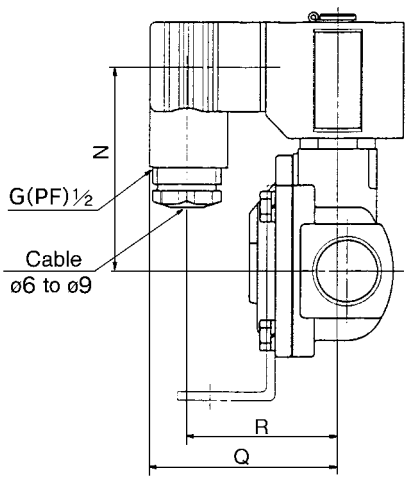




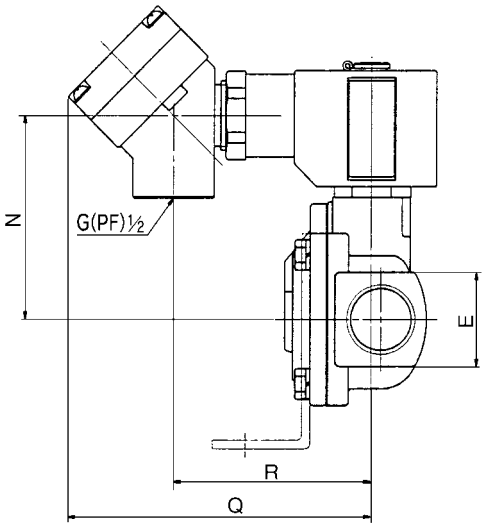
Conduit: C



DIN connector: D



Conduit terminal: T



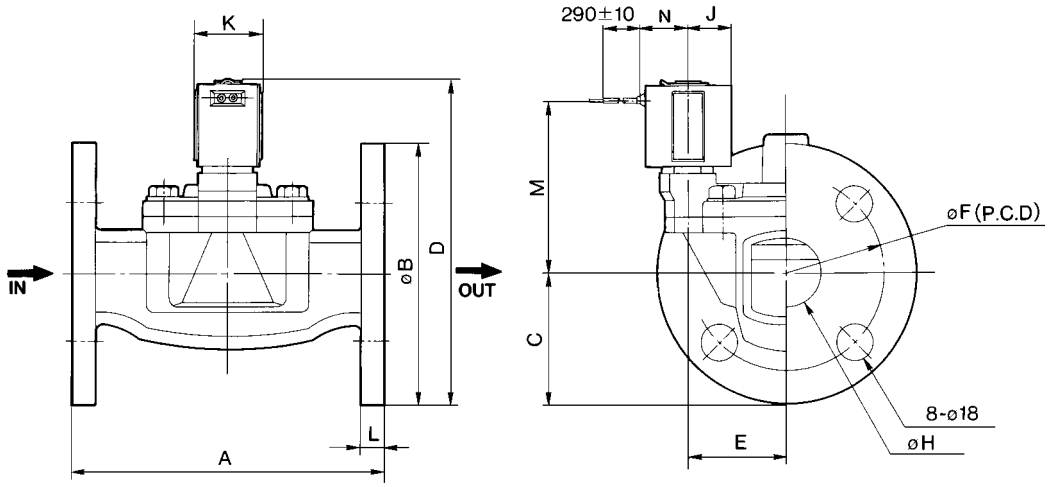
Model		Port size	A	B	C	D	E	F	H	J	K	L	M	Electrical entry									Bracket					
														Grommet		Conduit		DIN connector			Conduit terminal								
Energized open	Energized closed	Rc(PT)												N	Q	N	Q	N	Q	R	N	Q	R	a	b	c	d	e	f
VXD2140	**VXD2142**	3/8, 1/2	63	104 (116)	26	44	28	3	14	29	34	20	30	69 (76)	23	61	39	61 (68)	59	47	61 (68)	92	59	57	34	39	65	42	52
VXD2150	**VXD2152**	3/4	80	118 (136)	32.5	59	35	8	17.5	37	43	20	30	77 (84)	23	69	39	69 (76)	59	47	69 (76)	92	59	74	51	45.5	78	46	56
VXD2260	**VXD2262**	1	90	133 (150)	36.5	66	40	8	20	43	47	23	35	87 (97)	25.5	79	41.5	79 (89)	60	48	79 (89)	95	62	81	58	49.5	86	56	66

( ): N.O.

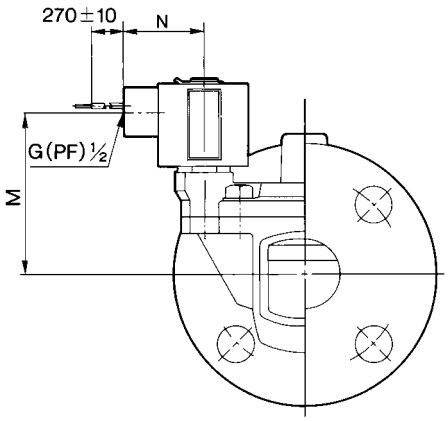
Dimensions (Orifice size 35mmø, 40mmø, 50mmø)

Energized Open/VXD2270, 2380, 2390 Energized Closed/VXD2272, 2382, 2392

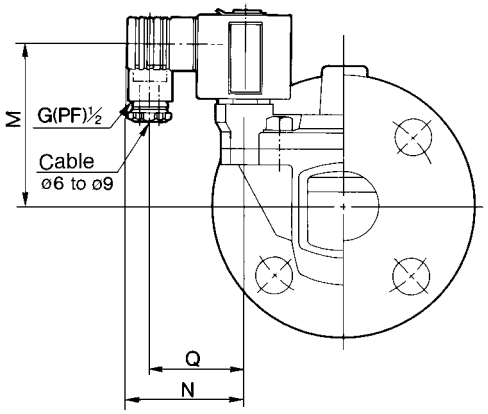
Grommet: G



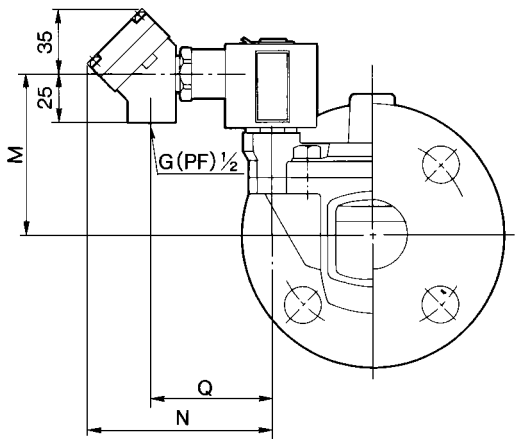
Conduit: C



Din connector: D



Conduit terminal: T



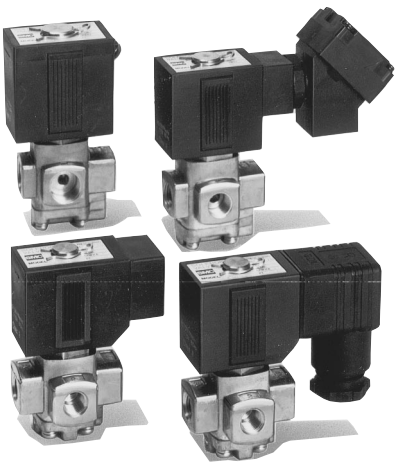
Model		Applicable flange	A	B	C	D	E	F	H	J	K	L	Electrical entry									
													Grommet		Conduit		DIN connector			Conduit terminal		
Energized open	Energized closed												M	N	M	N	M	N	Q	M	N	Q
VXD2270	**VXD2272**	32A	160	135	67.5	168 (185)	51.5	100	36	23	35	12	90 (100)	25.5	82 (92)	41.5	82 (92)	60	48	82 (92)	95	62
VXD2380	**VXD2382**	40A	170	140	70	182 (197)	54.5	105	42	25.5	40	14	101 (111)	28	93 (103)	44.5	93 (103)	62	50	93 (103)	97	64
VXD2390	**VXD2392**	50A	180	155	77.5	194 (209)	59	120	53	25.5	40	14	106 (116)	28	98 (108)	44.5	98 (108)	62	50	98 (108)	97	64

( ): N.O.

Direct Operated 3 port Solenoid Valve

Series VX31/32/33

For Air, Gas, Vacuum, Water, Steam and Oil



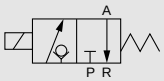
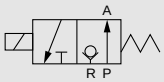
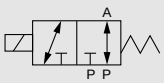
Proper selection of body and sealing materials permits application of a wide variety of fluids.

Application can be matched by simply choosing body materials (Brass, stainless steel), seal material (NBR, EPR, FPM, PTFE) and solenoid coil (class B, class H).

Can be quickly disassembled and reassembled.

Variations

Valve

Energized open (N.C.)	
Energized closed (N.O.)	
Common (C.O.)	

Solenoid coil

Coil: Class B, Class H

Voltage

□AC
Standard —— 100V, 200V
Option —— 48V, 110V, 220V, 240V

□DC
Standard —— 24V
Option —— 12V

Material

Body —— Brass, Stainless steel
Seal —— NBR, FPM, EPR, PTFE

Electrical entry

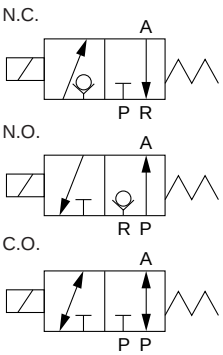
- Grommet
- Conduit
- DIN connector
- Conduit Terminal

Model

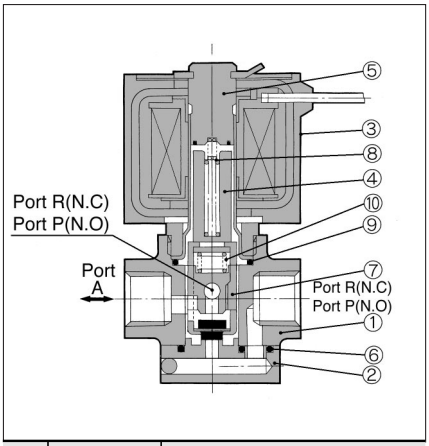
Model	Port size Rc(PT)	Orifice size (mmø)
VX311$^{0}_{2}$$_{4}$	1/8 , 1/4	1.5
VX312$^{0}_{2}$$_{4}$	1/8 , 1/4	2.2
VX313$^{0}_{2}$$_{4}$	1/8 , 1/4	3
VX3224	1/4 , 3/8	2.2
VX3234	1/4 , 3/8	3
VX3244	1/4 , 3/8	4
VX3324	1/4 , 3/8	2.2
VX3334	1/4 , 3/8	3
VX3344	1/4 , 3/8	4

Energized Open (N.C) Energized Closed (N.O) Common Open (C.O)

Symbol



Construction/Components



No.	Description	Material	
		Standard	Option
①	Body	Brass	Stainless steel
②	Retainer assembly	Brass	Stainless steel
③	Coil assembly	Class B molded	Class H molded
④	Armature	Stainless steel	—
⑤	Core assembly	Stainless steel, Copper	Stainless steel, Silver
⑥	O ring	NBR	FPM/EPR/PTFE
⑦	Valve assembly	Polyacetal, NBR	Stainless steel, FPM/EPR/PTFE
⑧	Return spring	Stainless steel	—
⑨	O ring	NBR	FPM/EPR/PTFE
⑩	Support spring	Stainless steel	—

Solenoid Specifications

Model	Power	Frequency Hz	Apparent power VA		Power consumption W (Holding)	Temp. rise °C (Rated voltage)
			Inrush	Holding		
VX31	AC	50	20	11	5	50
		60	17	7	3.5	45
	DC	—	—	—	6	55
VX32	AC	50	42	18	7.5	55
		60	37	12	6	45
	DC	—	—	—	8.5	60
VX33	AC	50	55	22	11	60
		60	47	18	9.5	50
	DC	—	—	—	11.5	60

Note)
- They are values in an ambient temperature of 20°C ± 5°C and application of rated voltage.
- Exchange from AC to DC and DC to AC is impossible because of a different core shape.
- Return voltage is 20% or more of the rated value at AC power and 5% or more at the DC power.
- Allowable voltage fluctuation is ± 10% of the rated voltage.

Applicable Fluids

Standard	Option (1)
Water (Standard, Up to 60°C)	Steam ····· (S, Q)
Air (Standard, Dry)	Vacuum (Up to 10^{-3} Torr) ····· (V, M)
Turbine oil	Non-leak (10^{-5} atm cc/sec or less) ····· (V, M)
Vacuum (Up to 1Torr)	High temperature water ····· (X, E, N, P)
Carbon dioxide (CO_2), Nitrogen gas (N_2)	High temperature oil ····· (D, N)
Freon11, 113, 114	Argon, Helium ····· (F)
	Others

Note 1) Refer to p.4.0-11 "Applicable Fluid Check List" for detail of a special fluid out of the standard and the option specifications.
The standard product and the option "D" have application of greace on the armature.

Model/Valve Specifications

Port size Rc(PT)	Orifice size (mmø)	Flow rate Cv	Flow rate Effective area (mm^2)	Model	Max operating press. differential (MPa) N.O., N.C. AC	Max operating press. differential (MPa) C.O. AC, DC	Max. system pressure (MPa)	(1) Weight (g)
1/8 (6A)	1.5	0.08	1.4	**VX311$^{0}_{4}$-01**	1.0	0.6	Water Air Oil: 2.0 Steam: 1.0	330
	2.2	0.16	2.8	**VX312$^{0}_{4}$-01**	0.5	0.3		
	3	0.24	4.3	**VX313$^{0}_{4}$-01**	0.3	0.2		
1/4 (8A)	1.5	0.08	1.4	**VX311$^{0}_{4}$-02**	1.0	0.6		
	2.2	0.16	2.8	**VX312$^{0}_{4}$-02**	0.5	0.3		
		0.19	3.4	**VX3224-02**	—	0.6		550
				VX3324-02	—	1.0		700
	3	0.24	4.3	**VX313$^{0}_{4}$-02**	0.3	0.2		330
		0.33	6	**VX3234-02**	—	0.3		550
				VX3334-02	—	0.6		700
	4	0.5	9	**VX3244-02**	—	0.15		550
				VX3344-02	—	0.3		700
3/8 (10A)	2.2	0.19	3.4	**VX3224-03**	—	0.6		550
				VX3324-03	—	1.0		700
	3	0.33	6	**VX3234-03**	—	0.3		550
				VX3334-03	—	0.6		700
	4	0.5	9	**VX3244-03**	—	0.15		550
				VX3344-03	—	0.3		700

Note 1) Weight of grommet style, Add 10g for conduit style, 30g for DIN connector style, 60g for conduit terminal style, respectively.
- Refer to the glossary p.4.0-14 for detail of max. operating pressure differential and max. system pressure.

Ambient and Fluid Temperature

Temperature	Power	Fluid temperature °C Water	Air	Oil	High temp. (3) water (X, E, N, P)	Oil (3) (D, N)	Steam (3) (S, Q)	Vacuum (3) (V, M)	Ambient temp. °C
Max.	AC	60	80	60	99	120	183	60	60
	DC	40	60	40	—	—	—	40	40
Min.	AC DC	1	–10 (1)	–5 (2)	—	—	—	–10	–20

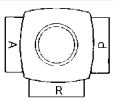
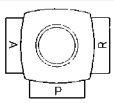
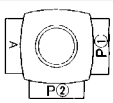
Note 1) Dew point –10°C or less
Note 2) 50cSt or less
Note 3) "X", "E", "N", "P" etc in the parenthesis are option symbols.

Tightness of Valve(Leakage)

Seal \ Fluid	Air	Liquid	Non-leak Vacuum (3)	Steam
NBR, FPM EPR	≤1cm³/min	≤0.1cm³/min (1)	≤10^{-5}atm cc/sec	—
PTFE	≤150cm³/min (1)	≤5cm³/min (1)	—	≤50cm³/min (2)

Note 1) Differ from the operating condition of pressure.
Note 2) Heat loss at 0.5MPA is about 5kca/h.
Note 3) Value on option "V", "M", "Y" (Non-leak, Vacuum).

Application Example

Style		N.C. (VX31)		N.O. (VX31)		C.O. (VX31, 32, 33)	
Sketch							
Position		ON	OFF	ON	OFF	ON	OFF
Example of application	Selector	X	X	X	X	P①→A	P②→A
	Divider	X	X	X	X	A→P①	A→P②
	Vacuum pad (1)	P→A	A→R(VP)	A→R(VP)	P→A	P①→A	P②→A
	Cylinder exhaust valve — Energizing press.	P→A	A→R	X	X	P①→A	A→P②
	Cylinder exhaust valve — Energizing exh.	X	X	A→R	P→A	A→P①	P②→A

Note 1) An exclusive style set with the maximum bore to only the orifice in the vacuum side can be supplied to user for using with application of high pressure air to the vacuum break port side such as in use of vacuum pad. Refer tp p.4.1-52.

Response Characteristics

Refer to p.4.1-54 for the response characteristics.

How to Order

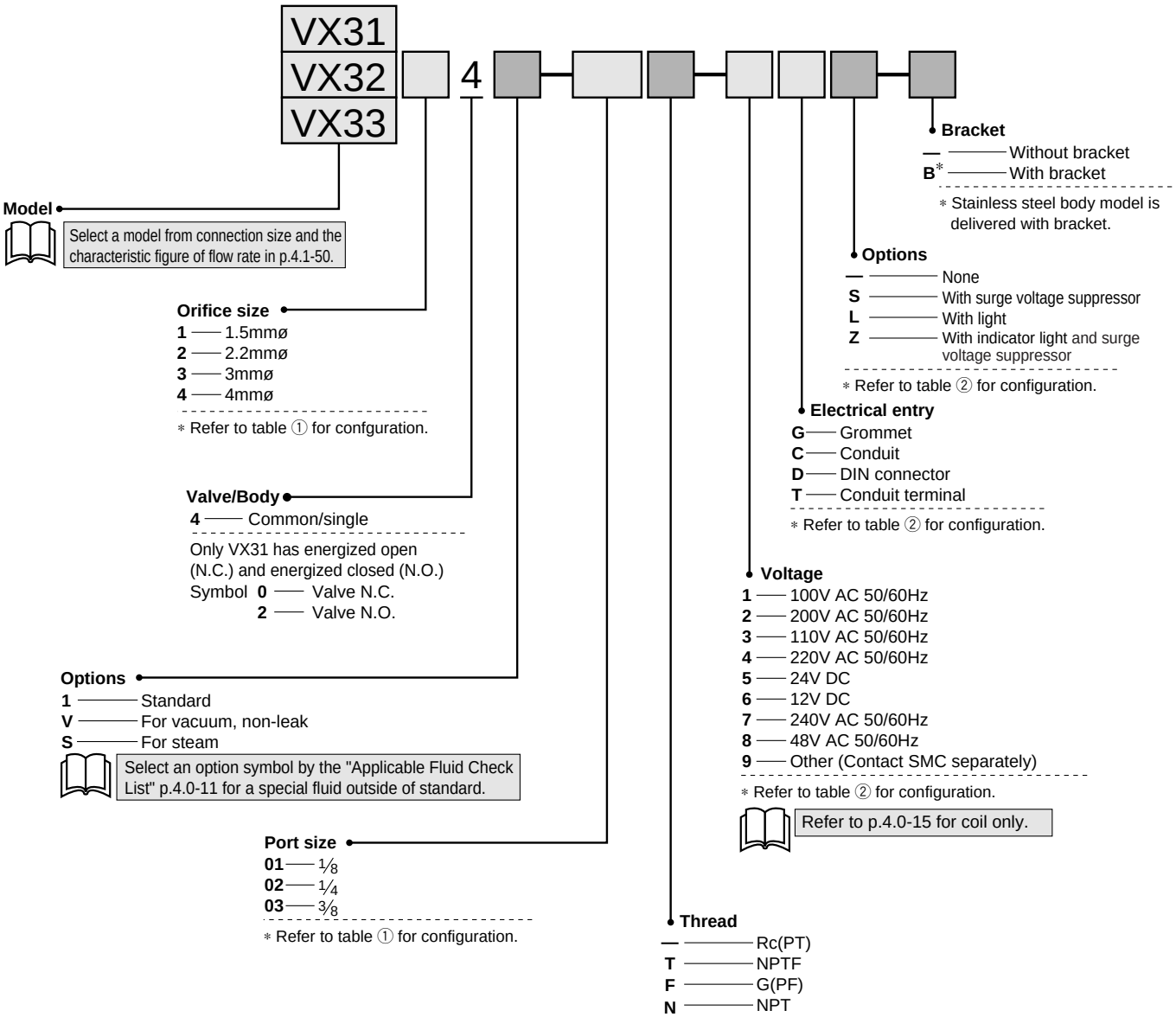


Table ① Port/Orifice Size

Solenoid			Orifice size			
VX31	VX32	VX33	1 (1.5mmø)	2 (2.2mmø)	3 (3mmø)	4 (4mmø)
01(1/8)	—	—	●	●	●	—
02(1/4)	—	—	●	●	●	—
—	02(1/4)	02(1/4)	—	●	●	●
—	03(3/8)	03(3/8)	—	●	●	●

Ordering Example

(Example) Series VX31, Common, Orifice size 1.5mmø, Rc(PT)1/8, 24V DC, DIN connector/with indicator light
(Model) **VX3114-01-5DL**

Table ② Voltage-Electrical Entry-Options

Insulation		Class B				Class H		
Electrical entry		G	C	D, T		G, C	T	
Options		S(1)	—	S	L, Z	—	S	L, Z
AC	1 (100V)	●	●	●	●	●	●	●
	2 (200V)	●	●	●	●	●	●	●
	3 (110V)	●	●	●	●	●	●	●
	4 (220V)	●	●	●	●	●	●	●
	7 (240V)	●	●	●	—	●	●	—
	8 (48V)	●	●	●	—	—	●	—
DC	5 (24V)	●	●	●	●	—	—	—
	6 (12V)	●	●	●	—	—	—	—

Note 1) Surge voltate suppressor is attached to the lead wire.

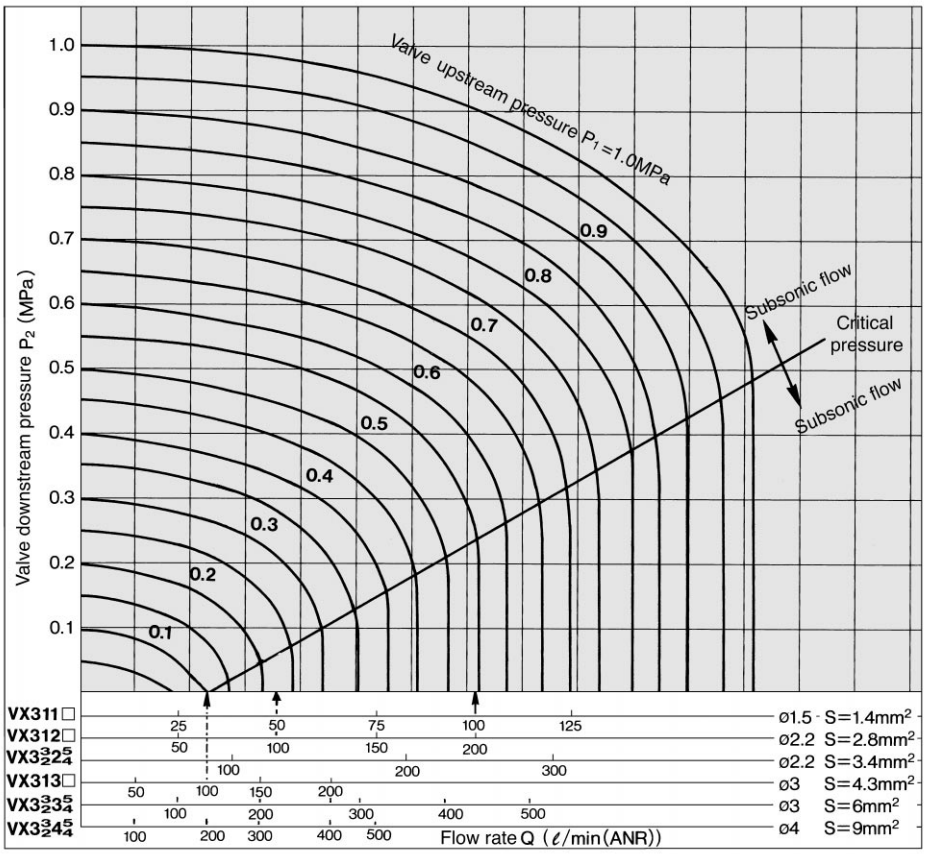
Made to Order

Splash Proof Specification (Based on JIS-C-0920 / Based on IEC529IP-X4)

VX3 Model — Port size — Electrical entry - X36

DIN Connector or class H coil not available.

Air



How to Read the Graph

In the sonic flow region:
For a flow of 100 ℓ/min.(ANR)
Orifice ø3 (VX313□)···$P_1 \cong 0.1$MPa
Orifice ø2.2 (VX312□)···$P_1 \cong 0.23$MPa
Orifice ø1.5 (VX311□)···$P_1 \cong 0.55$MPa

How to Calculate Flow/Air

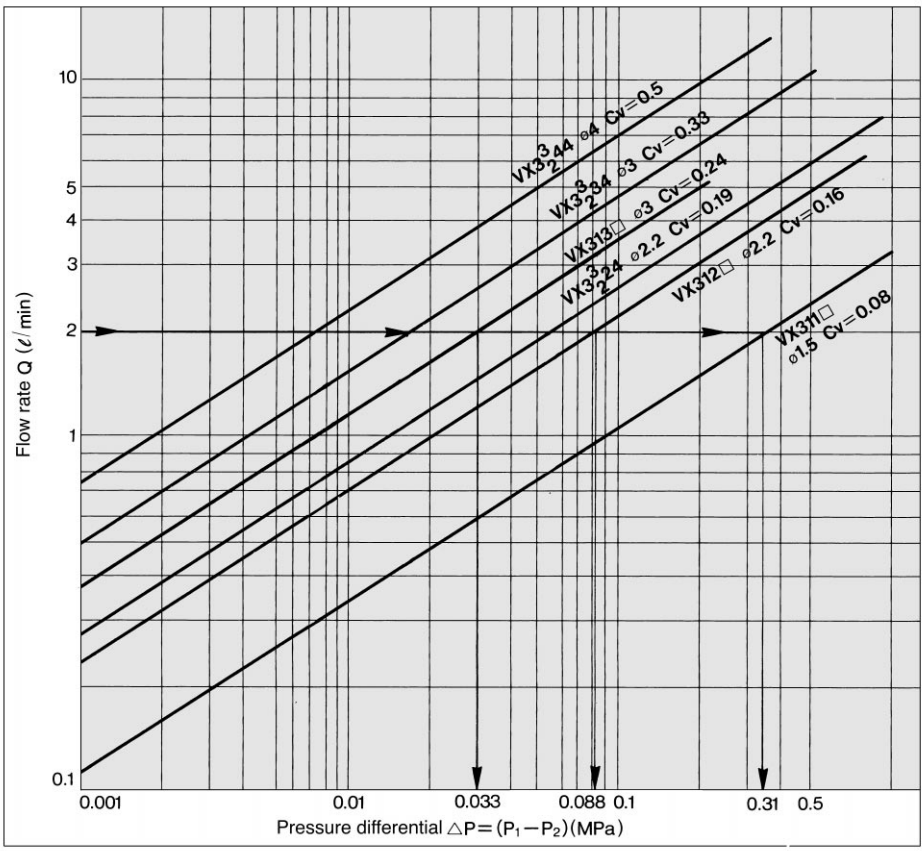
① Equation in the domain of subsonic flow
$P_1+0.1013=(1 \text{ to } 1.8941)(P_2+0.1013)$

- Calculation by Cv factor
  $Q=4073.4 \cdot Cv \cdot \sqrt{\triangle P(P_2+0.1013)} \cdots$ ℓ/min(ANR)
- Calculation by effective area
  $Q=226.3 \cdot S \cdot \sqrt{\triangle P(P_2+0.1013)} \cdots$ ℓ/min(ANR)

Equation in the domain of sonic flow
$P_1+0.1013 \geqq 1.8941(P_2+0.1013)$

- Calculation by Cv factor
  $Q=1972.8 \cdot Cv \cdot (P_1+0.1013) \cdots\cdots$ ℓ/min(ANR)
- Calculation by effective area
  $Q=109.6 \cdot S \cdot (P_1+0.1013) \cdots\cdots\cdots$ ℓ/min(ANR)

Water



How to Read the Graph

In case of a flow of 2 ℓ/min.
Orifice ø3 valve (VX313□)···△P ≅ 0.033MPa
Orifice ø2.2 valve (VX312□)···△P ≅ 0.088MPa
Orifice ø1.5 valve (VX311□)···△P ≅ 0.31MPa

How to Calculate Flow/Air

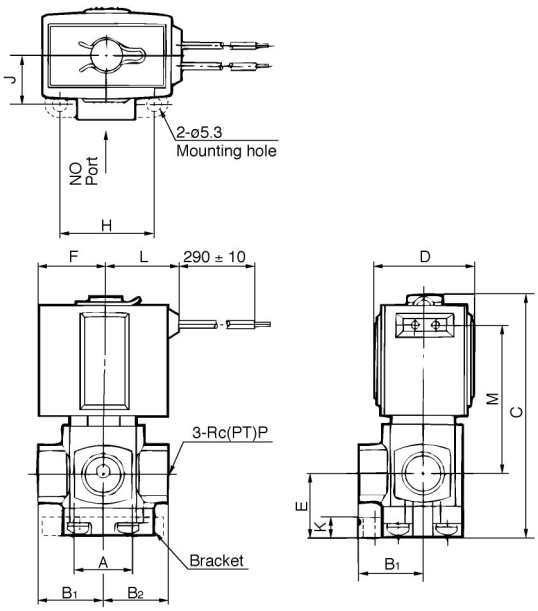
- Calculation by Cv factor
  $Q=14.2 \cdot S \cdot \sqrt{10.2 \cdot \triangle P} \cdots\cdots\cdots\cdots$ ℓ/min
- Calculation by effective area[Smm²]
  $Q=0.8 \cdot Cv \sqrt{10.2 \cdot \triangle P} \cdots\cdots\cdots\cdots$ ℓ/min

Q : Flow (Air ℓ/min(ANR)), (Steam kg/h), (Water ℓ/min)
△P : Pressure differential (P_1–P_2)
P_1 : Upstream pressure (MPa)
P_2 : Downstream pressure (MPa)
θ : Fluid temperature (°C)
S : Effective area (mm²)
Cv : Cv factor (/)

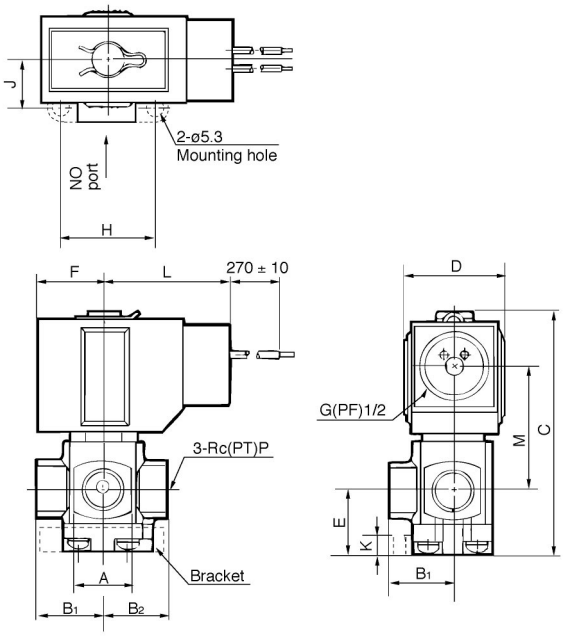
Dimensions (Orifice size 1.5mmø, 2.2mmø, 3mmø, 4mmø)

Energized Open/VX31$\frac{1}{2}$0, Energized Closed/VX31$\frac{1}{2}$2, Common/VX31$\frac{1}{2}$4, 32$\frac{2}{3}$4, 33$\frac{2}{3}$4

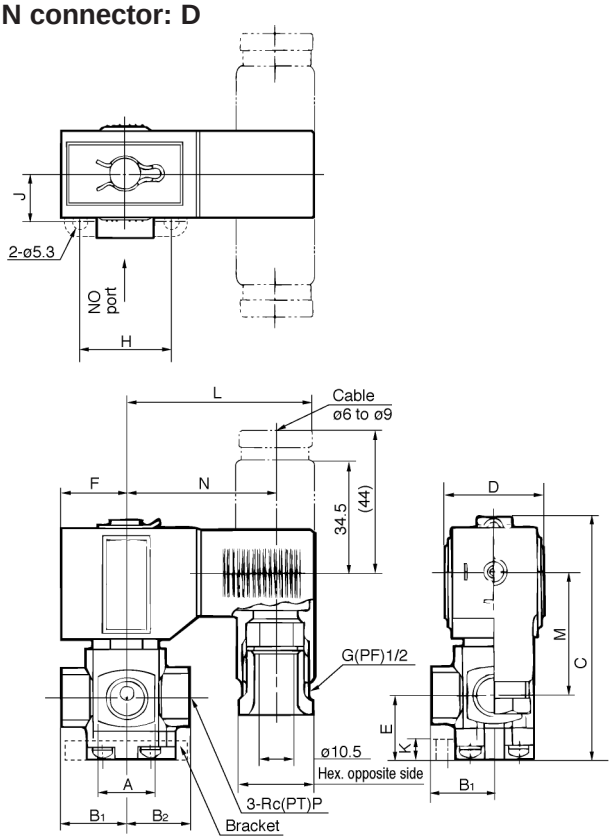
Grommet: G



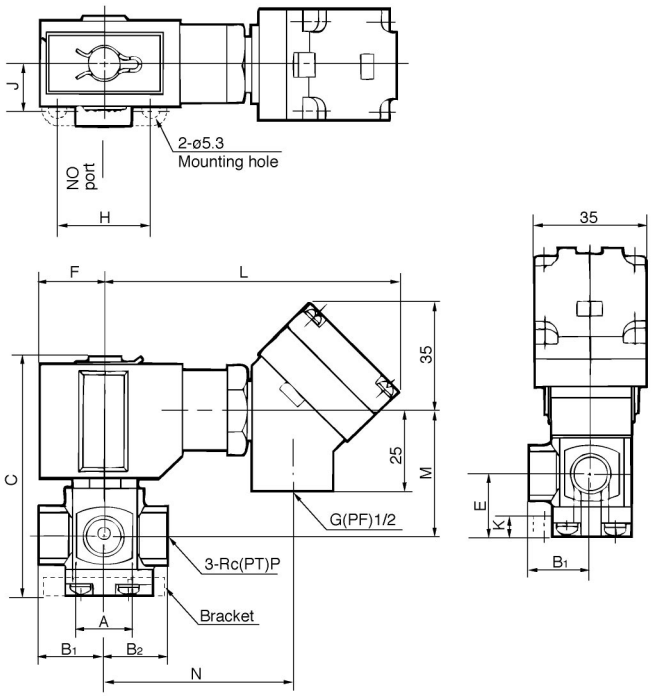
Conduit: C



DIN connector: D



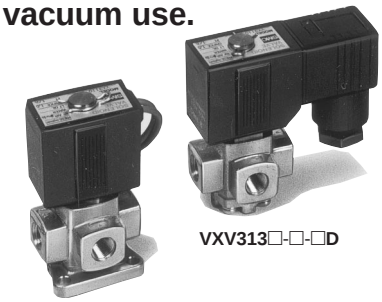
Conduit terminal: T



Model	Port size P Rc(PT)	A	B		C	D	E	F	Measurement for connection			Electrical entry									
												Grommet		Conduit		DIN connector			Conduit terminal		
			B1	B2					H	J	K	L	M	L	M	L	M	N	L	M	N
VX31	1/8, 1/4	18	20	22.5	74.5	30	19	20	29	14.5	6	23	46.5	39	38.5	59	38.5	47	92	38.5	59
VX32	1/4, 3/8	21	20	27.5	90	35	25	23	32	17	7.5	25.5	55	41.5	47	60	47	48	95	47	62
VX33	1/4, 3/8	21	20	27.5	98	40	25	25.5	32	17	7.5	28	62	44.2	55	62	54	50	97	55	64

Vacuum Use/VXV3□□□

- **Vacuum flow passage has large orifice.**
- **Pressure side permits high pressure, optimum for vacuum use.**



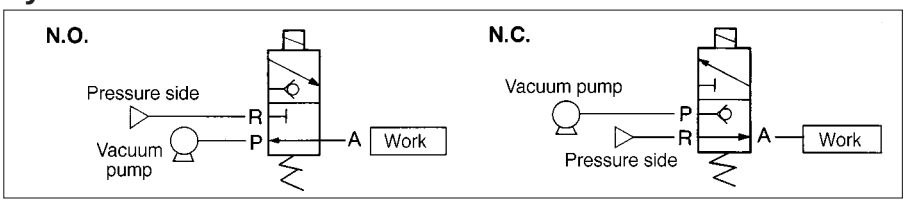
VXV313□-□-□D

VXV313 □-□-□ G-B

Specifications

Model		VXV313□	VXV324□	VXV334□
Operating pressure (MPa)	R Port	0 to 0.5	0 to 0.5	0 to 0.9
	P Port	Vacuum	Vacuum	Vacuum
Orifice size ø	Pressure side	1.5	2.2	2.2
	Vacuum side	3	4	4
Cv factor (Effective area mm²)	R→A	0.08(1.4)	0.19(3.4)	0.19(3.4)
	A→P	0.24(4.3)	0.5(9)	0.5(9)

Symbol



How to Order

VXV3 1 3 0 ☐ — 01 — 1 G ☐ ☐

Series VX
Vacuum use

Solenoid size
1 — No.1
2 — No.2
3 — No.3

Orifice size
3 — R port: ø1.5, P port: ø3 (VXV31)
4 — R port: ø2.2, P port: ø4 (VXV32, 33)

Valve
0 — N.C. (Energized open)
2 — N.O. (Energized closed)

Options
— — Standard
F, G, L, T are available option. Refer to p.4.0-11 "Applicable Fluid Check List".

Port size
01 — Rc(PT)1/8 (VXV31)
02 — Rc(PT)1/4 (VXV31, 32, 33)
03 — Rc(PT)3/8 (VXV32, 33)

Voltage
1 — 100V AC 50/60Hz
2 — 200V AC 50/60Hz
3 — 110V AC 50/60Hz
4 — 220V AC 50/60Hz
5 — 24V DC
6 — 12V DC
7 — 240V AC 50/60Hz
8 — 48V AC 50/60Hz
9 — Other (Contact SMC seprately)

Electrical entry
G — Grommet
C — Conduit
D — DIN connector
T — Conduit Terminal
(Refer to table ② in p.4.1-49)

Options
— — None
S — With surge voltage suppressor
L — With light
Z — With indicator light and surge voltage suppressor
(Refer to table ② in p.4.1-49)

Bracket
— — None
B — With bracket

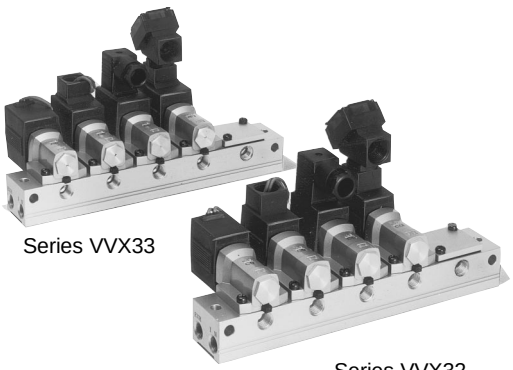
Dimensions

∗The single dimension is the same as a series of VX31, 32, 33 in p.4.1-51.

Direct Operated
3 Port Solenoid Valve/Manifold

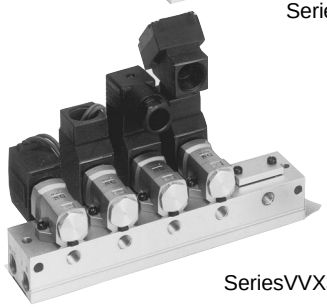
Series VVX31/32/33

For Air, Gas, Vacuum and Oil



Series VVX33

Series VVX32



SeriesVVX31

Configuration can be changed from NC to NO and from NO to NC by simply changing a gasket.

Compatible with wide variety of fluids.

Application can be matched by simply choosing the correct seal material (NBR, FPM, or EPR).

It is possible to replace valve without changing existing piping.

Weight-saving with aluminum base and body.

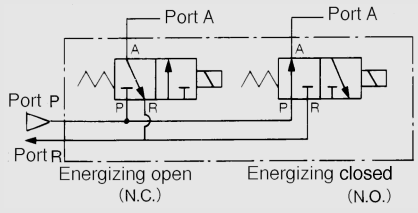
(Not applicable to water or steam).

VX
VN□
VQ

Variations

Valve

Energized open (N.C.)
Energized closed (N.O.)
Common (C.O.)

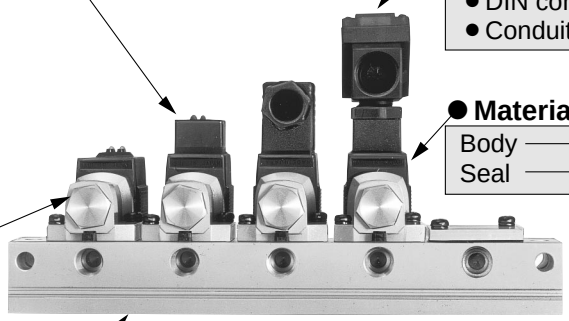


Electrical entry

- Grommet
- Conduit
- DIN connector
- Conduit terminal

Material

Body —— Aluminum
Seal —— NBR, FPM, EPR



Voltage

□AC
Standard —— 100V, 200V
Option —— 48V, 110V, 220V, 240V

□DC
Standard —— 24V
Option —— 12V

Manifold

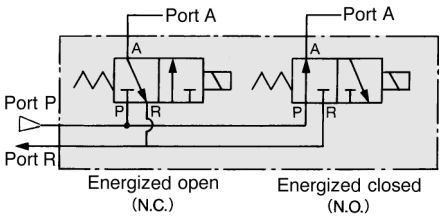
Manifold style —— B mount
Stations —— 2 to 10stations

Model

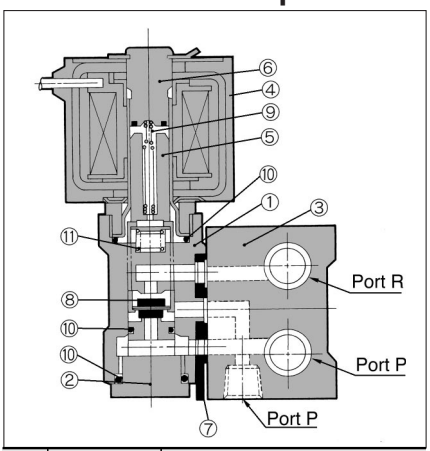
Model	Port A	Port P	Port R
VVX311-stations	1/8	1/4	1/4
VVX312-stations	1/4		
VVX321-stations	1/8		
VVX322-stations	1/4		
VVX331-stations	1/8		
VVX332-stations	1/4		

Energized Open (N.C.) Energized Closed (N.O.) Common (C.O.)

Symbol



Construction/Components



No.	Description	Material	
		Standard	Option
①	Manifold body	Aluminium	Brass
②	Retainer	Aluminium	Brass
③	Manifold base	Aluminium	—
④	Coil assembly	Class B molded	Class H molded
⑤	Armature	Stainless steel	—
⑥	Core assembly	Stainless steel, Copper	Stainless steel, Silver
⑦	Gasket	NBR	FPM/EPR
⑧	Valve assembly	Polyacetal NBR	Stainless steel FPM/EPR
⑨	Return spring	Stainless steel	—
⑩	O ring	NBR	FPM/EPR
⑪	Support spring	Stainless steel	—

Solenoid Specifications

Model	Power	Freq. Hz	Apparent power VA		Power consumption W (Holding)	Temp. rise °C (Rated volage)
			Inrush	Holding		
VX31	AC	50	20	11	5	50
		60	17	7	3.5	45
	DC	—	—	—	6	55
VX32	AC	50	42	18	7.5	55
		60	37	12	6	45
	DC	—	—	—	8.5	60
VX33	AC	50	55	22	11	60
		60	47	18	9.5	50
	DC	—	—	—	11.5	60

Note)
- They are values in an ambient temperatue of 20°C ± 5°C and application of rated voltage.
- Exchange from AC to DC and DC to AC is impossible because of a different core shape.
- Return voltage is 20% or more of the rated value at AC power and 5% or more at the DC power.
- Alowable voltage fluctuation is ±10% of the rated voltage.

Applicable Fluids

Standard	Option (1)
Air (Standard, dry) Turbin oil Vacuum (Up to 1 Torr) Carbon dioxide (CO_2), Nitrogen gas (N_2) Freon11, 113, 114 ⋮ Others	Vacuum (Up to 10^{-3} Torr)·····(V, R) Non-leak (10^{-5} atm cc/sec or less)····· (V, R) Argon, Helium····· (F)

Note 1) Refer to p.4.1-11 "Applicable Fluid Check List" for detail of a special fluid out of the standard and the option specifications.
The standard product and the option D have application of grease on the armature.

Manifold Specifications

Manifold	B Mount	
Manifold base	Common supply, Common exhaust, Individual out	
Number of valves	2 to 10 stations	
Blank plate (With gasket, O rings)	VVX31	VX011-004
	VVX32/33	VX011-005

Manifold Base and Applicable Solenoid Valve

n: stations

Manifold base	A port	Applicable solenoid valve	Base weight (g)
VVX311-stations	Rc(PT)1/8	VX31□$^{1}_{3}$$_{5}$-00-□□	nX100+50
VVX312-stations	Rc(PT)1/4		
VVX321-stations	Rc(PT)1/8	VX32□5-00-□□	nX160+60
VVX322-stations	Rc(PT)1/4		
VVX331-stations	Rc(PT)1/8	VX33□5-00-□□	nX160+60
VVX332-stations	Rc(PT)1/4		

Solenoid Valve for Manifold/Valve Specifications

Orifice size (mmø)	Flow rate		Model	Max operating press. dfifferential (MPa)		Max. system pressure (MPa)	(1) Weight (g)
	Cv	Effective area (mm²)		N.O, N.C.	C.O.		
				AC	AC, DC		
1.5	0.08	1.4	**VX311$^{1}_{3}$$_{5}$-00**	1.0	0.6	1.0	220
2.2	0.16	2.8	**VX312$^{1}_{3}$$_{5}$-00**	0.5	0.3		220
	0.19	3.4	**VX3225-00**	—	0.6		370
			VX3325-00	—	1.0		530
3	0.24	4.3	**VX313$^{1}_{3}$$_{5}$-00**	0.3	0.2		220
	0.33	6	**VX3235-00**	—	0.3		370
			VX3335-00	—	0.6		530
4	0.5	9	**VX3245-00**	—	0.15		370
			VX3345-00	—	0.3		530

Note 1) It is a grommet style value. Add the conduit style 10g, the DIN connector style 30g and the terminal style 60g respectively.
- Refer to p.4.1-14 the glossary for detail of max. operating pressure differential and max. system pressure.

Ambient and Fluid Temperature

Temperature	Power	Fluid temperature °C				Ambient temp. °C
		Air (Std.)	Oil (Std.)	Oil (3) (D, N)	Vacuum (3) (V, R, Y)	
Max.	AC	60	60	60	60	60
	DC	60	40	—	—	40
Min.	AC DC	–10 (1)	–5 (1)	—	–10	–20

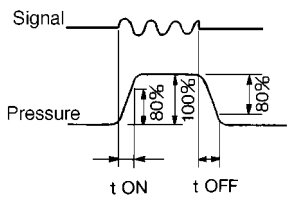
Note 1) Dew point –10°C or less
Note 2) 50cSt or less
Note 3) "D", "N" in the parenthesis are option symbols.

Tightness of Valve (Leakage)

Seal \ Fluid	Air	Liquid	Non-leak (2) Vacuum
NBR, FPM, EPR	1cm³/min or less	0.1cm³/ (1) min or less	10^{-5}atm cc/sec or less

Note 1) Differ from the operating condition of pressure.
Note 2) Value on option "V", "R", "Y" (Non-leak, Vacuum).

Response Characteristics



Model	Changing Power	Response time (msec)	
		ON	OFF
VX31	DC	60 or less	40 or less
	AC	50 or less	40 or less
VX32	DC	40 or less	50 or less
	AC	40 or less	50 or less
VX33	DC	60 or less	60 or less
	AC	40 or less	50 or less

Note) The value is a case of no grease on armature.

Solenoid Valve for Manifold/How to Order

VX31 / VX32 / VX33 □ 5 □ — 00 — □ □ □

Model

Select a model from the highest operating pressure difference and the characteristics figure difference of flow rate in p.4.1-50.

Orifice size
- **1** — 1.5mmø
- **2** — 2.2mmø
- **3** — 3mmø
- **4** — 4mmø

∗ Refer to table ① for configuration.

Valve/Body
- **5** — Common for manifold

Only VX31 has an energized open (N.C.) and energized closed (N.O.)
Mark **1** — Valve N.C.
3 — Valve N.O.

Options
- **—** — Standard
- **V, R** — For vacuum, non-leak

Select an option symbol by the "Applicable Fluid Check List" p.4.0-11 for a special fluid outside of standard.

Connection
- **00** — (No connection screw) For manifold

Voltage
- **1** — 100V AC 50/60Hz
- **2** — 200V AC 50/60Hz
- **3** — 110V AC 50/60Hz
- **4** — 220V AC 50/60Hz
- **5** — 24V DC
- **6** — 12V DC
- **7** — 240V AC 50/60Hz
- **8** — 48V AC 50/60Hz
- **9** — Other (Contact SMC separately)

∗ Refer to table ② for configuration.

Refer to p.4.0-15 for coil only.

Electrical entry
- **G** — Grommet
- **C** — Conduit
- **D** — DIN connector
- **T** — Conduit terminal

∗ Refer to table ② for configuration.

Options
- **—** — None
- **S** — With surge voltage suppressor
- **L** — With light
- **Z** — With indicator light and surge voltage suppressor

∗ Refer to table ② for configuration.

Table ① Orifice Size

Solenoid valve	Orifice size (No.)			
	1 (1.5mmø)	2 (2.2mmø)	3 (3mmø)	4 (4mmø)
VX31	●	●	●	—
VX32	—	●	●	●
VX33	—	●	●	●

Table ② Voltage-Electrical Entry-Options

Insulation		Class B				Class H		
Electrical entry		G	C	D, T		G, C	T	
Options		S(1)	—	S	L, Z	—	S	L, Z
AC	**1** (100V)	●	●	●	●	●	●	●
	2 (200V)	●	●	●	●	●	●	●
	3 (110V)	●	●	●	●	●	●	●
	4 (220V)	●	●	●	●	●	●	●
	7 (240V)	●	●	●	—	●	●	—
	8 (48V)	●	●	●	—	—	●	—
DC	**5** (24V)	●	●	●	●	—	—	—
	6 (12V)	●	●	●	—	—	—	—

Note 1) Surge voltage suppressor is attached to the lead wire.

How to Order Manifold Base

VVX31 / VVX32 / VVX33 □ — □

Manifold base

Mark	Solenoid valve
VVX31	VX31□[3/5]-00
VVX32	VX325□-00
VVX33	VX335□-00

Stations
- **02** — 2stations
- ⋮
- **10** — 10stations

Port size (Individual port)
- **1** — Rc(PT) 1/8
- **2** — Rc(PT) 1/4

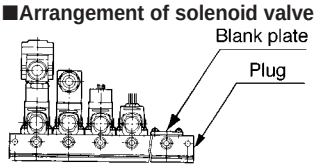
∗ All common ports are Rc(PT) 1/4. The common SUP is indicated as "P" on the common port and the individual SUP is indicated as "VAC".

■Write both the base style and the style of solenoid or blank plate manifold.

(Example) 7 stations of VX31 common SUP, individual port 1/8.

(Base)	VVX311-07·····1 pc
(Solenoid valve)	VX3111-00-1G·····6 pcs.
(Blank plate)	VX011-004·····1 pc

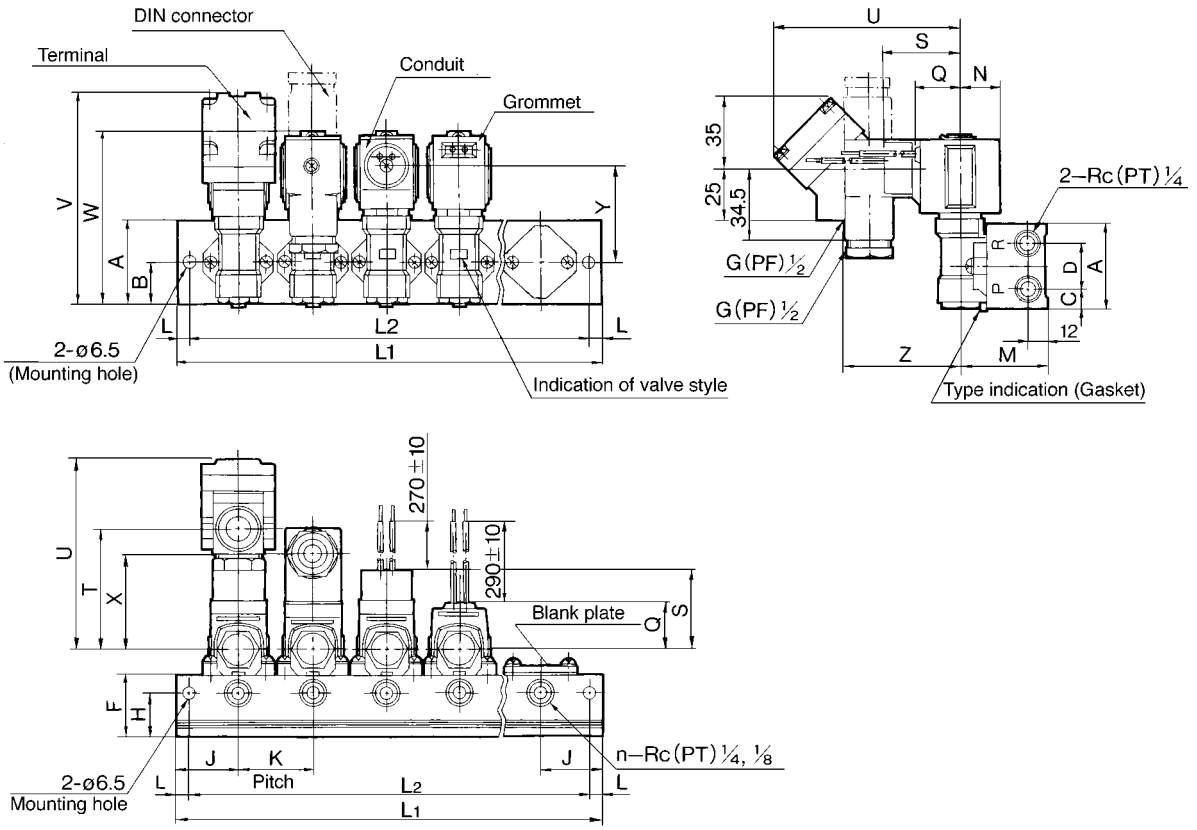
■Arrangement of solenoid valve



The standard arrangements of manifolds should be placed on an individual port on this side, each solenoid valve from the left side and a blank plate in the right side. The right side of the common port provides plug.

VX
VN□
VQ

Dimensions



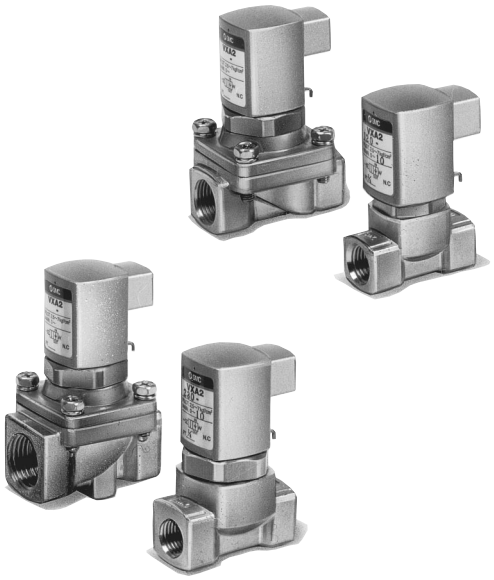
Model	Symbol \ Station	2	3	4	5	6	7	8	9	10
VVX31	L_1	96	132	168	204	240	276	312	348	384
	L_2	84	120	156	192	228	264	300	336	372
VVX32	L_1	126	172	218	264	310	356	402	448	494
VVX33	L_2	108	154	200	246	292	338	384	430	476

Model	A	B	C	D	F	H	J	K	L	M	N	Q	S	T	U	V	W	X	Y	Z
VVX31	40	20	9	22	33	24	30	36	6	45.5	20	23	39	59	92	102	83	47	47	59
VVX32	44	22	10	24	34	25	40	46	9	50.5	23	25	41	62	95	114	99	48	58	62
VVX33	44	22	10	24	34	25	40	46	9	50.5	25.5	28	44	64	97	123	106	51	67	64

Direct Air Operated 2 Port Valve

Series VXA21/22

For Air, Gas, Vacuum, Water and Oil



Proper selection of body sealing materials permits application of a wide variety of fluids.

Application can be matched by simply choosing body material (Brass or Stainless steel) and seal material (NBR, FPM, EPR or PTFE).

Easy to disassemble and reassemble in a short time.

Compatible with high viscosity fluids (500cSt)

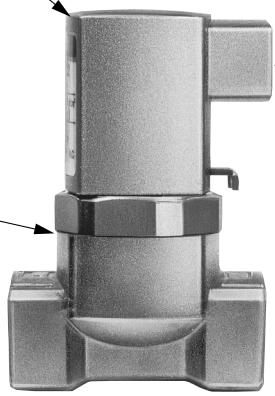
Variations

Valve

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

Material

Body —— Brass, Stainless steel
Seal —— NBR, FPM, EPR



Pilot port (Free take off direction)

Port size —— Rc(PT) 1/8
Pilot pressure —— 0.25 to 0.7MPa

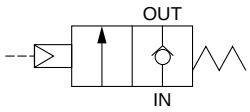
Model

Model	Port size Rc(PT)	Orifice size (mmø)
VXA212$^{2}_{0}$	1/8, 1/4	3
VXA213$^{2}_{0}$	1/8, 1/4	4.5
VXA223$^{2}_{0}$	1/4, 3/8	4.5
VXA224$^{2}_{0}$	1/4, 3/8	6
VXA225$^{2}_{0}$	1/4, 3/8	8
VXA226$^{2}_{0}$	1/4, 3/8, 1/2	10

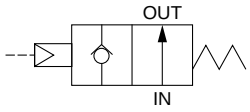
Normally Closed (N.C.)/Normally Open (N.O.)

Symbol

N.C.

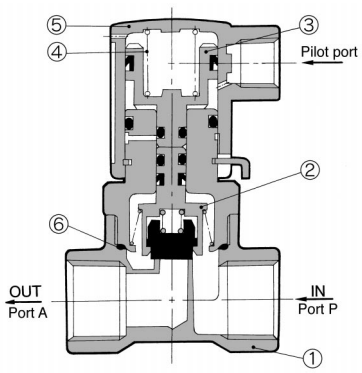


N.O.

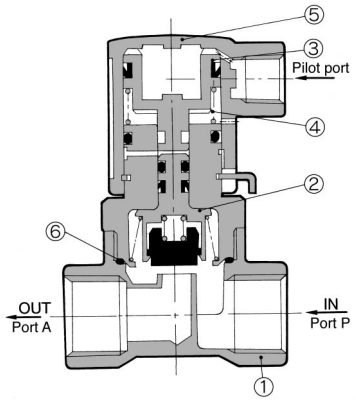


Construction/Components

Normally closed (N.C.)



Normally open (N.O.)



No.	Description	Material	
		Standard	Option
①	Body	Brass	Stainless steel
②	Valve assembly	Stainless steel, Brass, NBR, Polyacetal	Stainless steel FPM/EPR
③	Piston assembly	Polyacetal/NBR	—
④	Piston spring	Stainless steel	—
⑤	Pilot cover	Aluminium	—
⑥	O ring	NBR	FPM/EPR

Applicable Fluids

Standard	Option (1)
Water (Standard, Up to 40°C) Air (Standard, dry), Turbine oil Vacuum (Up to 1 Torr) Carbon dioxide (CO_2), Nitrogen gas(N_2) Freon11, 113, 114	Vacuum (Up to 10^{-3} Torr)·····(V, M) Non-leak (10^{-5} atm cc/sec or less)·····(V, M)

Note 1) Refer to p.4.0-12 "Applicable Fluid Check List" for detail of a special fluid out of the standard and the option specifications.

Model/Valve Specifications

Port size Rc(PT)	Orifice size (mmø)	Flow rate Cv	Flow rate Effective area (mm^2)	Model	Max.operating presure differential (MPa)	Max. system pressure (MPa)	Proof pressure (MPa)	Weight (g)
1/8 (6A)	3	0.33	6	**VXA212$^{2}_{0}$**	1.0	1.0	1.5	170
	4.5	0.61	11	**VXA213$^{2}_{0}$**	0.5			
1/4 (8A)	3	0.33	6	**VXA212$^{2}_{0}$**	1.0			
	4.5	0.61	11	**VXA213$^{2}_{0}$**	0.5			
				VXA223$^{2}_{0}$	1.0			250
	6	1.05	19	**VXA224$^{2}_{0}$**	0.6			
	8	1.7	31	**VXA225$^{2}_{0}$**	0.2	0.4		340
	10	1.9	34	**VXA226$^{2}_{0}$**	0.1			
3/8 (10A)	4.5	0.61	11	**VXA223$^{2}_{0}$**	1.0	1.0		250
	6	1.05	19	**VXA224$^{2}_{0}$**	0.6			
	8	1.7	31	**VXA225$^{2}_{0}$**	0.2	0.4		340
	10	2.4	43	**VXA226$^{2}_{0}$**	0.1			
1/2 (15A)	10	2.4	43	**VXA226$^{2}_{0}$**	0.1			420

Note) Refer to p.4.0-14 the glossary for detail of max. operating pressure differential and max. system pressure.

Ambient and Fluid Temperature

Temperature	Fluid temperature °C				Ambient temperture °C
	Water (Standard)	Air (Standard)	Oil (Standard)	Vacuum (3) (V, M)	
Max.	40	60	40	40	40
Min.	1	–5 (1)	–5 (2)	–5	–5

Note 1) Dew point: –5°C or less Note 2) 500cSt or less
Note 3) "V" and "M" in the parenthesis are option symbols.

Tightness of Valve(Leakage)

Fluid / Seal	Air	Liquid	Non-leak Vacuum (2) V, M
NBR, FPM, EPR	≤1cm^3/min	≤0.1cm^3/min (1)	≤10^{-5}atm cc/sec

Note 1) Different from the operating condition of pressure.
Note 2) Value on option "V", "M" (Non-leak, Vacuum).

Pilot Pressure

Type	Pressure (MPa)
VXA21□□ **VXA22□□**	0.25 to 0.7

How to Order

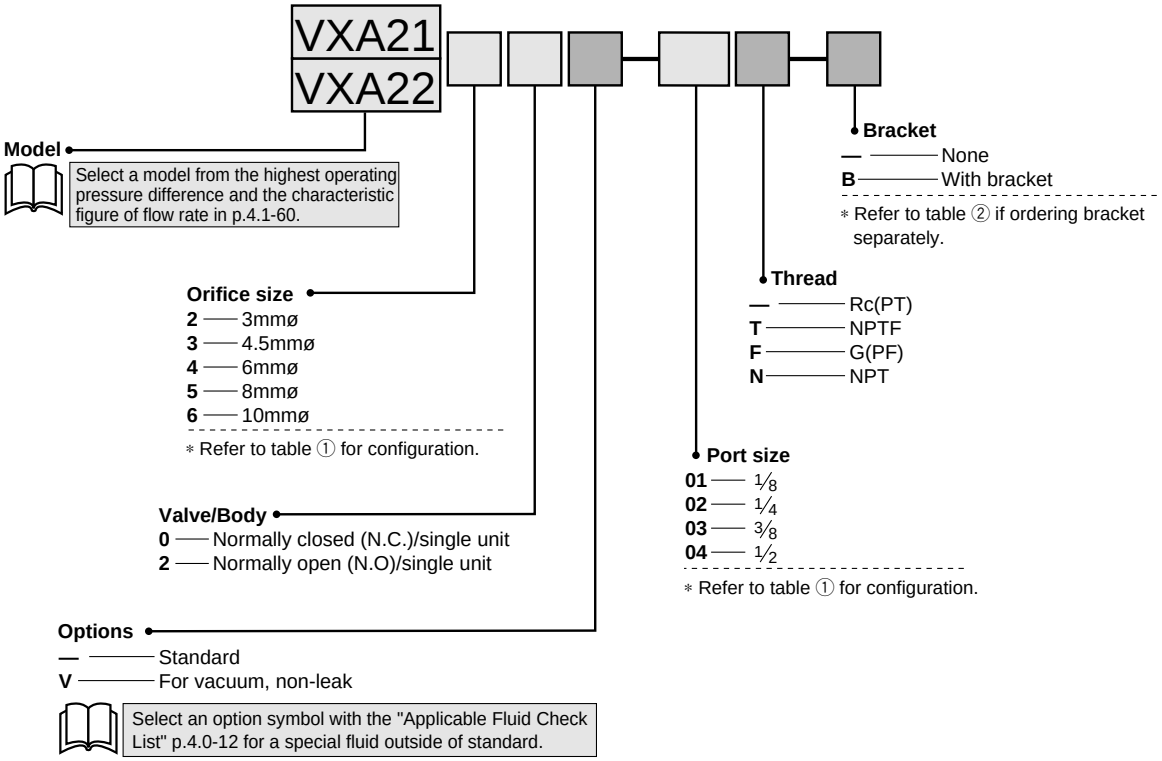


Table ① Port/Orifice Size

Model		Orifice size (No.)				
VXA21	**VXA22**	2 (3mmø)	3 (4.5mmø)	4 (6mmø)	5 (8mmø)	6 (10mmø)
01 (1/8)	—	●	●	—	—	—
02 (1/4)	—	●	●	—	—	—
—	02 (1/4)	—	●	●	●	●
—	03 (3/8)	—	●	●	●	●
—	04 (1/2)	—	—	—	—	●

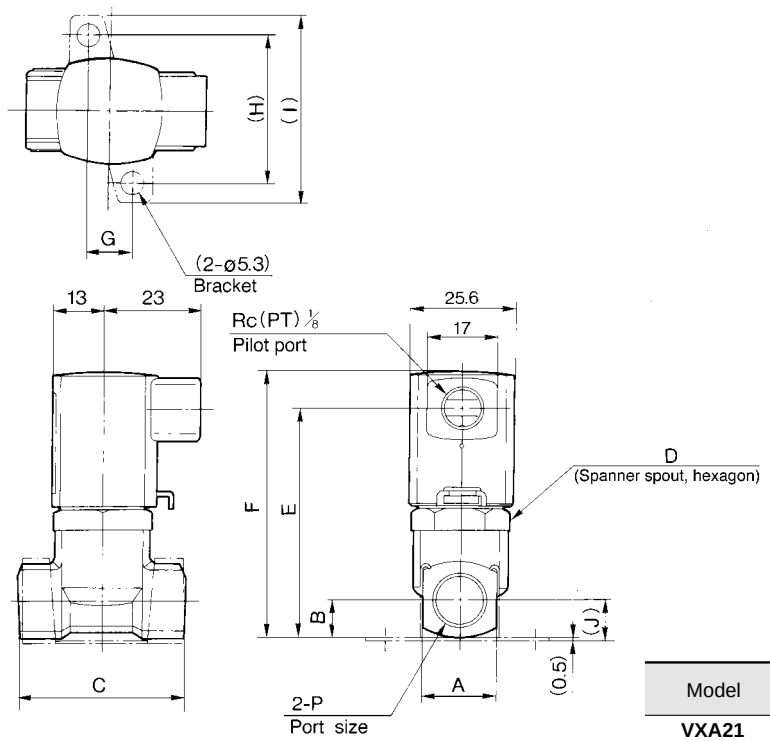
Table ② Bracket Part Number

Model	Part number
VXA212□ VXA213□	VX070-020
VXA223□ VXA224□	VX070-022
VXA225□ VXA226□	VX070-029

Ordering Example

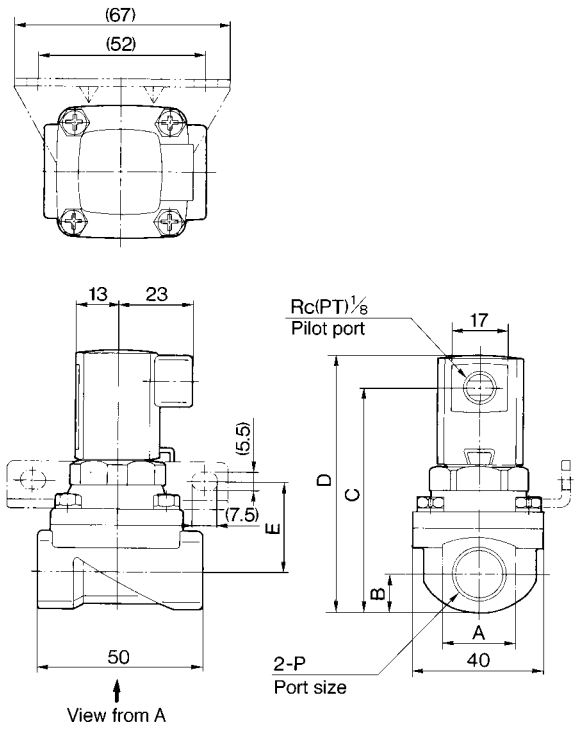
(Example) Series VXA21, Orifice size 4.5mmø, Normal closed, Rc(PT)1/4
(Part number)**VXA2130-02**

Dimensions (Orifice size 3 mmø, 4.5 mmø, 6 mmø)
VXA212□, VXA213□, VXA223□, VXA224□

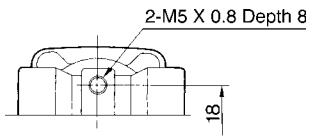


Model	Port size P Rc(PT)	A	B	C	D	E	F	With bracket			
								G	H	I	J
VXA21	1/8, 1/4	18	9	40	21	55	64	11	36	46	10
VXA22	1/4, 3/8	21	10.5	45	27	62	71	13	46	56	11.5

Dimensions (Orifice size 8mmø, 10mmø)
VXA225□, VXA226□



Thread fixed:
(VXA226 $^{2}_{0}$-04 0nly)



Dimention of view from A

Model	Port size Rc(PT)	A	B	C	D	Bracket E
VXA22 $^{52\ 02}_{60\ 03}$	1/4, 3/8	22	11	67	77	27
VXA226 $^{2}_{0}$**-04***	1/2	28	14.5	73	83	30

* Fixing with thread is also possible.

How to Order/Manifold

VXA21
VXA22 □□□ — 00

Model

Select a model from the highest operating pressure difference and the characteristic figure of flow rate in p.4.1-60

Orifice size
2 — 3mmø
3 — 4.5mmø
4 — 6mmø

∗ Refer to table ① for configuration.

Valve/Body
1 — Normally closed (N.C.)/Manifold
3 — Normally open (N.O.)/Manifold

Options

Select an option symbol by "Applicable fluid check list" p.4.0-12 for a special fluid out of the standard.

Connection
00 — (No connection screw) For manifold

Table ① Orifice Size

Model	Orifice size (No.)		
	2 (3mmø)	3 (4.5mmø)	4 (6mmø)
VXA21	●	●	—
VXA22	—	●	●

How to Order Manifold Base

VVXA21
VVXA22 □ □ —

Manifold base

Mark	Applicable valve
VVXA21	VXA21□$^{3}_{1}$-00
VVXA22	VXA22□$^{3}_{1}$-00

Manifold base
— — Common pressure
V — Individual pressure (For vaccum)

Stations
02 — 2 stations
⋮
10 — 10 stations

Port size (Individual port)
1 — Rc(PT) 1/8
2 — Rc(PT) 1/4

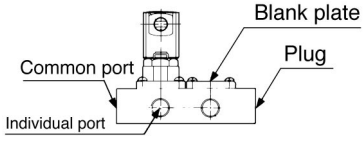
∗ All common ports are Rc(PT) 3/8. Common SUP model has indication of "P" and individual SUP has indication of "VAC" at the common port.

■Write both the base style and the style of valve or blank plate manifold.

(Example) 7 stations of VXA21 common pressure, individual port Rc(PT)1/8.

(Base)	VVXA211-07	1 pc.
(Valve)	VXA2121-00	6 pcs.
(Blank plate)	VX011-001	1 pc.

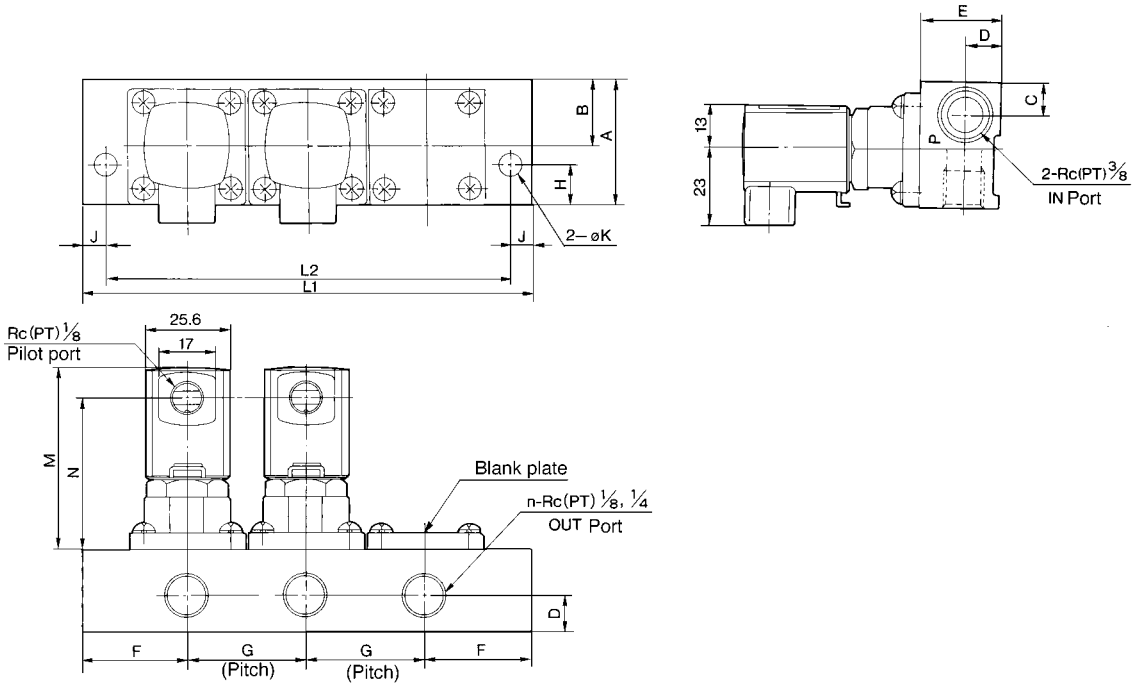
■Arrangement of solenoid valves



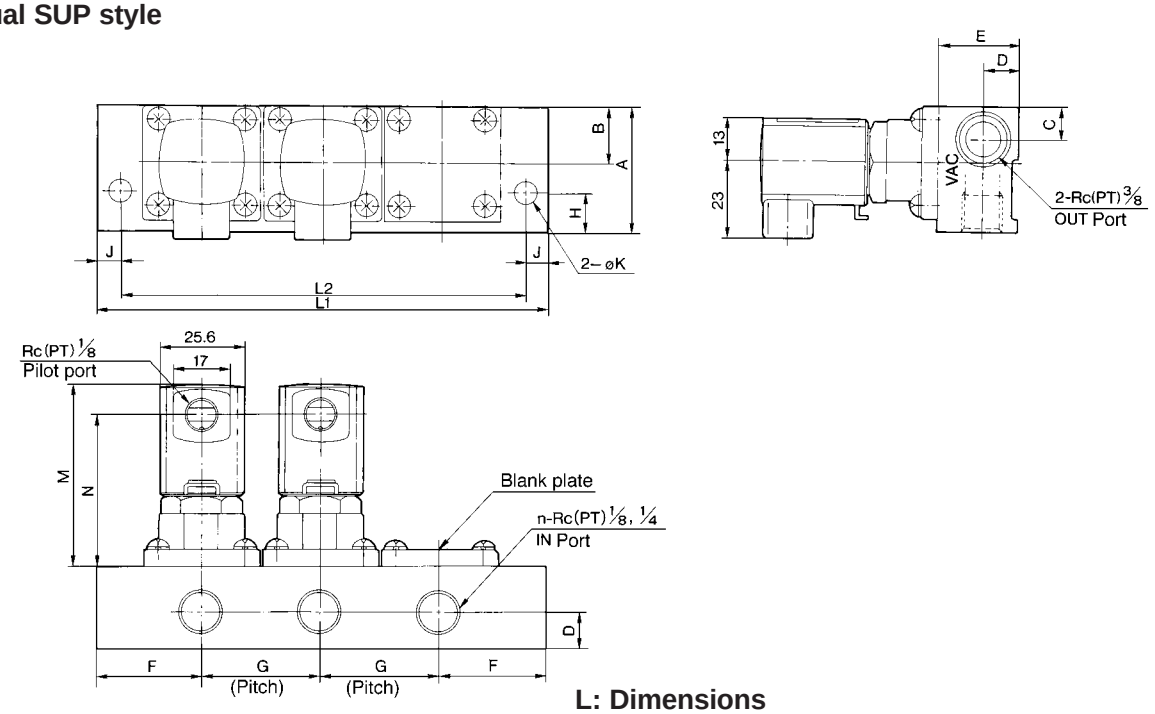
The standard arrangement of manifolds should be placed on an individual port on this side, each solenoid valve from the left side and a blank plate in the right side. The right side of the common port provides plug.

Dimensions

Common SUP style



Individual SUP style



L: Dimensions

Model	Stations / L	2	3	4	5	6	7	8	9	10
VVXA21□	L1	100	136	172	208	244	280	316	352	388
	L2	86	122	158	194	230	266	302	338	374
VVXA22□	L1	126	172	218	264	310	356	402	448	494
	L2	108	154	200	246	292	338	384	430	476

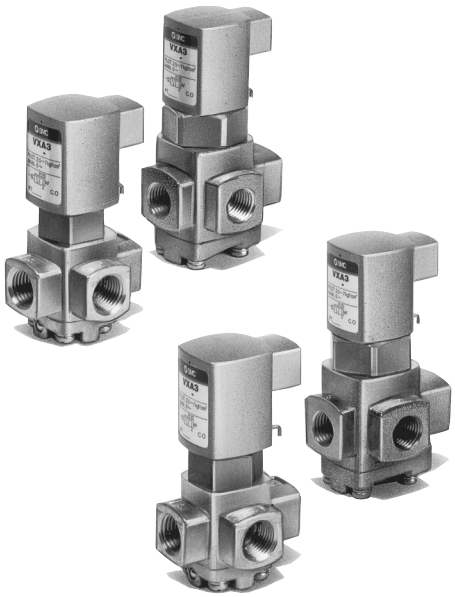
Model	A	B	C	D	E	F	G	H	J	K	M	N
VVXA21□	38	20.5 [17.5]	10.5	11	25	32	36	12	7	6.5	54	45
VVXA22□	49	26.5 [22.5]	13	13	30	40	46	15	9	8.5	58	49

[ ]: Individual pressure style

Direct Air Operated 3 Port Valve

Series VXA31/32

For Air, Gas, Vacuum, Water and Oil



- **Proper selection of body and sealing materials permits application of a wide variety of fluids.**

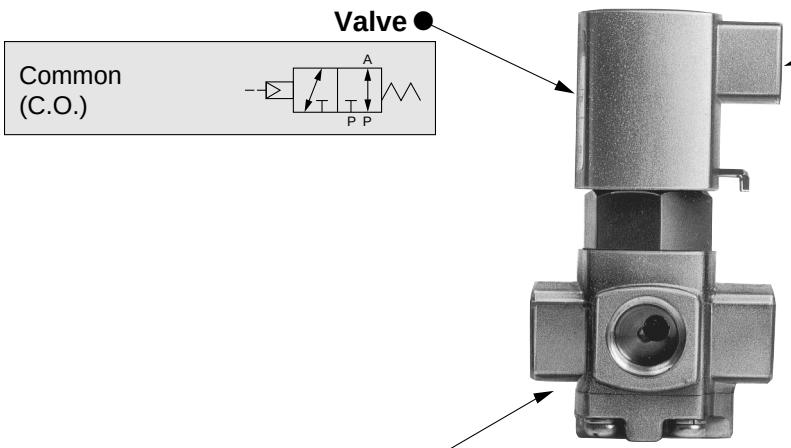
  Application can be matched by simply choosing body material (Brass or Stainless steel) and seal material(NBR, FPM or EPR).

- **C.O. style easy to use; operatable as either N.C. or N.O.**

- **Easy to disassemble and reassemble in a short time.**

- **Compatible with high viscosity fluids (500cSt).**

Variations



Model

Model	Connecting port size Rc(PT)	Orifice size (mmø)
VXA3114	1/8, 1/4	1.5
VXA3124	1/8, 1/4	2.2
VXA3134	1/8, 1/4	3
VXA3224	1/4, 3/8	2.2
VXA3234	1/4, 3/8	3
VXA3244	1/4, 3/8	4

Common (C.O.)

Applicable Fluids

Standard	Option (1)
Water (Standard, Up to 40°C) Air (Standard, Dry), Turbine oil, Vacuum (Up to 1 Torr), Carbon dioxide (CO_2), Nitrogen gas (N_2), Freon11, 113, 114	Vacuum (Up to 10^{-3} Torr) ····· (V, M) Non-leak (10^{-5} atm cc/sec or less)····· (V, M)

Note 1) Refer to p.4.0-13 "Applicable Fluid Check List" for detail of a special fluid out of the standard and the option specifications.

Model/Valve Specifications

Port size Rc(PT)	Orifice size (mmø)	Flow rate Cv	Flow rate Effective orifice (mm^2)	Model	Max. operating pressure differential (MPa)	Max. system pressure (MPa)	Proof pressure (MPa)	(1) Weight (g)
1/8 (6A)	1.5	0.08	1.4	**VXA3114**	1.0	1.0	1.5	280
	2.2	0.16	2.8	**VXA3124**	0.5			
	3	0.24	4.3	**VXA3134**	0.3			
1/4 (8A)	1.5	0.08	1.4	**VXA3114**	1.0			
	2.2	0.16	2.8	**VXA3124**	0.5			
		0.19	3.4	**VXA3224**	1.0			410
	3	0.24	4.3	**VXA3134**	0.3			280
		0.33	6	**VXA3234**	0.6			410
	4	0.5	9	**VXA3244**	0.3			
3/8 (10A)	2.2	0.19	3.4	**VXA3224**	1.0			
	3	0.33	6	**VXA3234**	0.6			
	4	0.5	9	**VXA3244**	0.3			

Note 1) Refer to p.4.0-14 the glossary for detail of max.operating pressure differential and max. system pressure.

Ambient and Fluid Temperature

Temperature	Fluid temperature °C Water (Standard)	Air (Standard)	Oil (Standard)	Vacuum(3) (V, M)	Ambient temperature °C
Max.	40	60	40	40	40
Min.	1	–5(1)	–5(2)	–5	–5

Note 1) Dew point: –10°C or less. Note 2) 500cSt or less.
Note 3) "V", "M" in the parenthesis are option symbols.

Tightness of Valve(Leakage)

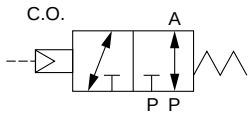
Seal \ Fluid	Air	Liquid	Non-leak, Vacuum (2)
NBR, FPM, EPR	≤1cm^3/min	≤0.1cm^3/min(1)	≤10^{-5}atm cc/sec

Note 1) Differ from the operating condition of pressure.
Note 2) Value on option "V", "M" (Non-leak, Vacuum).

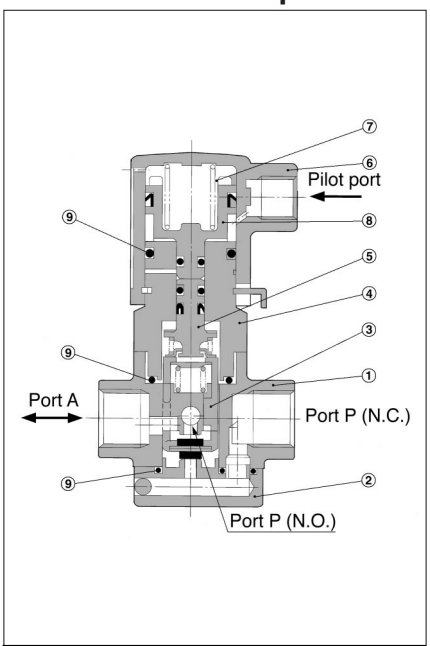
Pilot Pressure

Model	Pressure MPa
VXA31□4 **VXA32□4**	0.25 to 0.7

Symbol



Construction/Components



No.	Description	Material Standard	Material Option
①	Body assembly	Brass	Stainless steel
②	Retainer assembly	Brass	Stainless steel
③	Valve assembly	NBR Polyacetal	FPM/EPR Stainless steel
④	Adapter	Brass	Stainless steel
⑤	Travel assembly	Stainless steel, NBR, Polyacetal	FPM/EPR Stainless steel
⑥	Pilot cover	Aluminium	—
⑦	Piston spring	Stainless steel	—
⑧	Piston assembly	Polyacetal, NBR	—
⑨	O ring	NBR	FPM/EPR

How to Order

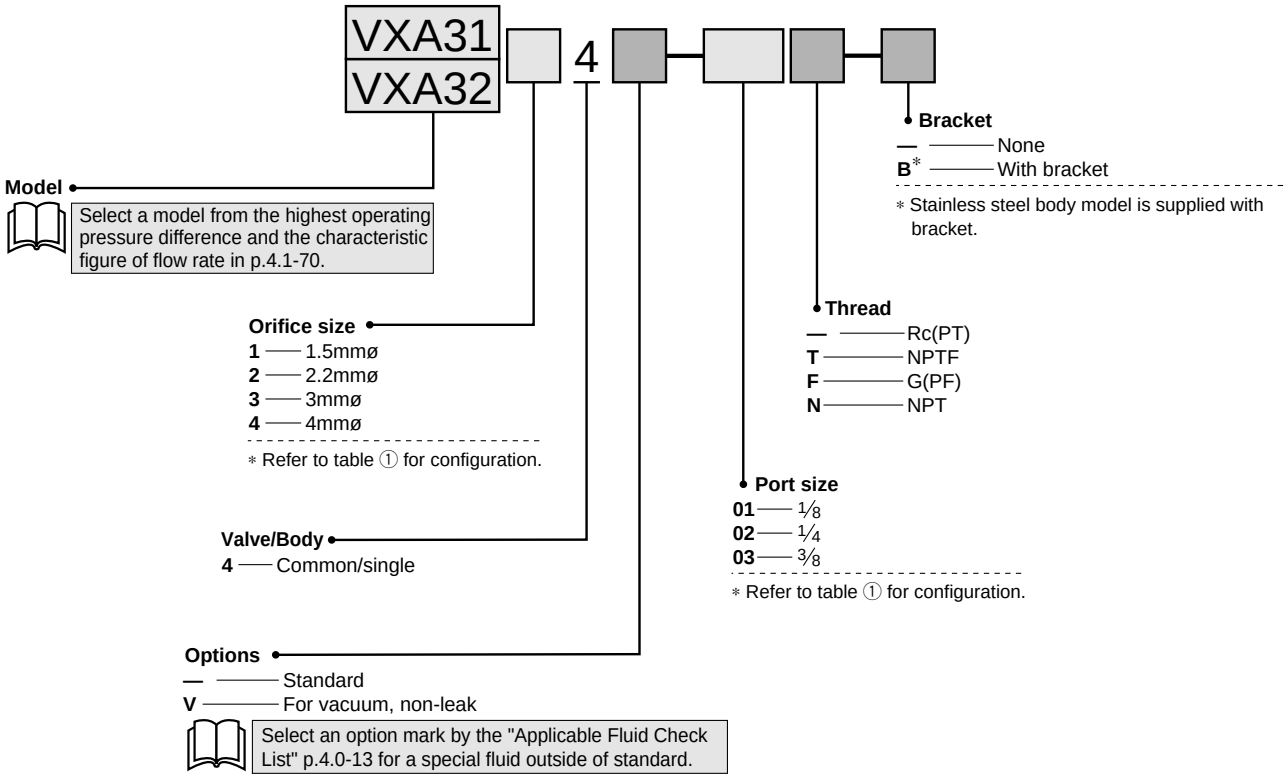


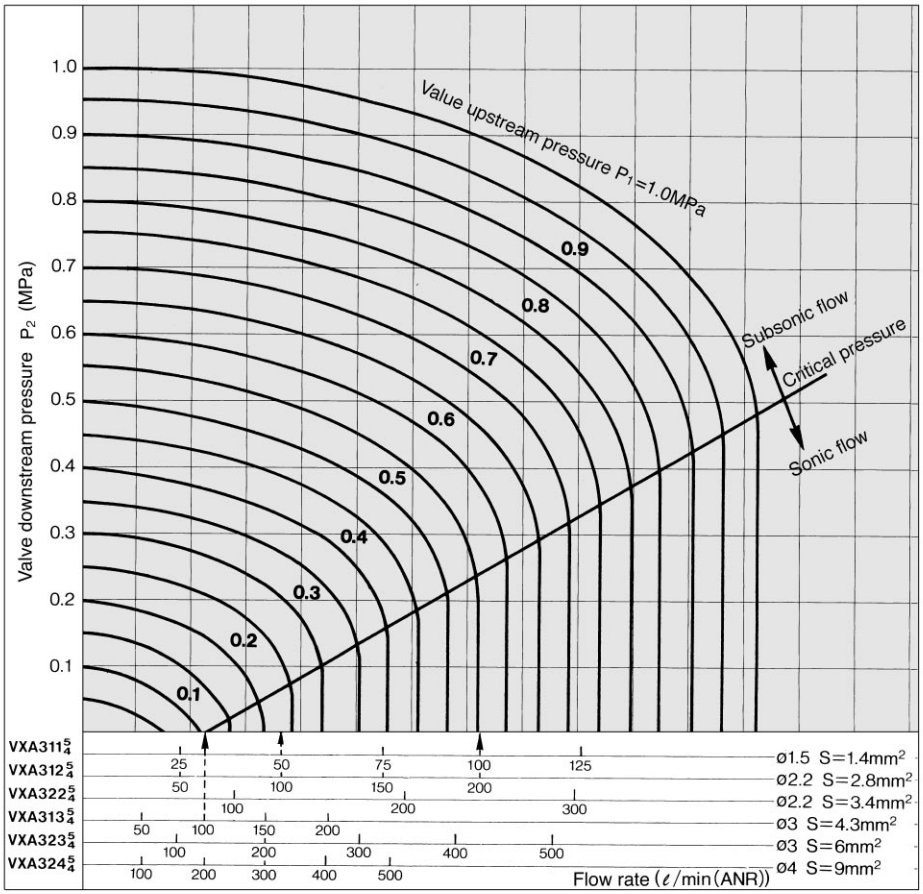
Table ① Port/Orifice Size

Valve (Port size)		Orifice size (No.)			
VXA31	**VXA32**	1 (1.5mmø)	2 (2.2mmø)	3 (3mmø)	4 (4mmø)
01 (1/8)	—	●	●	●	—
02 (1/4)	—	●	●	●	—
—	02 (1/4)	—	●	●	●
—	03 (3/8)	—	●	●	●

Ordering Example

(Example) Series VXA31, Orifice size 1.5mmø, Rc(PT)1/8
(Part number) **VXA3114-01**

Air



How to Read the Graph

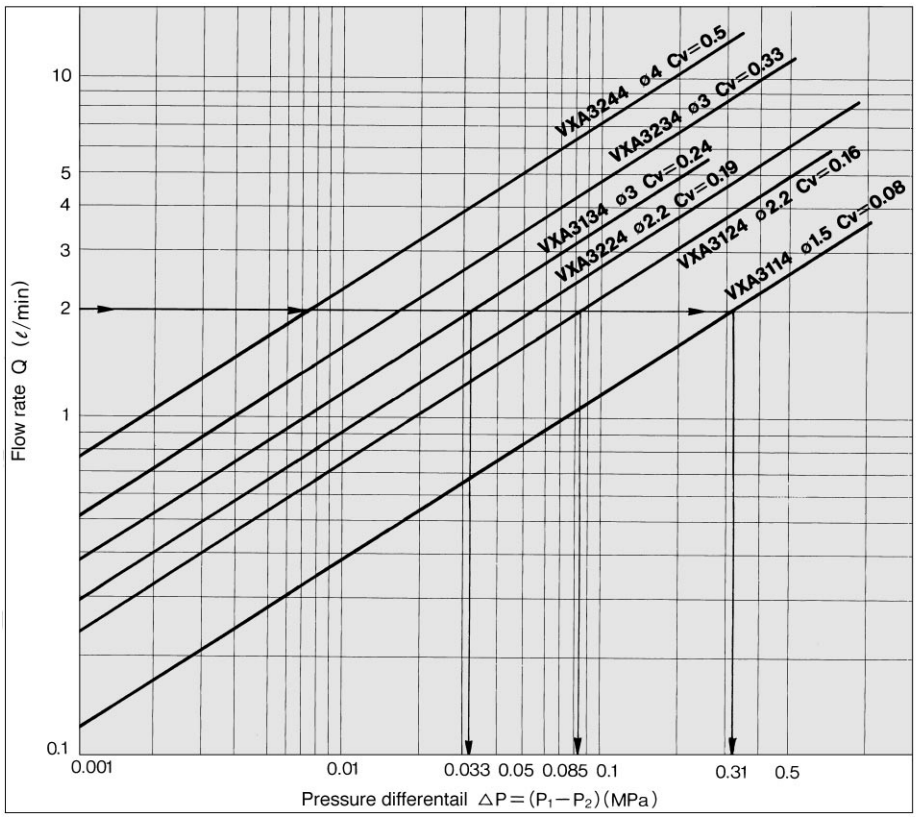
In the sonic flow region:
For a flow of 100 ℓ/min.(ANR)
Orifice ø3 (VXA313$^{5}_{4}$)·····P1 ≅ 0.1MPa
Orifice ø2.2 (VXA312$^{5}_{4}$)·····P1 ≅ 0.23MPa
Orifice ø1.5 (VXA311$^{5}_{4}$)·····P1 ≅ 0.55MPa

How to Calculate Flow/Air

①Equation in the domain of subsonic flow
$P_1+0.1013=(1 \text{ to } 1.8941)(P_2+0.1013)$
- Calculation by Cv factor
  $Q=4073.4 \cdot Cv \cdot \sqrt{\triangle P(P_2+0.1013)}$·····ℓ/min(ANR)
- Calculation by effective area
  $Q=226.3 \cdot S \cdot \sqrt{\triangle P(P_2+0.1013)}$ ·····ℓ/min(ANR)

②Equation in the domain of sonic flow
$P_1+0.1013 \geqq 1.8941(P_2+0.1013)$
- Calculation by Cv factor
  $Q=1972.8 \cdot Cv \cdot (P_1+0.1013)$·····ℓ/min(ANR)
- Calculation by effective area
  $Q=109.6 \cdot S \cdot (P_1+0.1013)$·····ℓ/min(ANR)

Water



How to Read the Graph

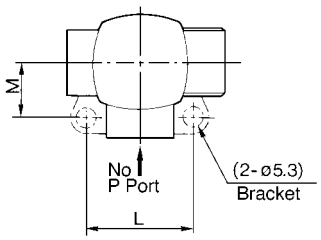
In case of a flow of 2 ℓ/min.
Orifice ø3 valve (VXA3134)···△P ≅ 0.033MPa
Orifice ø2.2 valve (VXA3124)··△P ≅ 0.085 MPa
Orifice ø1.5 valve (VXA3114)··△P ≅ 0.31MPa

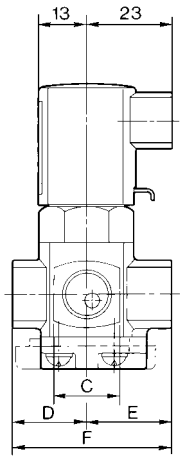
How to Calculate Flow/Water

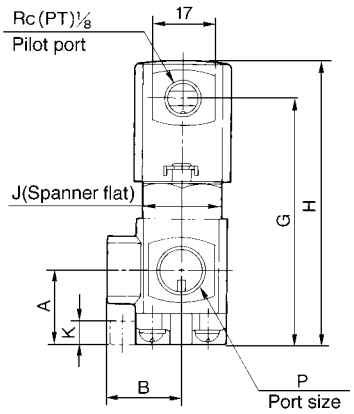
- Calculation by Cv factor
  $Q=14.2 \cdot Cv \cdot \sqrt{10.2 \cdot \triangle P}$ ·····ℓ/min
- Calculation by effective area[Smm²]
  $Q=0.8 \cdot S \cdot \sqrt{10.2 \cdot \triangle P}$ ·····ℓ/min

Q : Flow (Air ℓ/min(ANR)), (Steam kg/h), (Water ℓ/min)
△P: Pressure differential (P_1–P_2)
P_1 : Upstream pressure (MPa)
P_2 : Downstream pressure (MPa)
θ : Fluid temperature (˚C)
S : Effective area (mm²)
Cv : Cv factor (/)

Dimensions





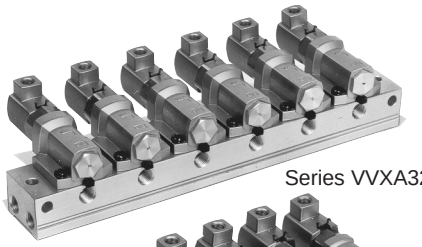


Model \ Symbol	Port size P Rc(PT)	A	B	C	D	E	F	G	H	J	With bracket		
											K	L	M
VXA31	⅛, ¼	19	20	18	20	22.5	42.5	71	81	21	6	29	14.5
VXA32	¼, ⅜	25	20	21	20	27.5	47.5	80	90	27	7.5	32	17

Direct Air Operated
3 Port Valve/Manifold

Series VVXA31/32

For Air, Gas, Vacuum and Oil



Series VVXA32

Series VVXA31

Compatible with a wide variety of fluids.

Application can be matched by simply choosing the correct seal material (NBR, FPM or EPR).

It is possible to replace valve without changing existing piping.

Configuration can be changed from N.C. to N.O., and from N.O. to N.C. easily.

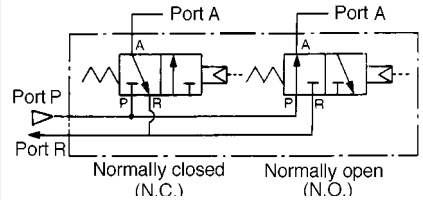
Weight-saving aluminum base and body.

(Not applicable to water or steam.)

Variations

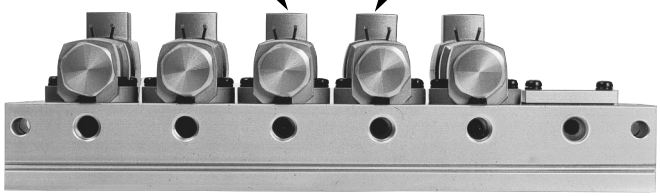
Valve

Common (C.O.)



Material

Base, Body ——— Aluminum
Seal ——— NBR, FPM, EPR



Manifold

Manifold style ——— B mount
Manifold stations —— 2 to 10 stations

Model

Manifold base	Port A Rc(PT)	Port P Rc(PT)	Port R Rc(PT)
VVXA311-stations	1/8	1/4	1/4
VVXA312-stations	1/4		
VVXA321-stations	1/8		
VVXA322-stations	1/4		

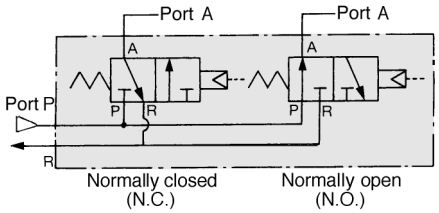
Common (C.O.)

Applicable Fluids

Standard	Option (1)
Air (Standard, Dry), Vaccum (Up to 1 Torr), Turbine oil, Carbon dioxide (CO_2), Nitrogen gas (N_2) Freon 11, 113, 114	Vaccum (Up to 10^{-3} Torr) ·····(V) Non-leak or less (10^{-5} atm cc/sec or less) ····· ⋮ Others

Note 1) Refer to p.4.0-13 "Applicable Fluid Check List" for detail of a special fluid out of the standard and the option specifications.

Symbol



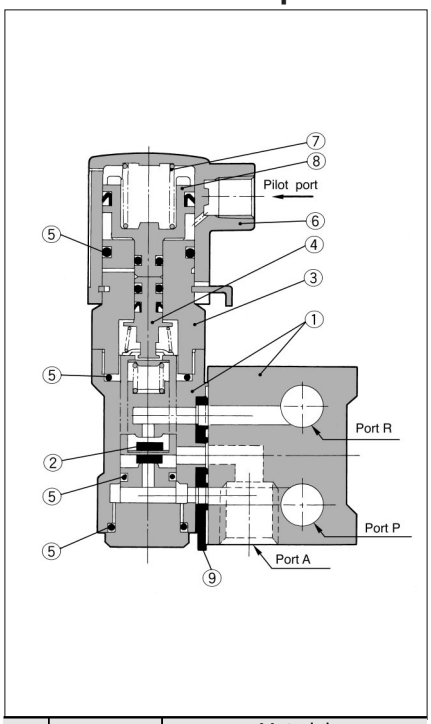
Manifold Specifications

Manifold	B Mount	
Manifold base	Common supply, Common exhaust, Common out	
Number of valves	2 to 10 stations	
Blanking plate (With gasket, screws)	VVXA31	VX011-004
	VVXA32	VX011-005

Manifold Base and Applicable Valve

Manifold base	Individual port Rc(PT)	Applicable valve	Base weight (g)
VVXA311-stations	1/8	VXA31□5-00	n X 100+50
VVXA312-stations	1/4		
VVXA321-stations	1/8	VXA32□5-00	n X 160+70
VVXA322-stations	1/4		

Construction/Components



No.	Description	Material	
		Standard	Options
①	Manifold body, base	Aluminum	Brass (Base is aluminum.)
②	Valve assembly	NBR Polyacetal	EPR/FPM
③	Adapter	Aluminum	EPR/FPM
④	Travel assembly	NBR Polyacetal	EPR/FPM
⑤	O ring	NBR	EPR/FPM
⑥	Pilot cover	Aluminum	—
⑦	Piston spring	Stainless steel	—
⑧	Piston	NBR Polyacetal	—
⑨	Gasket	NBR	FPM/EPR

Model/Valve Specifications

Orifice size (mmø)	Flow rate		Model	Max. operating pressure differential (MPa)	Max. system pressure (MPa)	Proof pressure (MPa)	(1) Weight (g)
	Cv	Effective area (mm^2)					
1.5	0.08	1.4	**VXA3115-00**	1.0	1.0	1.5	150
2.2	0.16	2.8	**VXA3125-00**	0.5			
	0.19	3.4	**VXA3225-00**	1.0			230
3	0.24	4.3	**VXA3135-00**	0.3			150
	0.33	6	**VXA3235-00**	0.6			230
4	0.5	9	**VXA3245-00**	0.3			

Note 1) •Add the V type (VXA31) 80g, (VXA32)130g.
•Refer to p.4.0-14 the glossary for detail of max. operating pressure and max. system.

Ambient and Fluid Temperature

Temperature	Fluid temperature °C			Ambient temperature °C
	Air (Standard)	Oil (Standard)	Vacuum(3) (V)	
Max.	60	40	40	40
Min.	–5 (1)	–5 (2)	–5	–5

Note 1) Dew point: –5°C or less Note 2) 500cSt or less
Note 3) "V" in the parenthesis is option symbol.

Tightness of Valve(Leakage)

Fluid / Seal	Air	Liquid	Non-leak, Vacuum(2)
NBR, FPM, EPR	≤1cm^3/min	≤0.1cm^3/min(1)	≤10^{-5}atm cc/sec

Note 1) Differ from the operating conditon of pressure.
Note 2) Value on option "V" (Non-leak, Vacuum).

Pilot Pressure

Model	Pressure MPa
VXA31□5 **VXA32□5**	0.25 to 0.7

How to Order/Manifold

VXA31 / VXA32 □ 5 □ — 00

Model

Select a model from the highest operating pressure difference and the characteristic figure of flow rate in p.4.1-70.

Orifice Size

1 — 1.5mmø
2 — 2.2mmø
3 — 3mmø
4 — 4mmø

∗ Refer to table ① for configuration.

Valve/Body

5 — Commonly open/Manifold

Valve Options

— — Standard
V — For vacuum, non-leak

Select an option mark by the "applicable Fluid Check List" p.4.0-13 for a special fluid out of the standard.

Connection

00 — (No connection screw) For manifold

Table ① Orifice Size

Model	Orifice size (No.)			
	1 (1.5mmø)	2 (2.2mmø)	3 (3mmø)	4 (4mmø)
VXA31	●	●	●	—
VXA32	—	●	●	●

How to Order Manifold Base

VVXA31 / VVXA32 □ — □

Manifold base

Symbol	Applicable valve
VVXA31	VXA31□5-00
VVXA32	VXA32□5-00

Stations

02 — 2 stations
⋮
10 — 10 stations

Port size (Individual port)

1 — Rc(PT) 1/8
2 — Rc(PT) 1/4

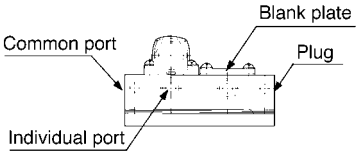
∗ All common ports are Rc(PT) 1/4. The common SUP is indicated as "P" on the common port and the individual SUP is indicated as "VAC".

■Write both the base style and the style of valve or blank plate manifold.

(Example) 7stations of VXA31, Individual port Rc(PT)1/8

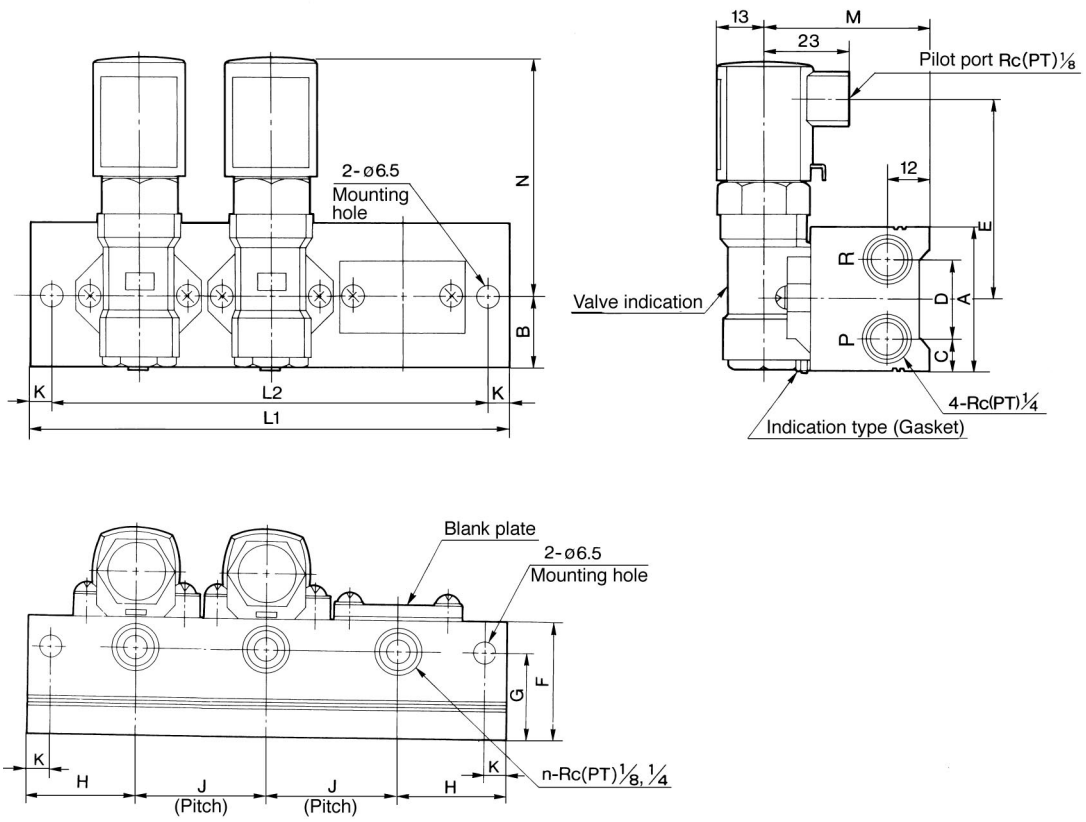
(Base)	VXA311-07····· 1 pc
(Valve)	VXA3115-00·····6 pcs.
(Blank plate)	VX011-004·····1 pc.

■Arrangement of solenoid valves



The standard arrangement of manifolds should be placed on an individual port on this side, each solenoid valve from the left side and a blank plate in the right side. The right side of the common port provides plug.

Dimensions



Model \ Stations / L		2	3	4	5	6	7	8	9	10
VVXA31	L1	96	132	168	204	240	276	312	348	384
	L2	84	120	156	192	228	264	300	336	372
VVXA32	L1	126	172	218	264	310	356	402	448	494
	L2	108	154	200	246	292	338	384	430	476

Model \ Symbol	A	B	C	D	E	F	G	H	J	K	M	N
VVXA31	40	20	9	22	59	33	24	30	36	6	45.5	69
VVXA32	44	22	10	24	66	34	25	40	46	9	50.5	76

Pilot Operated/Zero Pressure Differential Operation

2 Port Solenoid Valve

Series VXZ

Change of valve style from N.C. to N.O. is simple.

Excellent maintainability

Separation of movable iron core and diaphragm valve permits easy disassembly/reassembly.

Diaphragm

Strong against dust and water scale in fluid.

Wide variations permit use of almost all types of fluid.

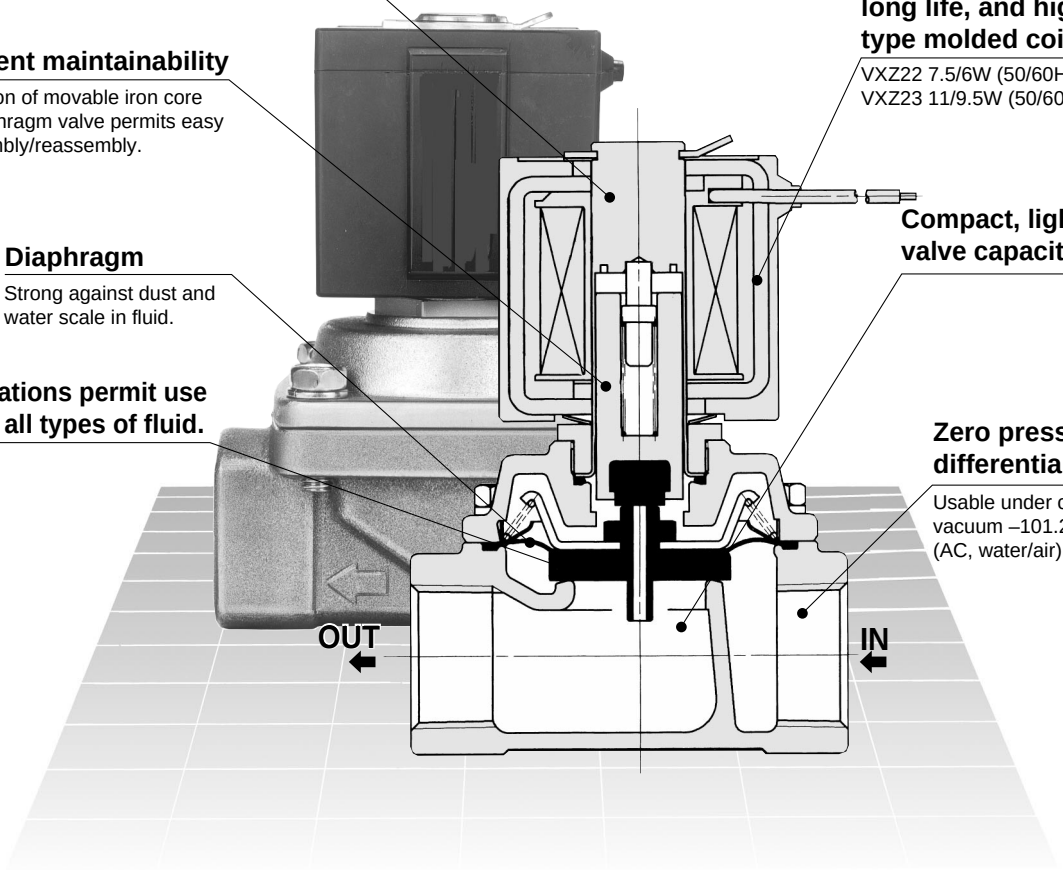
Low power consumption, long life, and high reliability type molded coil

VXZ22 7.5/6W (50/60Hz AC)
VXZ23 11/9.5W (50/60Hz AC)

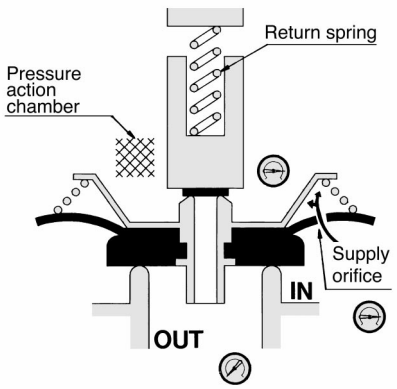
Compact, light, and large valve capacity

Zero pressure differential operation

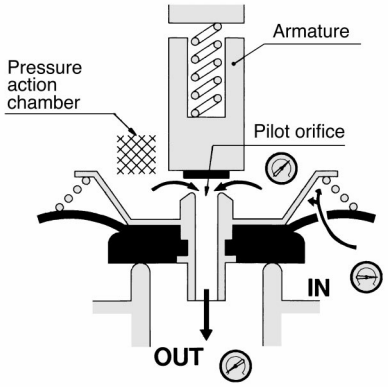
Usable under conditions of vacuum –101.2kPa to 1MPa (AC, water/air).



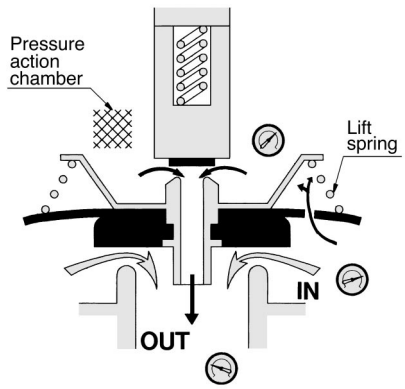
When power is not supplied >> **Right after power is supplied (Pilot valve opens)** >> **When power is being supplied (Main valve opens.)**



Fluid from the IN side goes through the supply orifice and fills the pressure action chamber.
The main valve is kept closed by the force pushing down the valve and the reaction force of the return spring.



When power is supplied to the coil, the armature begins to be attracted, and the pilot orifice opens.
The fluid filled in the pressure action chamber flows through the pilot orifice to the OUT side.



Since the fluid is discharged from the pilot orifice, the pressure in the pressure action chamber decreases.
The force pushing down the valve weakens, and the pressure pushing up the valve over-comes the said force. Thus the main valve opens.
When the IN side has no pressure, or when the pressure is very low,the reaction force of the lift spring opens the main valve.

How to Order

◀N.C.▶ **Normally open**

▶N.O.◀ **Normally closed**

VXZ 2230 □ 02 □ 1 G □ □

VXZ 2232 □ 02 □ 1 G □ □

Model — Port size

2230	**02** {Rc(PT)1/4}
2230	**03** {Rc(PT)3/8}
2240	**04** {Rc(PT)1/2}
2350	**06** {Rc(PT)3/4}
2360	**10** {Rc(PT)1}

Select a model according to the connection size and flow characteristics chart on p.4.1-80.

Thread

—	Rc(PT)
T	NPTF
F	G(PF)
N	NPT

Electrical option

—	Without light/surge voltage suppressor
S	With surge voltage suppressor
L	With light
Z	With light voltage suppressor

∗ See table ① below for applications.

Bracket

—	None
B	With bracket

Electrical entry

G	Grommet
C	Conduit
D	DIN connector
T	Conduit terminal

∗ See table ① below for applications.

Optional solenoid valve

—	Standard

For special non-standard fluid, see the "Applicable Fluid Check List" on p.4.1-81 and select an option code.

Model — Port size

2232	**02** {Rc(PT)1/4}
2232	**03** {Rc(PT)3/8}
2242	**04** {Rc(PT)1/2}
2352	**06** {Rc(PT)3/4}
2362	**10** {Rc(PT)1}

Select a model according to the connection size and flow characteristics chart on p.4.1-80.

Rated voltage

1	100V AC 50/60Hz
2	200V AC 50/60Hz
3	110V AC 50/60Hz
4	220V AC 50/60Hz
5	24V DC
6	12V DC
7	240V AC 50/60Hz
8	48V AC 50/60Hz
9	Other (Contact SMC for inquiry.)

∗ See Table ① below for applications.
∗∗ See pages p.4.1-84 for purchasing a coil alone.

Fluid

Standard specifications	Option (1)
Air (general, dry)	Air (dry) ····· (T)
Vacuum (up to 1Torr)	High temp, water ····· (D, E)
Turbine oil, Carbon dioxide gas (CO_2),	Argon, helium ····· (F)
Nitrogen gas (N_2)	⋮
Freon 11, 113, 114	(Others)

Note 1) See the "Applicable fluid check list" on p.4.1-81 for special nonstandard fluid and details of optional specifications.

Fluid and Ambient Temperature

Temp. conditions	Power supply	Fluid temp. °C					Ambient temp °C
		Water (Standard)	Air (Standard)	Oil (Standard)	High temp. water (D.E.N.P) (3)	High temp. oil (D.N) (3)	
Max.	AC	60	80	60	99	100	60
	DC	40	60	40	—	—	40
Min.	AC, DC	1	–10(1)	–5(2)	—	—	–10

Note 1) Dew point is below –10°C Note 2) Below 50cSt
Note 3) The parenthesized D.E.N.P represent option codes.

Table ① Rated voltage-Electrical entry-Electrical option

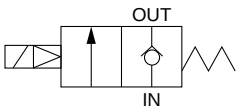
Insulation		Class B				Class H		
Electrical entry		G	C	D, T		G, C	T	
Electrical option		S(1)	—	S	L, Z	—	S	L, Z
AC	**1** (100V)	●	●	●	●	●	●	●
	2 (200V)	●	●	●	●	●	●	●
	3 (110V)	●	●	●	●	●	●	●
	4 (220V)	●	●	●	●	●	●	●
	7 (240V)	●	●	●	—	●	●	—
	8 (48V)	●	●	●	—	—	●	—
DC	**5** (24V)	●	●	●	●	—	—	—
	6 (12V)	●	●	●	—	—	—	—

Note 1) The surge voltage supppressor is attached in the middle of a lead wire

⚠ Caution

Refer to p.0-33 for Safety Instructions and p.0-37 to 0-40 for common precautions.

Symbol



◀N.C.▶ Normally closed

Model/Valve Specifications

Port size	Orifice dia. (mmø)	Flow rate coefficient Cv	Flow rate coefficient Effective area (mm^2)	Model	Min oper. press. diff. (MPa)	Max. operating press. diff. (MPa) Water AC	Water DC	Air AC	Air DC	Oil AC	Oil DC	Max. system pressure (MPa)	(1) Weight (g)
1/4	10	1.9	34	**VXZ2230-02**	0	1.0	0.7	1.0	0.7	0.7	0.7	1.5	550
3/8	10	2.4	43	**VXZ2230-03**		1.0	0.7	1.0	0.7	0.7	0.7		550
1/2	15	5.3	95	**VXZ2240-04**		1.0	0.7	1.0	0.7	0.7	0.7		760
3/4	20	9.2	165	**VXZ2350-06**		1.0	1.0	1.0	1.0	0.7	0.7		1,300
1	25	12	215	**VXZ2360-10**		1.0	1.0	1.0	1.0	0.7	0.7		1,480

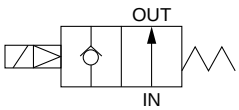
Note 1) Values for the grommet style. Add 10g for the conduit style, 30g for the DIN connector style, 60g for the terminal style.
- See the "Terminology on p.4.0-14 for details of max. operating pressure difference and max. system pressure.

Solenoid Specifications

Model	Power supply	Frequency Hz	Apparent power VA Inrush	Apparent power VA Holding	Power consumption W (Holding)	Temp rise °C (Rated voltage)
VXZ22	AC	50	60(53)	18	7.5	60
		60	51(44)	12	6	50
	DC	—	—	—	8	60
VXZ23	AC	50	80	21	11	65
		60	67	17	9.5	60
	DC	—	—	—	11.5	65

Note)
- The return voltage is 20% or more of the rated voltage for AC and 2% or more for DC.
- The allowable voltage fluctuation rate is ±10% of the rated value for both AC and DC.
- When the ambient temperature is 20°C ±5°C and rated voltage is applied.
- **Coil change from AC to DC or DC to AC is impossible because the iron core shapes are different.**
- The apparent power in the parenthesis is for VXZ2230.

Symbol



▶N.O.◀ Normally open

Model/Valve Specifications

Port size	Orifice dia. (mmø)	Flow rate coefficient Cv	Flow rate coefficient Effective area (mm^2)	Model	Min oper. press. diff. (MPa)	Max. operating press. diff. (MPa) Water AC	Water DC	Air AC	Air DC	Oil AC	Oil DC	Max. system pressure (MPa)	(1) Weight (g)
1/4	10	1.9	34	**VXZ2232-02**	0	0.7	0.6	0.7	0.6	0.7	0.6	1.5	600
3/8	10	2.4	43	**VXZ2232-03**		0.7	0.6	0.7	0.6	0.7	0.6		600
1/2	15	5.3	95	**VXZ2242-04**		0.7	0.6	0.7	0.6	0.7	0.6		850
3/4	20	9.2	165	**VXZ2352-06**		0.7	0.6	0.7	0.6	0.7	0.6		1,370
1	25	12	215	**VXZ2362-10**		0.7	0.6	0.7	0.6	0.7	0.6		1,550

Note 1) Values for the grommet style. Add 10g for the conduit style, 30g for the DIN connector style, and 60g for the terminal style.
- See the "Terminology on p.4.0-14 for details of max. operating pressure difference and max. system pressure.

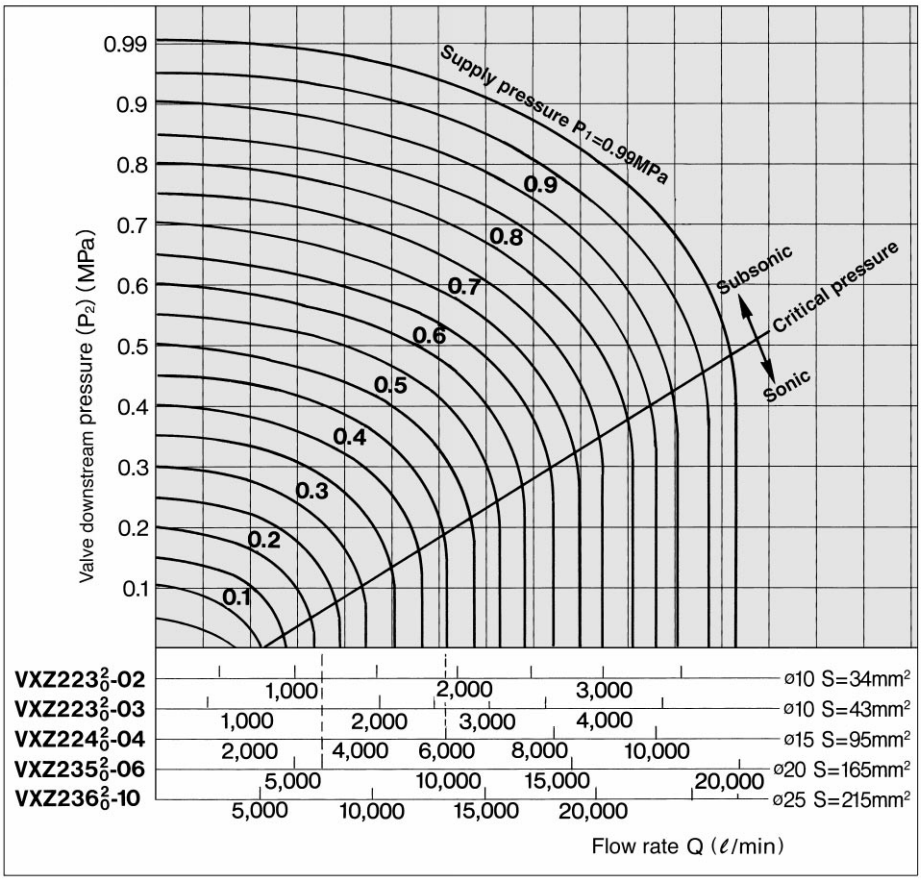
Solenoid Specifications

Model	Power supply	Frequency Hz	Apparent power VA Inrush	Apparent power VA Holding	Power consumption W (Holding)	Temp rise °C (Rated voltage)
VXZ22	AC	50	66(60)	20	8	55
		60	57(51)	15	6.5	45
	DC	—	—	—	8	50
VXZ23	AC	50	93	25	11	60
		60	79	20	9.5	50
	DC	—	—	—	11.5	55

Note)
- The return voltage is 20% or more of the rated voltage for AC and 5% or more for DC.
- The allowable voltage fluctuation rate is ±10% of the rated voltage value for both AC and DC.
- When the ambient temperature is 20°C ±5°C and rated voltage is applied.
- **Coil change from AC to DC or DC to AC is impossible because the iron core shapes are different.**
- The apparent power in the parenthesis is for VXZ2232.

Flow Characteristics

Air



How to Read Chart

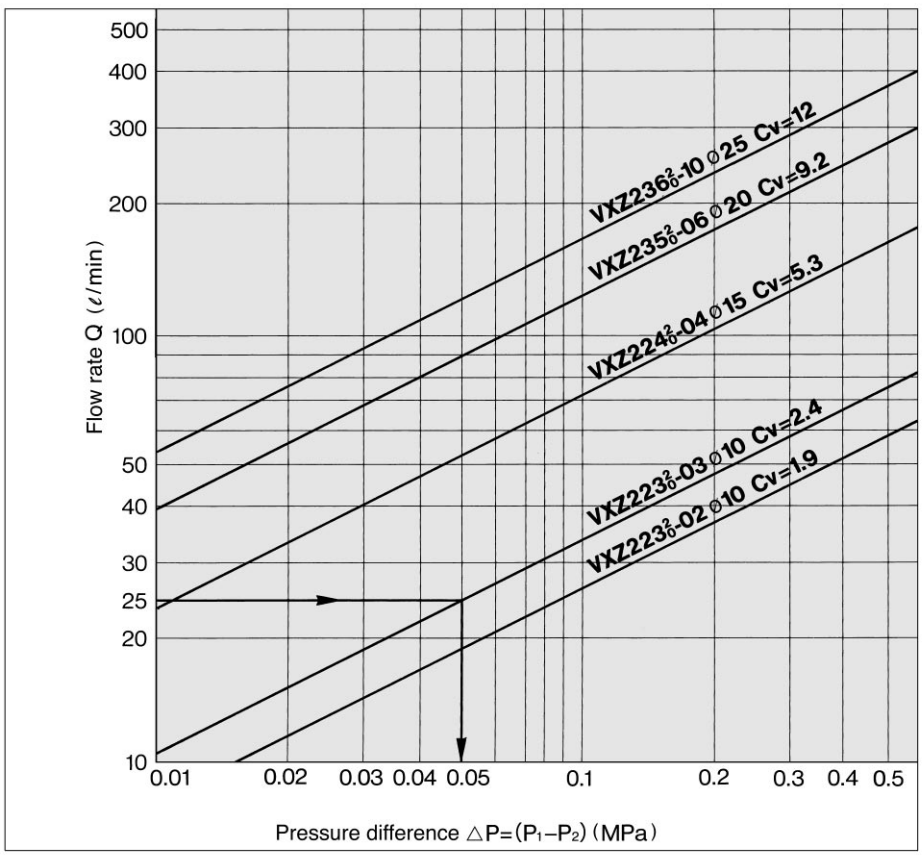
The pressure in the sonic region for the flow rate of 6000ℓ/min (ANR) is $P_1 \cong 4.7$MPa for the orifice of 15 dia. (VXZ224$^2_0$-04) and $P_1 \cong 2.3$MPa for the orifice of 20 dia. (VXZ235$^2_0$-06).

How to Calculate flow rate/Air

① In subsonic region:
$P_1+0.1013=(1 \text{ to } 1.8941)(P_2+0.1013)$
- Formula with Cv factor
  $Q=4073.4 \cdot Cv \cdot \sqrt{\triangle P(P_2+0.1013)}$ ··· ℓ/min (ANR)
- Formula with effective orifice
  $Q=226.3 \cdot S \cdot \sqrt{\triangle P(P_2+0.1013)}$ ····· ℓ/min (ANR)

② In sonic region
$P_1+0.1013 \geqq 1.8941(P_2+0.1013)$
- Formula with Cv factor
  $Q=1972.8 \cdot Cv \cdot (P_1+0.1013)$ ····· ℓ/min (ANR)
- Formula with effective orifice
  $Q=109.6 \cdot S \cdot (P_1+0.1013)$ ····· ℓ/min (ANR)

Water



How to Read Chart

The pressure difference for the flow rate of 25ℓ/min. is $\triangle P \cong 0.05$MPa for the orifice orifice of ø10 dia. (VXZ223$^2_0$-03)

How to Calculate Flow Rate/Water

- Formula with Cv factor
  $Q=14.2 \cdot Cv \cdot \sqrt{10.2 \cdot \triangle P}$ ····· ℓ/min
- Formula with effective orifice (Smm²)
  $Q=0.8 \cdot S \cdot \sqrt{10.2 \cdot \triangle P}$ ····· ℓ/min

Q : Flow rate (Air ℓ/min), (Steam kg/h), (Water ℓ/min)
△P: Pressure difference (P_1-P_2)
P_1 : Upstream pressure (kgf/cm²)
P_2 : Downstream pressure (kgf/cm²)
θ : Air temperature (°C)
S : Effective orifice (mm²)
Cv : Cv factor (/)

Applicable Fluid Check List

◀N.C.▶ Normally closed

See p.4.1-79 for model and specifications.

Option code and components

Option code	Seal material	Coil insulation	Main body, shading coil material
Standard	NBR	B	Brass or BC6, copper
A	FPM		
B	EPR		
D	FPM	H	
E	EPR		
F*	FPM	B	
G	NBR		
H	FPM		Stainless steel, silver
J	EPR		
L*	FPM		
N	FPM	H	
P	EPR		
T*	NBR	B	Brass or BC6, copper
X*	FPM		

Note 1) The option code with "∗" stands for non-lube treatment. Suffix "–X21" should be added to the parts number of other options for non-lube treatment.
Note 2) The option "T/X" has a long life iron core, but water is not applicable.

Fluid name and options

Fluid (application)	Option code and body material	
	Brass or BC6	Stainless steel
Argon	F	L
Argon (long life)	X	—
Ethyl alcohol	F, B	L, J
Ethylene glycol	B	J
Caustic sode (25%≧)	—	J
Air (dry)	T	—
Light oil	A	H
Silicon oil	A	H
Heavy oil (up to 60°C)	A	H
Heavy oil (up to 100°C)	D	N
Steam system (boiler water)	—	G, J
Steam system (condensate)	E	P
Insulation oil	A	H
Naphtha	A	H
Parachloroetylene	A	H
Brake oil	B	J
Water (up to 99°C)	D, E	N, P

▶N.O.◀ Normally open

See p.4.1-79 for model and specifications.

Option code and components

Option code	Seal material	Coil insulation	Main body, shading coil material	Holder material (In core ass'y)
Standard	NBR	B	Brass or BC6, copper	Polyacetal
A	FPM			
B	EPR			
D	FPM	H		Stainless steel
E	EPR			
F*	FPM	B		Polyacetal
G	NBR		Stainless steel, silver	
H	FPM			
J	EPR			
L*	FPM			
N	FPM	H		Stainless steel
P	EPR			
T*	NBR	B	Brass or BC6, copper	Polyacetal
X*	FPM	H		Stainless steel

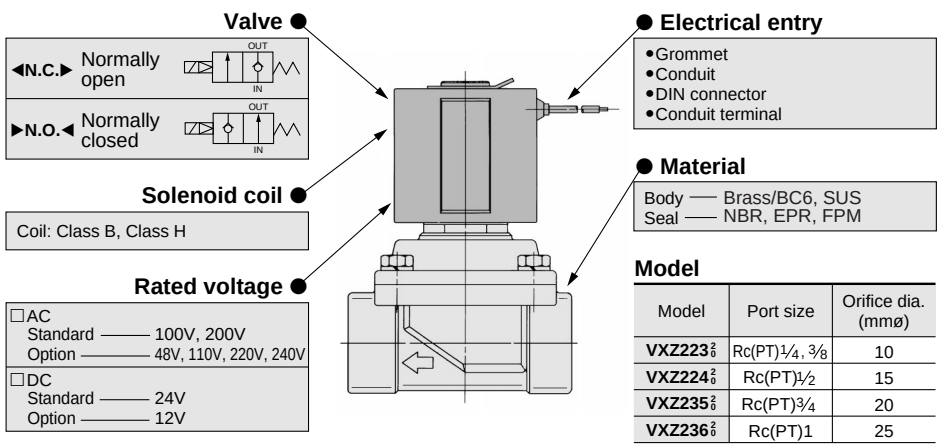
Note 1) The option code with "∗" stands for non-lube treatment. Suffix "–X21" should be added to the parts number of other options for non-lube treatment.
Note 2) The option "T/X" has a long life iron core, but water is not applicable.

Fluid name and options

Fluid (application)	Option code and body material	
	Brass or BC6	Stainless steel
Argon	F	L
Caustic soda (25%≧)	—	J
Air (dry)	T	—
Light oil	A	H
Silicon oil	A	H
Heavy oil (up to 60°C)	A	H
Heavy oil (up to 100°C)	D	N
Steam system (boiler water)	—	G, J
Steam system (condensate)	E	P
Insulation oil	A	H
Parachloroetylene	A	H
Brake oil	B	J
Water (up to 99°C)	E	N, P

Selection procedures

① Selection of port size
② Selection of material according to the operating temperature and type of fluid
③ Selection of power voltage and electrical entry



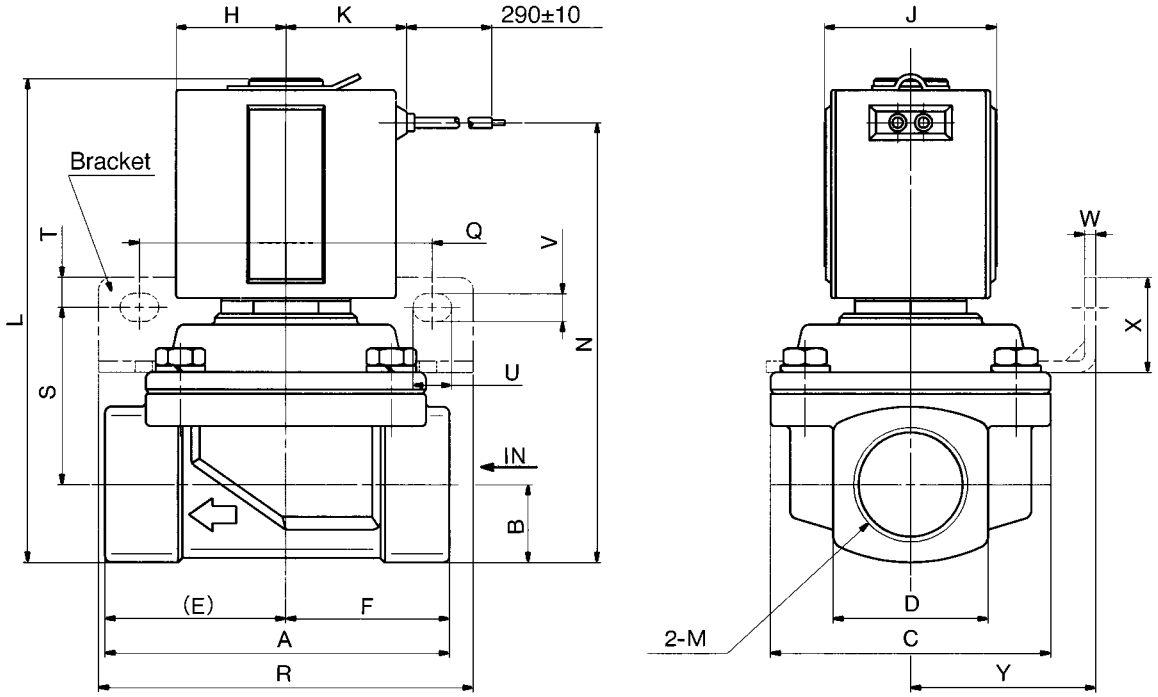
Model

Model	Port size	Orifice dia. (mmø)
VXZ223⬚	Rc(PT)1/4, 3/8	10
VXZ224⬚	Rc(PT)1/2	15
VXZ235⬚	Rc(PT)3/4	20
VXZ236⬚	Rc(PT)1	25

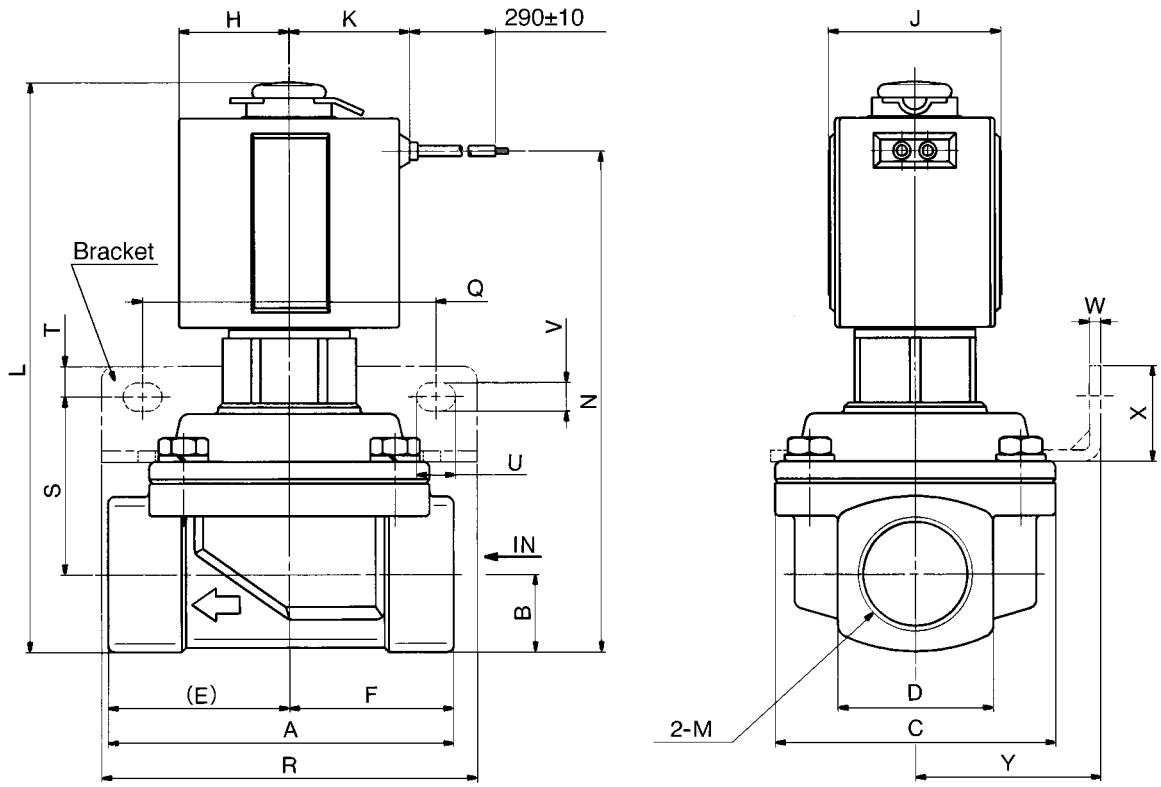
Dimensions

Grommet: G

◀N.C.▶ Normally closed: VXZ2230, 2240, 2350, 2360



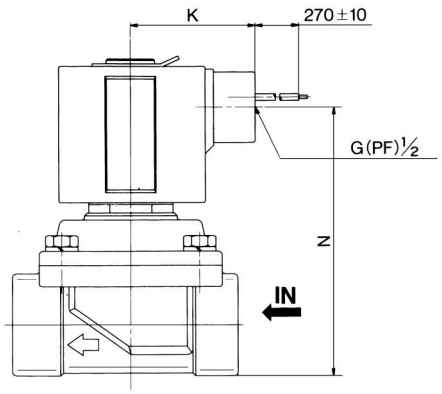
▶N.O.◀ Normally open: VXZ2232, 2242, 2352, 2362



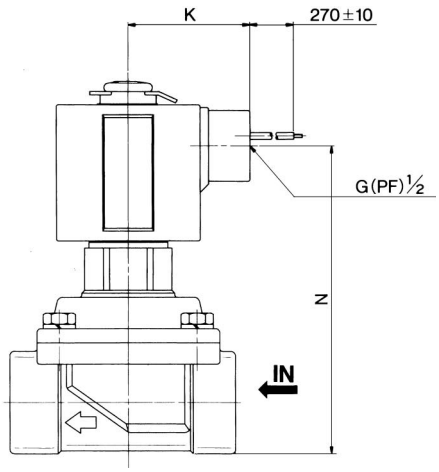
Model		Port size Rc(PT) M	A	B	C	D	E	F	H	J	K	N.C.		N.O.		Q	R	S	T	U	V	W	X	Y
N.C.	N.O.											L	N	L	N									
VXZ2230	**VXZ2232**	1/4 , 3/8	50	11	40	22	24	26	23	35	25	89	79.5	108	93	52	67	25.5	6	7.5	5.5	1.6	14	28
VXZ2240	**VXZ2242**	1/2	63	14	52	28	33	30	23	35	25	97	87.5	117	102	60	75	33	7	8.5	6.5	2.3	17	35
VXZ2350	**VXZ2352**	3/4	80	18	65	36	42	38	25.5	40	28	112	101.5	130	115.5	68	87	41	7	9	6.5	2.6	22	43
VXZ2360	**VXZ2362**	1	90	21	70	42	47	43	25.5	40	28	117	106.5	135	120.5	73	92	44	7	9	6.5	2.6	22	45

Conduit: C

◀N.C.▶ Normally closed



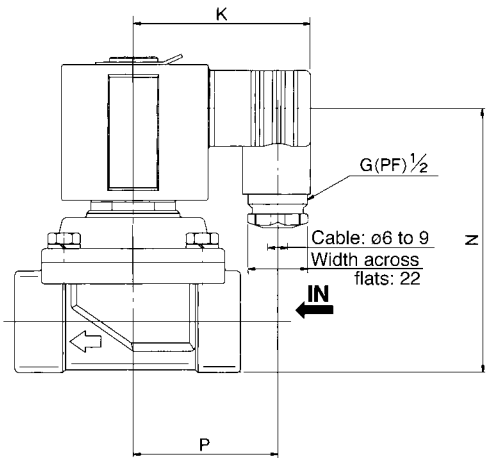
▶N.O.◀ Normally open



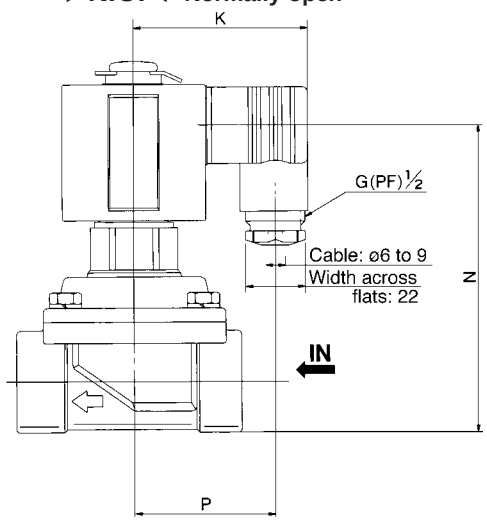
Model		K	N	
N.C.	N.O.		N.C.	N.O.
VXZ2230	VXZ2232	41	72	88
VXZ2240	VXZ2242	41	80	97
VXZ2350	VXZ2352	44	95	108.5
VXZ2360	VXZ2362	44	100	113.5

DIN connector: D

◀N.C.▶ Normally closed



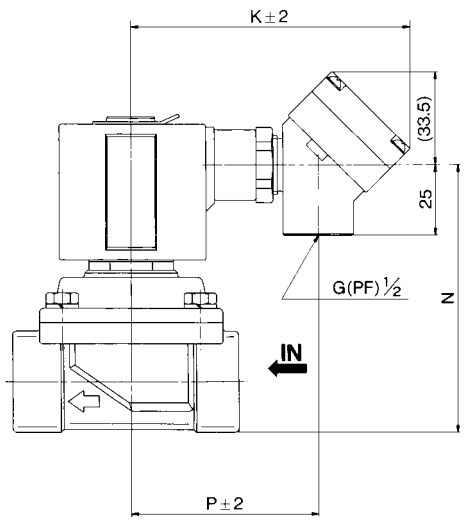
▶N.O.◀ Normally open



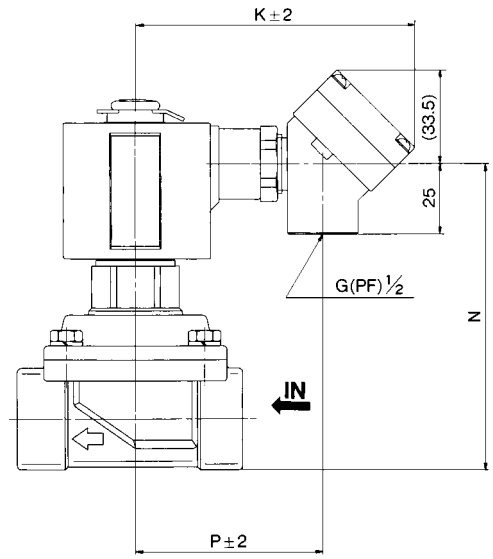
Model		K	N		P
N.C.	N.O.		N.C.	N.O.	
VXZ2230	VXZ2232	60	72	88	48
VXZ2240	VXZ2242	60	80	97	48
VXZ2350	VXZ2352	62	95	108.5	50
VXZ2360	VXZ2362	62	100	113.5	50

Conduit Terminal: T

◀N.C.▶ Normally closed



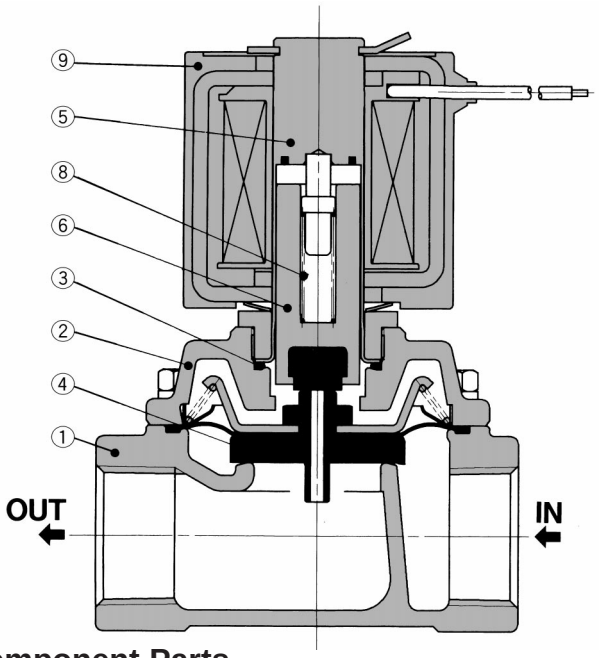
▶N.O.◀ Normally open



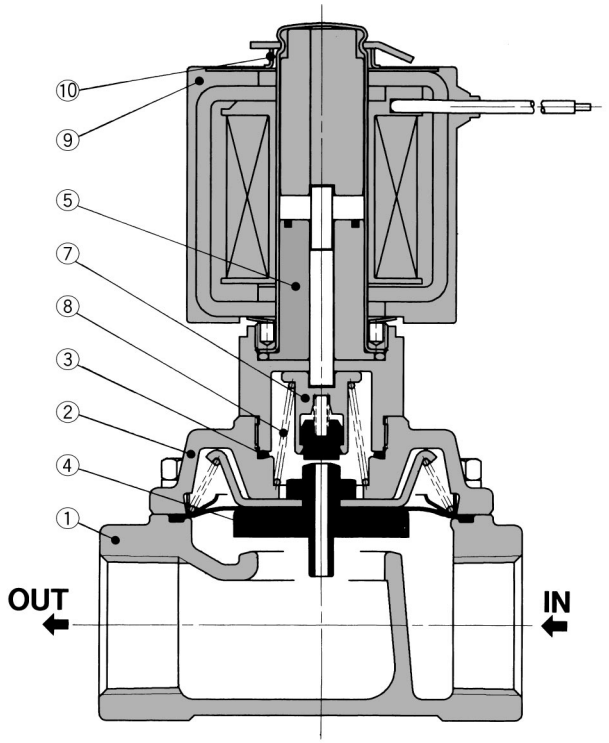
Model		K	N		P
N.C.	N.O.		N.C.	N.O.	
VXZ2230	VXZ2232	95	72	88	62
VXZ2240	VXZ2242	95	80	97	62
VXZ2350	VXZ2352	97	95	108.5	64
VXZ2360	VXZ2362	97	100	113.5	64

Construction

◀N.C.▶ Normally closed



▶N.O.◀ Normally open



Component Parts

No.	Description	Material	
		Standard	Option
①	Body	Brass/BC6	Stainless steel
②	Bonnet	Brass	Stainless steel
③	O ring	NBR	FPM/EPR
④	Diaphragm assembly	Stainless steel, NBR	Stainless steel, FPM/Stainless steel, EPR
⑤	Core ass'y	Stainless steel, Copper	Stainless steel, Silver

No.	Description	Material	
		Standard	Option
①	Armature ass'y	Stainless steel, NBR	Stainless steel, FPM/Stainless steel, EPR
②	Holder ass'y	POM, NBR	Stainless steel, FPM/Stainless steel, EPR
③	Return spring	Stainless steel	—
④	Coil ass'y	Class B, molded	Class H, molded
⑤	Color	Stainless steel	—

Coil Assembly No.

VX021 — 002 | CBTZ — 01

- 002: **Solenoid No.**
- CBTZ: **Coil combination code** (See the table below.)
- 01: **Rated voltage**

No.	Applicable valve model
002	**VXZ22□□**
003	**VXZ23□□**

01	100V AC 50/60Hz	**08**	48V AC 50/60Hz
02	200V AC 50/60Hz	**13**	24V AC 50/60Hz
03	110V AC 50/60Hz	**23**	440V AC 50/60Hz
04	220V AC 50/60Hz	**51**	6V DC
05	24V DC	**53**	48V DC
06	12V DC	**55**	100V DC
07	240V AC 50/60Hz	**56**	110V DC

Note 1) The voltage codes of 01 to 08 when the suffix "0" is removed, are the same as the solenoid valve model codes.

Applicable voltage for electrical option

Power supply	Voltage code	Surge suppressor	Light
AC	**01**	●	●
	02	●	●
	03	●	●
	04	●	●
	07	●	—
	08	●	—
DC	**05**	●	●
	06	●	—

Coil Combination Code

Grommet

Code	Insulation	Option
GB	Class B	—
GBS		With surge voltage suppressor
GH	Class H	—

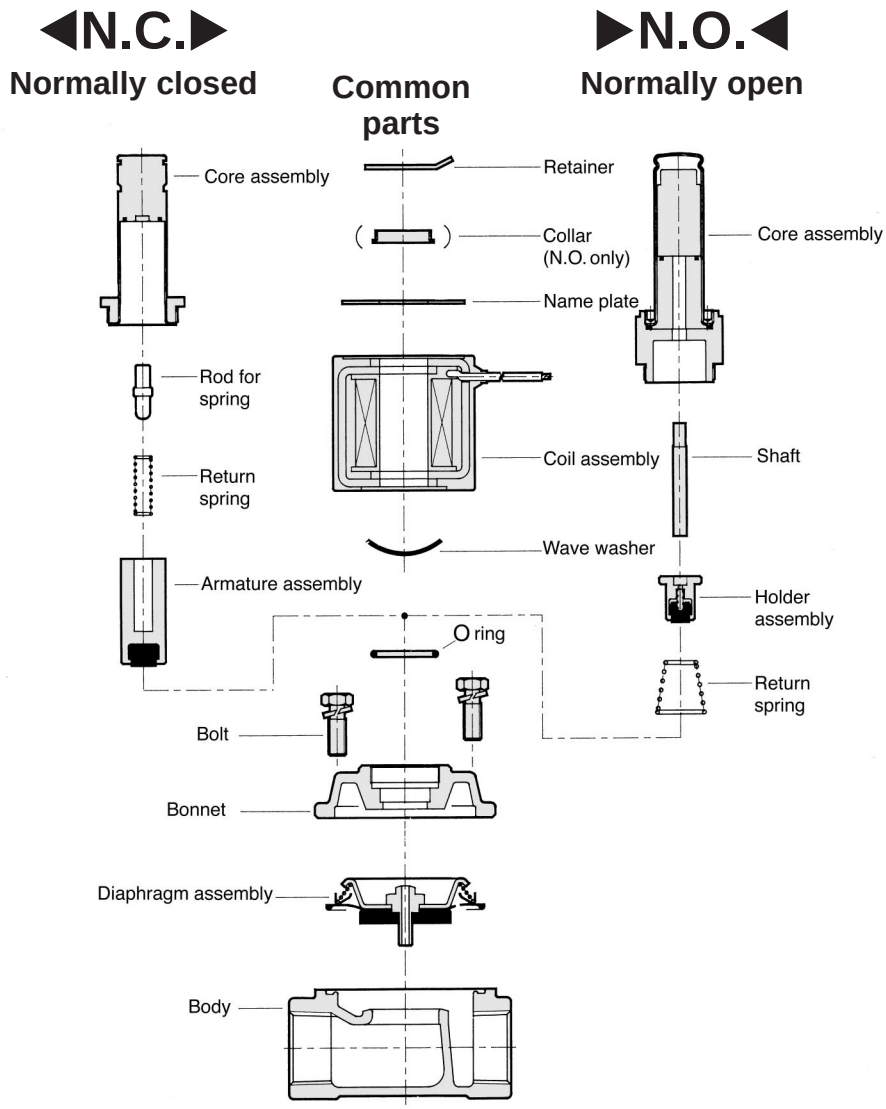
Conduit

Code	Insulation	Option
CB	Class B	—
CBT		With terminal
CBTS		With terminal and surge suppressor
CBTL		With terminal and light
CBTZ		With terminal and light surge suppressor
CH	Class H	—
CHT		With terminal
CHTS		With terminal and surge suppressor
CHTL		With terminal and light
CHTZ		With terminal and light surge suppressor

DIN connector

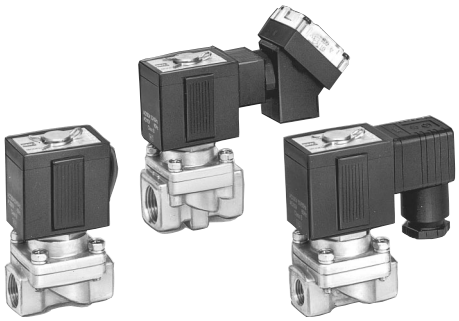
Code	Insulation	Option
DB	Class B	—
DBT		With connector
DBTS		With connector and surge suppressor
DBTL		With connector and light
DBTZ		With connector and light surge suppressor

Detail Construction



Pilot Operated/Diaphragm Style
2 Port Solenoid Valve for High Pressure
Series VXH

Orifice size: ø10 (Cv2.4)
Max. Operating pressure: 2MPa



Valve Specifications

Port size Rc(PT)	Orifice size (mmø)	Flow rate		Min. operating pressure differential (MPa)	Max. operating pressure differential (MPa)			Max. system pressure (MPa)	Weight (g)
		Cv	Effective area (mm^2)		Water	Air	Oil		
1/4	10	1.9	34	0.05	2	2	1.5	2	550
3/8		2.4	43						550
1/2		2.4	43						630

Solenoid Specifications

Power	Frequency Hz	Apparent power VA		Power consumption (Holding)	Temperature rise (°C) (Rated voltage)
		Inrush	Holding		
AC	50	53	18	7.5	60
	60	44	12	6	50

How to Order

VXH2230 — 02 — 1 — G — [ ] — [ ]

2 port valve for high pressure

Valve/Body

0	Energized open/single

Port size

02	Rc(PT) 1/4
03	Rc(PT) 3/8
04	Rc(PT) 1/2

Voltage

1	100V AC 50/60Hz
2	200V AC 50/60Hz
3	110V AC 50/60Hz
4	220V AC 50/60Hz
7	240V AC 50/60Hz
8	48V AC 50/60Hz
9	Other (only AC)

Electrical entry

G	Grommet
C	Conduit
D	DIN terminal
T	Conduit terminal

∗ Refer to table ① for configuration.

Options

—	None
S	With surge voltage suppressor
L	With indicator light
Z	With surge voltage suppressor and indicator light

∗ Refer to table ① for configuration.

Bracket

—	None
B	With bracket

Symbol

⚠ Caution

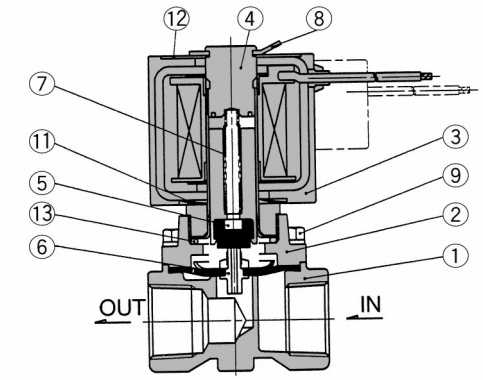
Refer to p.0-33 for Safety Instructions p.0-37 to 0-40 for common precautions.

Table ①
Voltage-Electrical Entry-Options

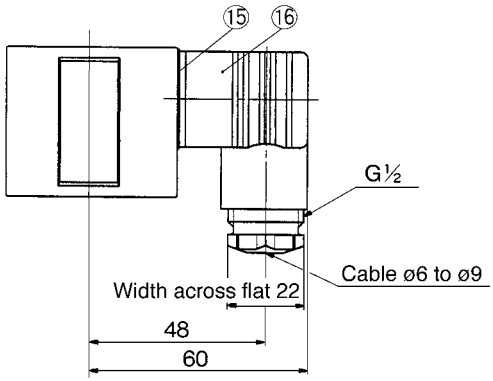
Insulation		Class B			
Electrical entry		G	C	D, T	
Options		S(1)	—	S	L, Z
AC	**1** (100V)	●	●	●	●
	2 (200V)	●	●	●	●
	3 (110V)	●	●	●	●
	4 (220V)	●	●	●	●
	7 (240V)	●	●	●	—
	8 (48V)	●	●	●	—

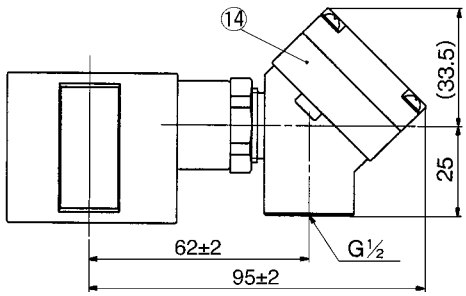
Note 1) Surge voltage suppressor is attached to the lead wire.

Construction/Dimensions

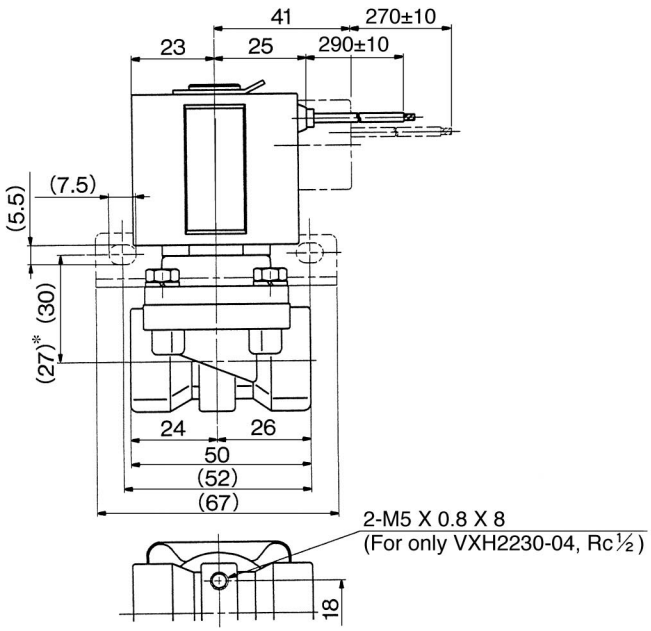


No.	Description	Material	Note
①	**Body**	C3771	
②	**Bonnet**	C3771	
③	**Coil assembly**	Epoxy mold	Class B insulation
④	**Core assembly**	Stainless steel, Cu	
⑤	**Armature assembly**	Stainless steel, NBR	
⑥	**Diaphragm assembly**	Stainless steel, NBR	
⑦	**Return spring**	Stainless steel	
⑧	**Retainer**	Stainless steel	
⑨	**Upset bolt**	Stainless steel	
⑩	**Bracket**	SPC	Option
⑪	**Wave washer**	Stainless steel	
⑫	**Name plate**	AL	
⑬	**O ring**	NBR	
⑭	**Terminal assembly**	—	
⑮	**Packing**	CR	
⑯	**DIN terminal**	—	

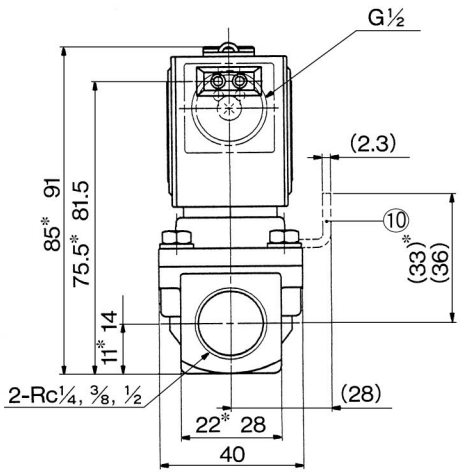




DIN terminal



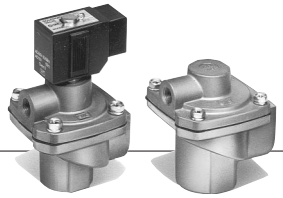
Terminal conduit



＊ For Rc(PT) ¼ , ⅜

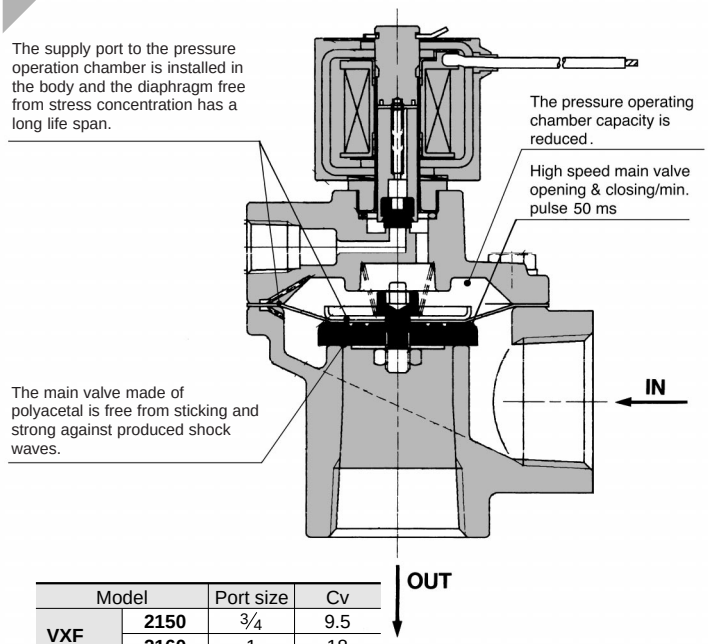
2 Port Solenoid Valve for Dust Collector

Series VXF



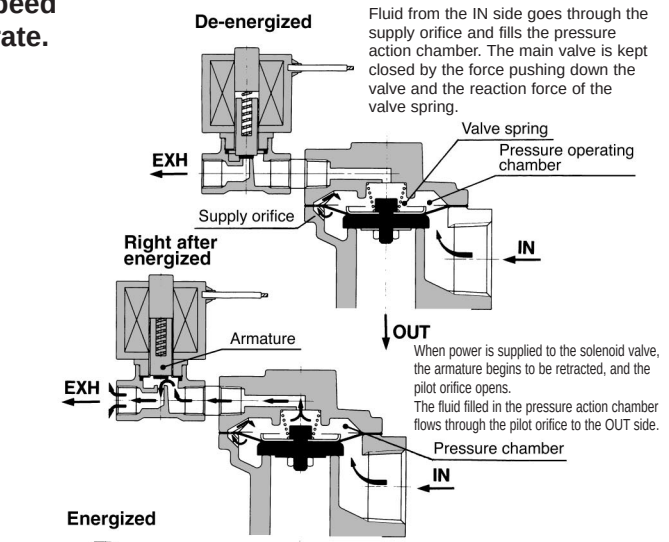
2 port solenoid valve for dust collector Series VXF

In this L-shaped 2 port valve, the bag filter is cleaned by high speed air jet and shock wave to materialize high speed response and control of instantaneous large flow rate.

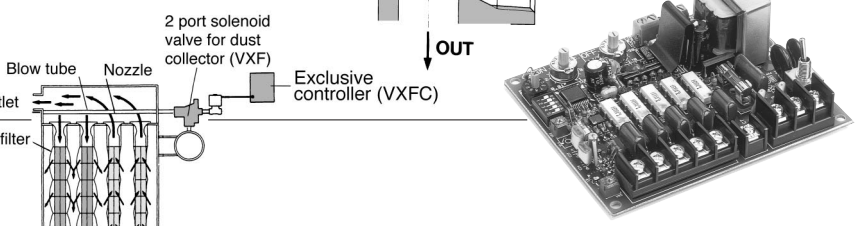


Model		Port size	Cv
VXF VXFA	2150	3/4	9.5
	2160	1	18
	2280	1 1/2	45

Principles of operation (VXFA)



Controllers used exclusively for operation Series VXFC



The valve controller turns ON/OFF many valves for the dust controller
Power voltage: 100V AC, 200V AC, 24V DC
Output points: 5 points, 10 points

■Two-time hitting function

Two-time hitting can be set to improve the sweeping effect by the bag filter. Two-time hitting is available by turning ON the DIP SW (one-time by turning OFF).

■Connection of multiple circuit boards is possible

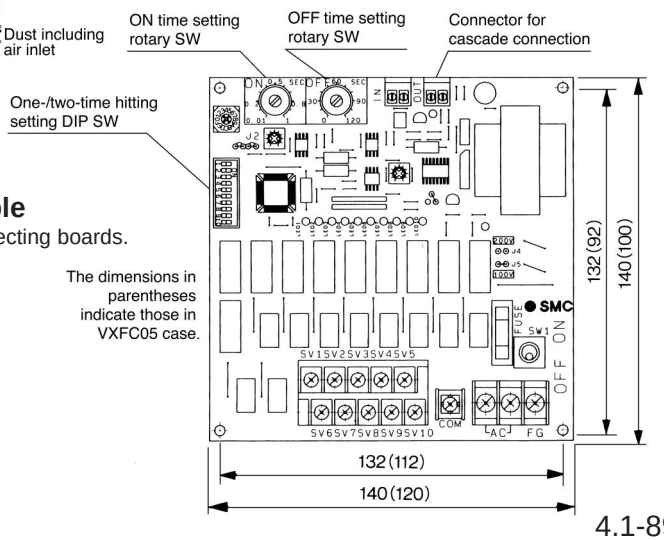
Number of output points can be increased (20/30 points) by connecting boards.

■Wide ranging time setting

ON-time (output to the valve): 0.01 to 1 sec.
OFF-time (adjournment to nest output): 1 to 120 sec.

■Small, light, and compact

VXFC10-1: Outside dimensions 140 X 140
Mounting dimensions 132 X 132 Weight 325 g
VXFC05-1: Outside dimensions 120 X 100
Mounting dimensions 112 X 92 Weight 280 g



How to Order

Solenoid Normally closed

VXF 2150 — 06 — 1 — G — [ ] — [ ]

Air operated

VXFA 2150 — 06

Option

—	Standard
S*	With silencer

* See table ② below for applications.

Table ② Option/Silencer

Style	Noise reduction	Effective area
2504-002	19dB or more	33.9mm²

Electrical option

—	None
S	With surge voltage suppressor
L	With light
Z	With light/surge voltage suppressor

* See table ① below for applications.

Model – Port size

2150	06	Rc(PT) 3/4
2160	10	Rc(PT)1
2280	14	Rc(PT)1 1/2

Rated voltage

1	100V AC 50/60Hz
2	200V AC 50/60Hz
3	110V AC 50/60Hz
4	220V AC 50/60Hz
5	24V DC
6	12V DC
7	240V AC 50/60Hz
8	48V AC 50/60Hz
9	Others (contact us for inquiry)

* See table ① below for applications.
** See p.4.1-93 for purchasing a coil alone.

Electrical entry

G	Grommet
C	Conduit
D	DIN connector
T	Conduit terminal

* See table ① below for applications.

Table ①
Rated voltage — Electrical entry — Electrical option

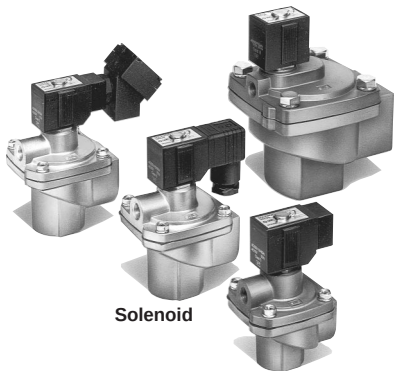
Insulation		Class B			
Electrical entry		G	C	D, T	
Electrical opion		S(1)	—	S	L, Z
AC	**1** (100V)	●	●	●	●
	2 (200V)	●	●	●	●
	3 (110V)	●	●	●	●
	4 (220V)	●	●	●	●
	7 (240V)	●	●	●	—
	8 (48V)	●	●	●	—
DC	**5** (24V)	●	●	●	●
	6 (12V)	●	●	●	—

Note 1) The surge voltage suppressor is attached in the middle of a lead wire.

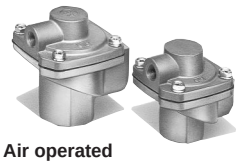
⚠ Caution

Selection

In case of selecting the air operated style VXFA, select 2 port solenoid valves (with orifice dia. of ø3 or more and effective area of 6mm² or more) in order to maintain the pilot valve performance.



Solenoid



Air operated

Model/Valve Specifications

Port size Rc(PT)	Orifice dia. (mmø)	Flow rate coefficient Cv	Flow rate coefficient Eff. orifice (mm^2)	Model	Min. operating press. diff. (MPa)	Max. operating press. diff. (MPa) Solenoid valve		Max. operating press. diff. (MPa) Air valve	Proof pressure (MPa)	Fluid temp. °C (1)	Weight (g)	
3/4	20	9.5	170	**VXF2150 VXFA2150**	0.03	AC	1.0	1.0	2.0	–10 to 60	VXF2150	530
						DC	0.7				VXFA2150	350
1	27	18	330	**VXF2160 VXFA2160**	0.03	AC	1.0	1.0	2.0	–10 to 60	VXF2160	580
						DC	0.7				VXFA2160	400
1 1/2	40	45	810	**VXF2280 VXFA2280**	0.03	AC	1.0	1.0	2.0	–10 to 60	VXF2280	1500
						DC	0.7				VXFA2280	1300

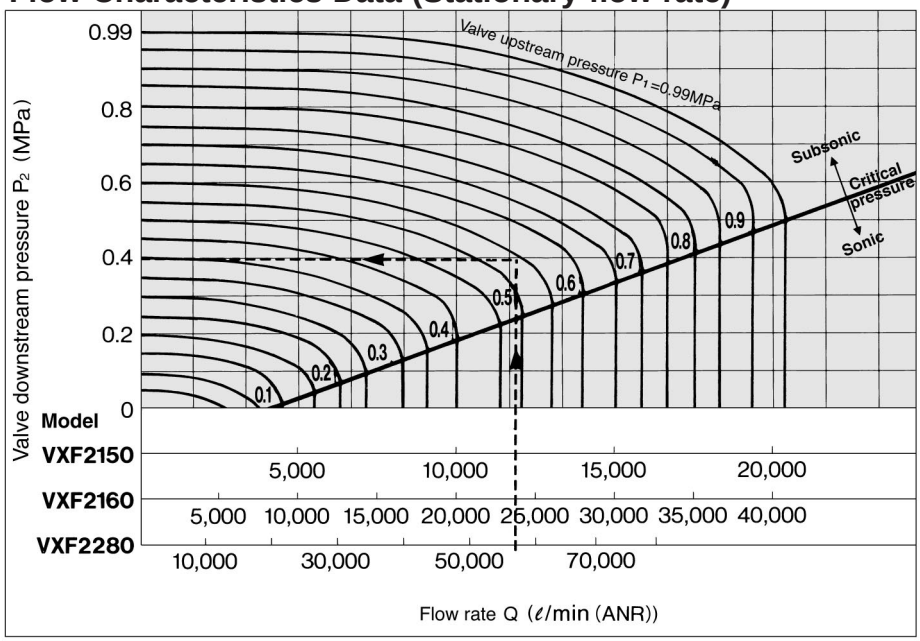
Note 1) The dew point shall be –10°C or less. No condensation allowed.

Solenoid Specifications

Model	Power supply	Frequency Hz	Apparent power VA Inrush	Apparent power VA Holding	Power consumption W (Holding)	Temp. rise °C (Rated voltage)	Voltage fluctuation %	Pilot exhaust noise dB W/o silencer	Pilot exhaust noise dB W/ silencer
VXF 2150	AC	50	20	11	4.5	5 to 60	Rated value ±10	104	83
		60							
	DC	—	—	—	6	5 to 40			
VXF 2160	AC	50	20	11	4.5	5 to 60	Rated value ±10	105	85
		60							
	DC	—	—	—	6	5 to 40			
VXF 2280	AC	50	40	18	7.5	5 to 60	Rated value ±10	108	85
		60							
	DC	—	—	—	8	5 to 40			

Flow Characteristics

Flow Characteristics Data (Stationary flow rate)



How to view the diagram: If the valve upstream pressure (P_1) is 0.6MPa and the downstream pressure (P_2) is 0.4 MPa, the flow rate is about 11,500 ℓ/min in case of VXF2150, 23,000 ℓ/min of VXF2160, and 56,000 ℓ/min of VXF2280 respectively.

How to calculate flow rate (In case of air and inert gas)

In subsonic region

$P_1+0.1013=(1 \text{ to } 1.8941)(P_2+0.1013)$

$Q=226.3 \cdot S \cdot \sqrt{\triangle P(P_2+0.1013)}$ ℓ/min (ANR)

In sonic region

$P_1+0.1013 \geqq 1.8941(P_2+0.1013)$

$Q=109.6 \cdot S \cdot (P_1+0.1013)$ ℓ/min (ANR)

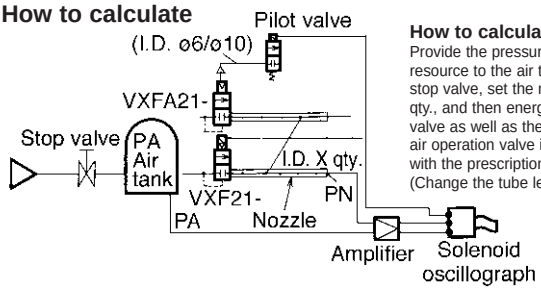
Q : Normal flow rate ℓ/min
P_1 : Upstream pressure (MPa)
P_2 : Downstream pressure (MPa)
$\triangle P$: Pressure differential ($P_1–P_2$)
S : Effective orifice (mm^2)

How to Select a Model (In case of use as a bag filter)

Model Selection

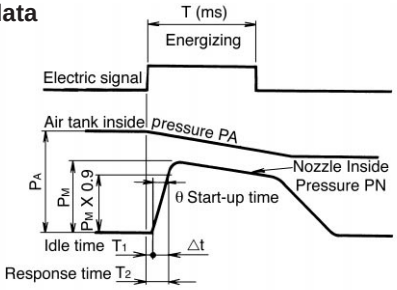
Since you can measure the deterrioration of VXF/VXFA properties due to the tube length from data B (response time/idle time) and data C (start-up speed), refer to these data to set energization time. Use data A (flow rate characteristics) to calculate the flow rate for each loading time separately in relation to the nozzle dia./qty., pressure, and tube although the data don't correspond to the actual bag filter operation.
(In the data: "Without tube" and Tube length ø=VXF)

How to calculate



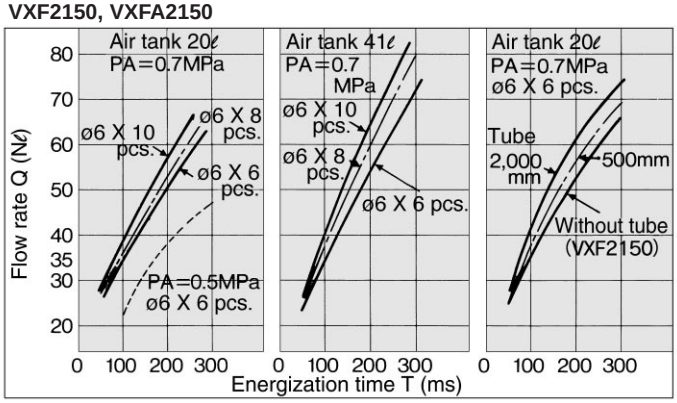
How to calculate
Provide the pressure from the air resource to the air tank. Close the stop valve, set the nozzle dia. and qty., and then energize the solenoid valve as well as the pilot valve of the air operation valve in accordance with the prescription.
(Change the tube length.)

How to read the data

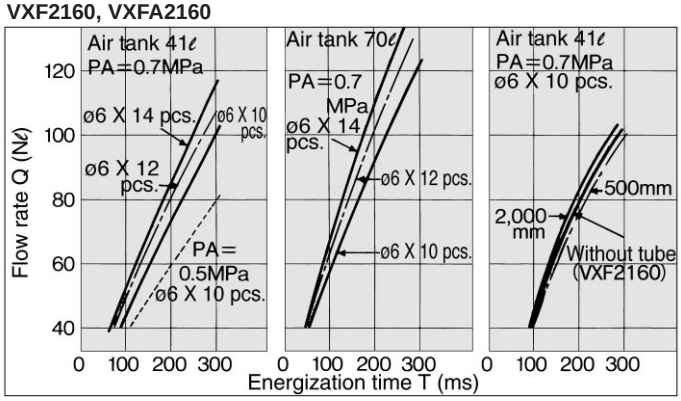


Data Ⓐ Flow Characteristics

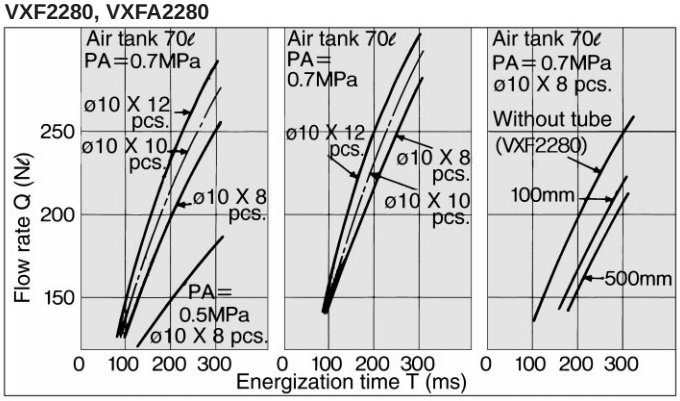
VXF2150, VXFA2150



VXF2160, VXFA2160



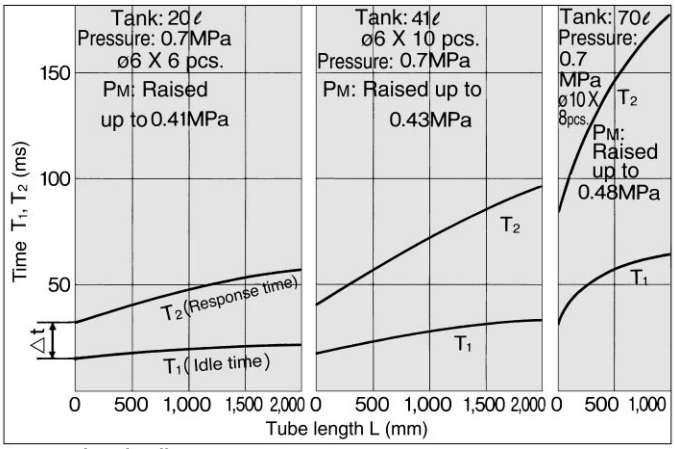
VXF2280, VXFA2280



How to view the diagrams
Even if the energizing time is constant, a greater amount of air flows when the PA is at 0.7MPa than at 0.5MPa. Moreover, the greater the air tank capacity, the greater the amount of airflow. Furthermore, the greater the nozzle's total cross sectional area, the greater the amount of airflow. While the flow volume changes according to the length of the tube, be aware that a wasted flow volume is involved during a return.

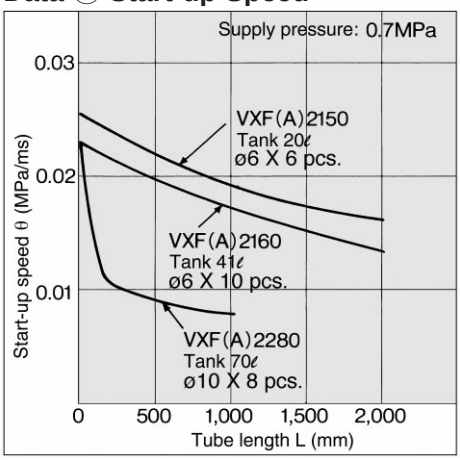
Data Ⓑ Response Time/Idle Time

VXF2150 **VXF2160** **VXF2280**
VXFA2150 **VXFA2160** **VXFA2280**



How to view the diagram
The longer the tube length, the longer the response time and wasted time. If even longer than the one in the diagram, the valve might not open due to the tube resistance.

Data Ⓒ Start-up Speed

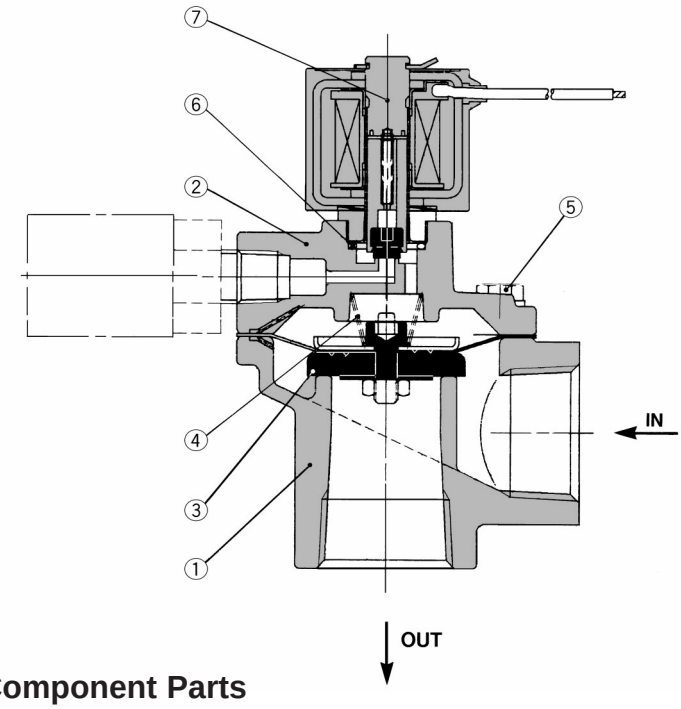


How to view the diagram
The start-up speed stands for the degree of the nozzle inside pressure rise per the unit of time. The greater it is, the stronger the shock wave from the nozzle becomes. It also means that the closing speed increases and consumption air can be used effectively.

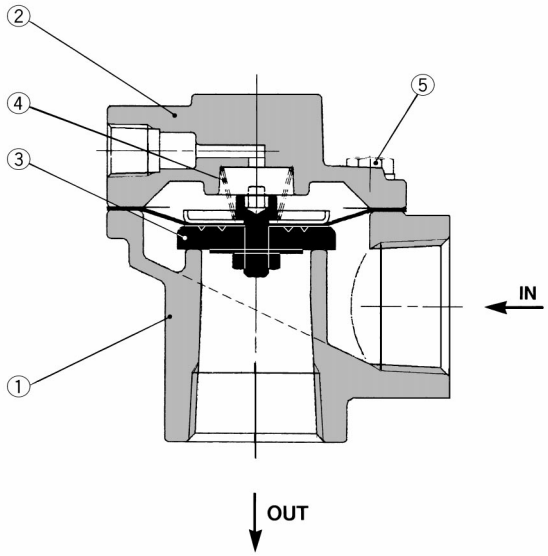
Start-up speed $\theta = \frac{P_M \times 0.9}{\triangle t}$ MPa/ms

Construction

Solenoid



Air operated



Component Parts

No.	Description	Material
①	Body	Aluminum
②	Bonnet	Aluminum
③	Diaphragm assembly	NBR, POM
④	Spring	Stainless steel
⑤	Hexagonal bolt	Stainless steel
⑥	O ring	NBR
⑦	Coil assembly	—

Coil Assembly No.

VX021 — 001 | CBTZ — 01

Solenoid No.

No.	Applicable valve model
001	VXF21□□
002	VXF22□□

Coil combination code
(See the table below.)

Rated voltage

01	100V AC 50/60Hz	**08**	48V AC 50/60Hz
02	200V AC 50/60Hz	**13**	24V AC 50/60Hz
03	110V AC 50/60Hz	**23**	440V AC 50/60Hz
04	220V AC 50/60Hz	**51**	6V DC
05	24V DC	**53**	48V DC
06	12V DC	**55**	100V DC
07	240V AC 50/60Hz	**56**	110V DC

Note 1) The voltage codes of 01 to 08 when the suffix "0" is removed, are the same as the solenoid valve model codes.

Applicable voltage for electrical option

Power supply	Voltage code	Surge suppressor	Light
AC	**01**	●	●
	02	●	●
	03	●	●
	04	●	●
	07	●	—
	08	●	—
DC	**05**	●	●
	06	●	—

Coil Combination Code

Grommet

Code	Insulation	Option
GB	Class B	—
GBS		With surge voltage suppressor

Conduit

Code	Insulation	Option
CB	Class B	—
CBT		Terminal
CBTS		With terminal and surge suppressor
CBTL		With terminal and light
CBTZ		With terminal and light/surge suppressor

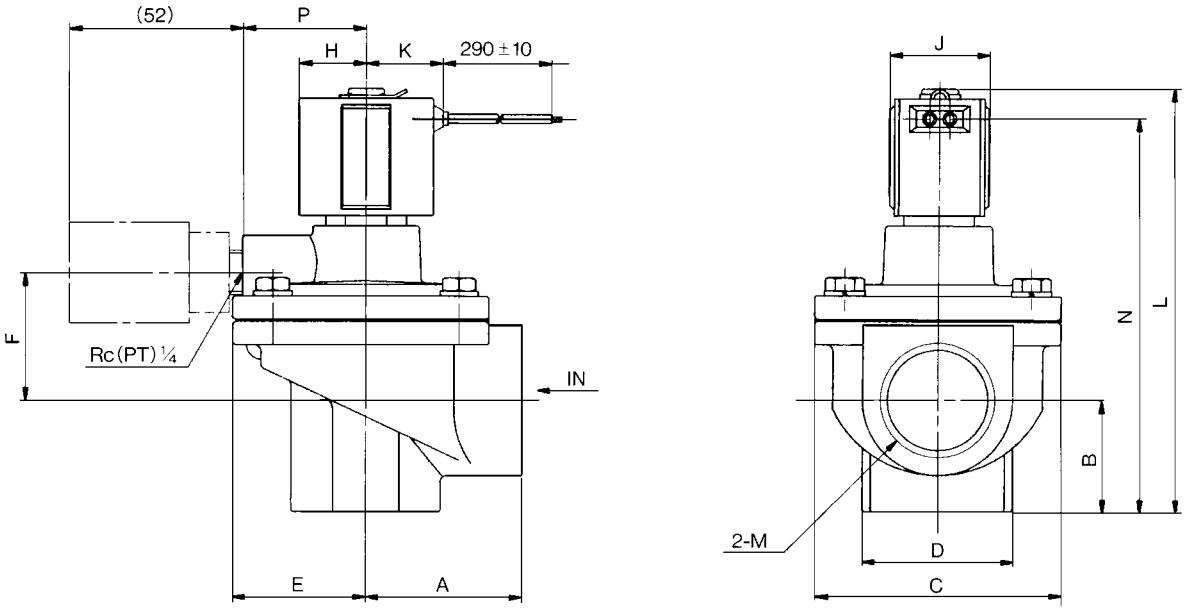
DIN connector

Code	Insulation	Options
DB	Class B	—
DBT		With connector
DBTS		With connector and surge suppressor
DBTL		With connector and light
DBTZ		With connector and light/surge suppressor

Dimensions

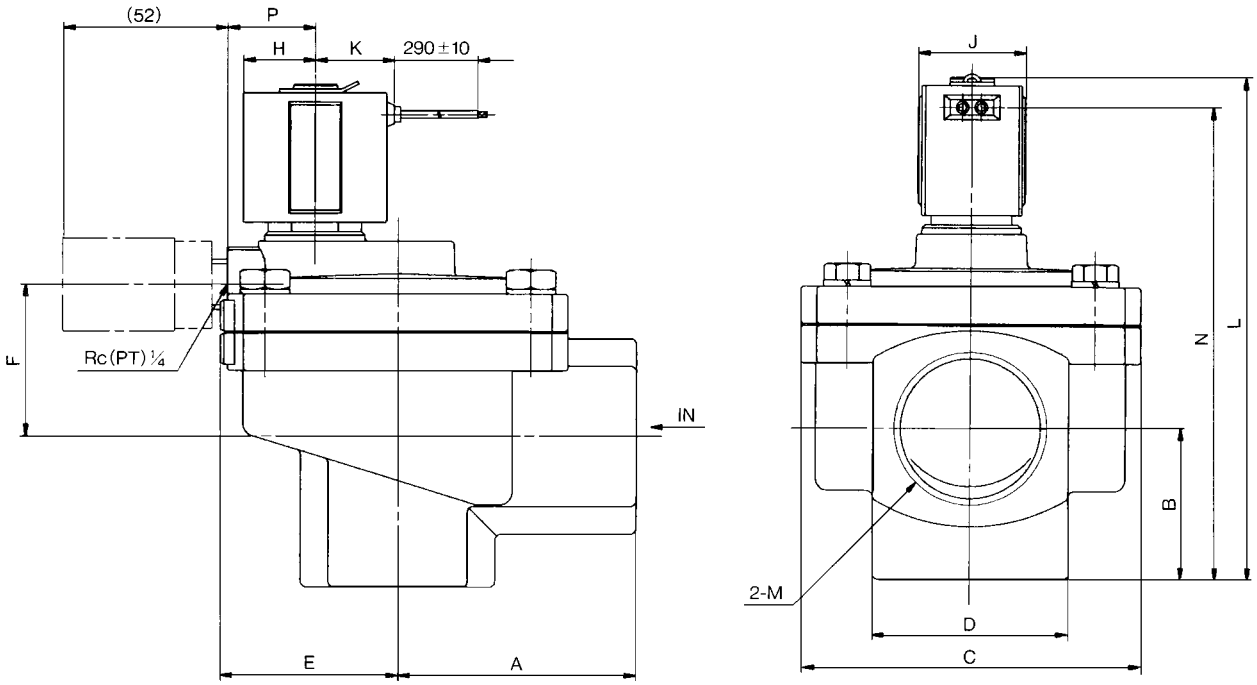
VXF21$^{6}_{5}$0/Solenoid

Grommet: G



VXF2280/Solenoid

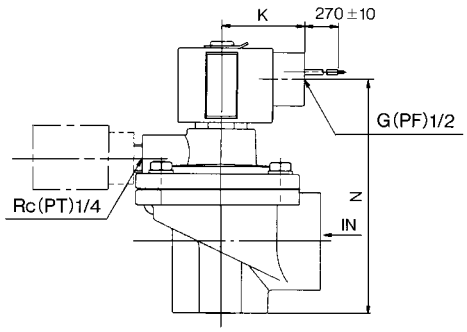
Grommet: G



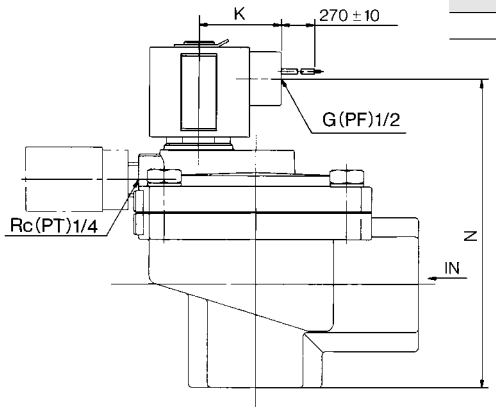
Model	Port size Rc(PT) M	A	B	C	D	E	F	H	J	K	L	N	P
VXF2150	¾	40	25	66	36	35.5	32.5	20	30	23	113	103	33
VXF2160	1	47	33.5	74	45	40	38	20	30	23	127	118	37
VXF2280	1½	77	48.5	110	63	57	49	23	35	25	162	152	28

Conduit: C

VXF2150, 2160



VXF2280

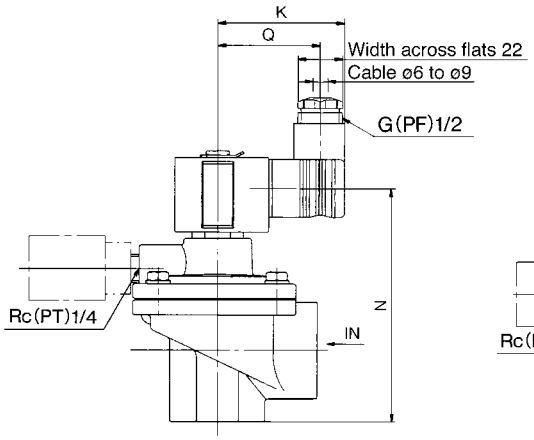


Conduit

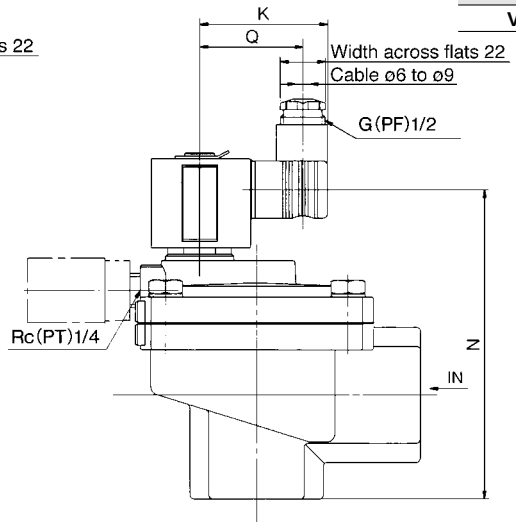
Model	K	N
VXF2150	39	96
VXF2160	39	110
VXF2280	41	144.5

DIN connector: D

VXF2150, 2160



VXF2280

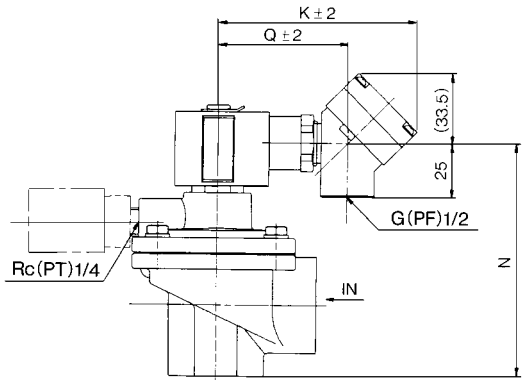


DIN connector

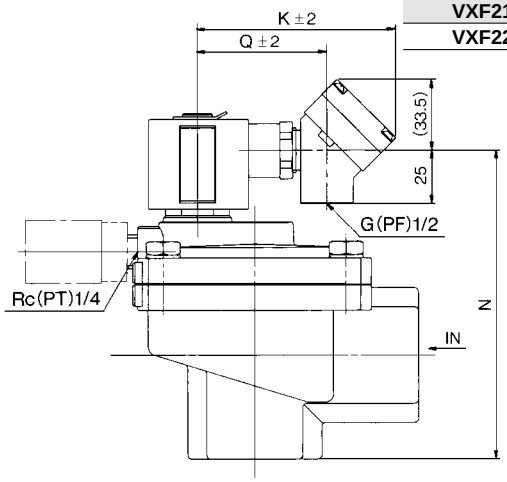
Model	K	N	Q
VXF2150	59	96	45
VXF2160	59	110	45
VXF2280	60	144.5	48

Conduit terminal: T

VXF2150, 2160



VXF2280

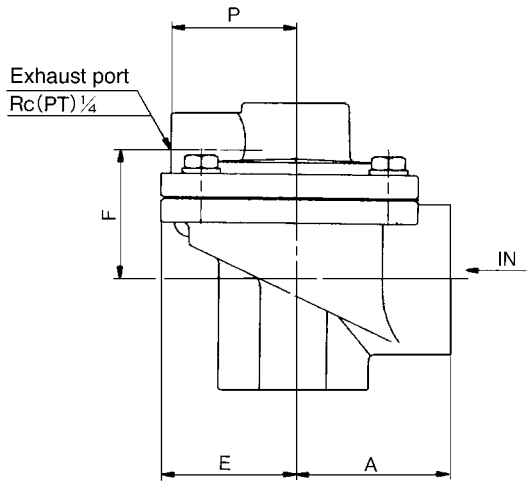


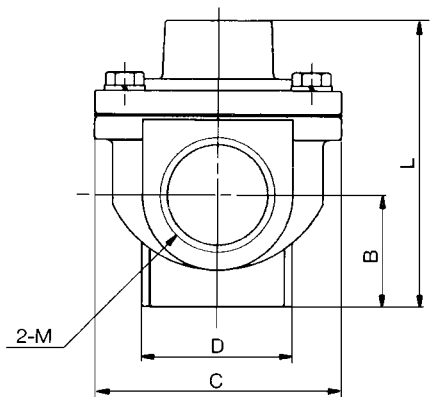
Conduit terminal

Model	K	N	Q
VXF2150	92	96	59
VXF2160	92	110	59
VXF2280	95	144.5	62

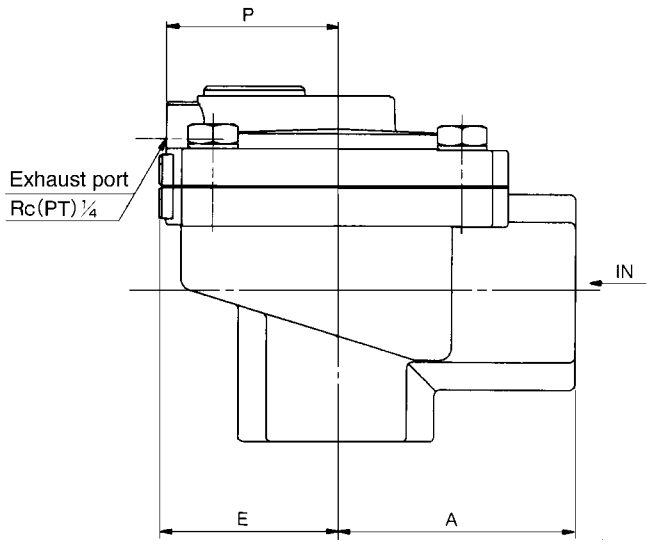
Dimensions

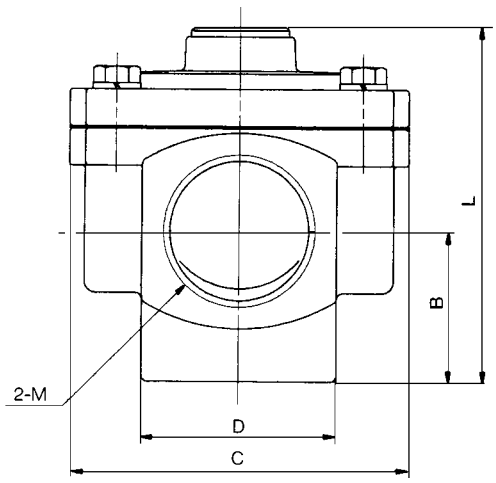
VXFA2150, 2160/Air operated





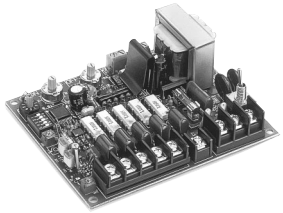
VXFA2280/Air operated





Model	Port size Rc(PT) M	A	B	C	D	E	F	H	J	K	L	P
VXFA2150	¾	40	25	66	36	35.5	32.5	20	30	23	72	33
VXFA2160	1	48	33.5	74	45	40	38	20	30	23	86	37
VXFA2280	1½	77	48.5	110	63	57	49	23	35	25	114	55

Controller Specifications/Series VXFC



How to Order Controller

VXFC 05 — 1

Number of output points

05	5
10	10

Voltage

1	100V AC
2	200V AC
5	24V DC

Specifications

Model		VXFC$^{05}_{10}$-1	VXFC$^{05}_{10}$-2	VXFC$^{05}_{10}$-5
Voltage (1)		100V AC	200V AC	24V DC
Power supply fuse		3A		1A
Time setting	ON time	0.01 to 1sec		
	OFF time	0 to 120sec		
	Time repeatability	Max. ± 20% of set time		
Number of output points		5, 10		
Operating ambient temperature		0 to 50°C		
Operating ambient humidity		35 to 85% (No condensation allowed)		
Ouput current		MAX. 1A		MAX. 0.5A
Noise resistance		2000V		

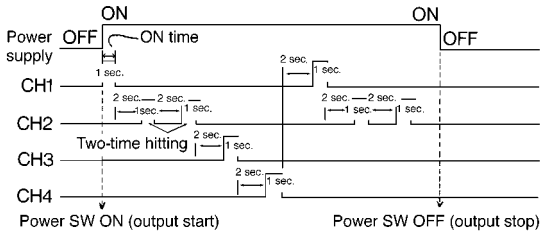
Note 1) The output and input voltages are the same.

Two-time Hitting Function

A two-time hitting function is adopted to improve the bag filter dusting efficiency. Turn ON the dip switch for two-time hitting (OFF for one-time hitting). (Effective up to the number of setting channels)

Operation sequence diagram

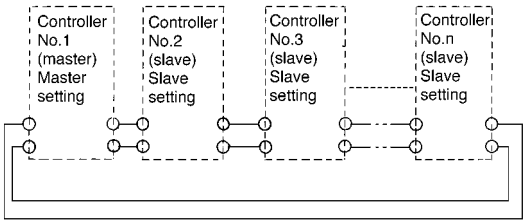
For 4 output points
Two-time hitting only for CH2
ON for 1 sec.
OFF for 2 sec.



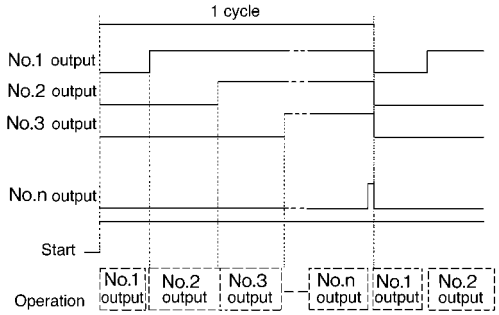
Cascade Connection (Multiple-board connection)

One board allows outputs at merely 10 output points max. But the points can be increased to 20 and 30 output points by connecting cascades.

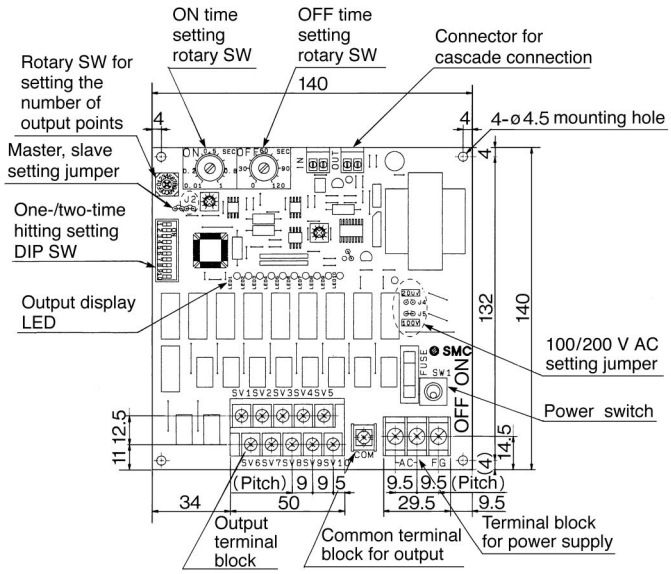
Connection

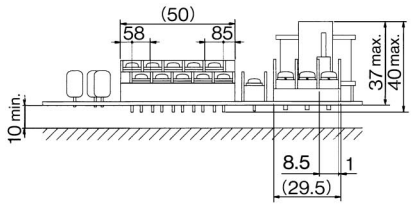


Operation sequence diagram



Dimensions





VX
VN□
VQ

⚠ Precautions

Be sure to read before handling. Refer to p.0-33 for Safety Instructions and p.0-37 to 0-40 for common precautions.

2 Port Solenoid Valve For Dust Collector Series VXF

Silencer

⚠ Caution

① The silencer's response properties do not change in the initial stage, but will change due to the blockage after long use. Replace it after about 500-thousand-time use, which is subject to the fluid quality and energization time.
② When using a silencer, make a space for silencer replacement.

Selection

⚠ Caution

① The response performance and start-up speed deterriorate in case of air operated style (VXFA) as compared with a solenoid style (VXF) case. Refer to the data for pilot piping.
② Be careful that, in DC case, idle time and return time increase if the voltage lowers. If a surge voltage suppressor is installed, the return speed decreases.

Exclusive Controller Series VXFC

Wiring

⚠ Warning

① The controller starts its output the moment the power switch is turned ON. Be aware that even if the power switch is turned OFF, power is connected to the terminal board.

⚠ Caution

① Make sure that the voltage of the power to be input matches the voltage in the controller's specifications. The voltage of the power that has been input becomes the voltage that is output to the solenoid valves.
② Connect a ground that is rated Class-3 or greater to the power supply terminal board.
③ If the power is DC, pay attention to its polarity. If the polarity is incorrect, it could lead to a malfunction or damage.
④ Operate at a voltage in the range of –10% to +10% of the rated voltage.

Environment

⚠ Caution

① Operate under conditions that are free of vibration and impacts.
② Operate in an ambient temperature range between 0°C and 50°C.
③ Operate in an ambient humidity range between 35% to 85% (no condensation). For further details, refer to the instruction manual that is provided separately.