

Process Valve

Series VNB

2 Port Valve For Flow Control

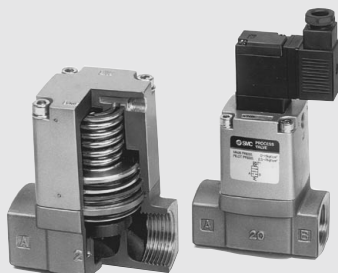
A wide variety of applicable fluids

Proper selection with body and sealing materials permits application with a wide variety of fluids such as air, water, oil, gas and vacuum.

Cylinder actuation by external pilot air

Wide variations

N.C., N.O., C.O., types are available. Screw-in type (6A to 50A) and the flange (32F to 50F) are standardized.



Air operated

External pilot solenoid

Selection Procedure

1 Applicable fluids

- Refer to "Table (1)" to check that the desired fluid is applicable.
- Select the body and sealing materials, depending on the fluid.

2 Flow characteristics (Air, Water)

- To find the flow rate of air or water, refer to the table of flow rate characteristics on page 10 to 16. Use the flow rate calculation equation to find the exact answer. Although the flow rate is the same, the operating pressure differs according to the valve size. Therefore, select the proper valve size from applicable valves.
- Refer to "Table (2)" to select the port size of the threaded type (6A to 50A) and flanges (32F to 50F).

3 Construction

- Select the air operated or external pilot solenoid styles. Valves come in N.C. (normally closed), N.O. (normally open), C.O. (double acting), and N.C. 1 MPa (normally closed) types. Select the proper one according to the operating conditions.

4 Power voltage and electrical entry (External pilot solenoid)

- Select the AC/DC power source and choose the electrical entry according to "Table (3)".

Table (1) Applicable Fluids Check List

Wetted part Wetted part Seal material	Copper alloy: Standard			Aluminum: L			Stainless steel: S		
	NBR : A	FKM : B	EPR : C	NBR : A	FKM : B	EPR : C	NBR : A	FKM : B	EPR : C
Fluid									
Air (Standard, Dry)	●	●	●	●	●	●	●	●	●
Low vacuum (Up to -101kPa)	●	●	●	●	●	●	●	●	●
Carbon dioxide (CO ₂ , 0.7 MPa or less)	●	●	●	●	●	●	●	●	●
Carbon dioxide (CO ₂ , 0.7 to 1 MPa)	●	●	●	●	●	●	●	●	●
Nitrogen gas (N ₂)	●	●	●	●	●	●	●	●	●
Argon	●	●	●	●	●	●	●	●	●
Helium	●	●	●	●	●	●	●	●	●
Water (standard, up to 60°C)	●	●	●	●	●	●	●	●	●
Water (up to 99°C air operated type only)	●	●	●	●	●	●	●	●	●
Turbine oil	●	●	●	●	●	●	●	●	●
Spindle oil	●	●	●	●	●	●	●	●	●
Fuel oil Class 3 (C fuel oil)	●	●	●	●	●	●	●	●	●
Silicone oil	●	●	●	●	●	●	●	●	●
Naphtha	●	●	●	●	●	●	●	●	●
Ethylene glycol (up to 80°C)	●	●	●	●	●	●	●	●	●
Boiler water	●	●	●	●	●	●	●	●	●

⚠ Caution

Note 1) When fluid permits application of multiple body and sealing materials, select the most suitable one according to the ambient environment (FKM or EPR seal material for high temperature) and other conditions (corrosion resistance and viscosity), etc.

Note 2) Test fluids to see if it will wash out cleaning liquid such as grease.

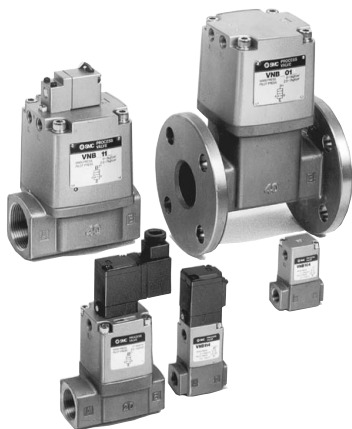
Table (2) Combinations between Valve Size and Port Size

Valve size	Port size											
	6A	8A	10A	15A	20A	25A	32A	32F	40A	40F	50A	50F
1	●	●	●	●	●	●	●	●	●	●	●	●
2	●	●	●	●	●	●	●	●	●	●	●	●
3	●	●	●	●	●	●	●	●	●	●	●	●
4	●	●	●	●	●	●	●	●	●	●	●	●
5	●	●	●	●	●	●	●	●	●	●	●	●
6	●	●	●	●	●	●	●	●	●	●	●	●
7	●	●	●	●	●	●	●	●	●	●	●	●

Table (3) Combinations between Electrical Entry and Light/Surge Voltage Suppressor

Valve size	Electrical entry				Light/Surge voltage suppressor		Manual override
	G	E	T	D	S	Z	
1, 2, 3, 4	●	●	●	●	●	●	●
5, 6, 7	●	●	●	●	(Only "G")	(Except "G")	●
					(Only "G")	(Only "D")	

Series VNB



Symbol

Type	Valve type	N.C.		N.O.		C.O.	
		Normally closed	Normally open	Normally open	Double acting	Double acting	Double acting
Air operated		VNB□0□		VNB□02		VNB□03	
		12 (P1)		10 (P2)		10 (P1)	
		1		2		1	
		2		1		2	
External pilot solenoid		VNB□1□		VNB□12		VNB□12	
		12 (P1)		12 (P1)		10 (P2)	
		1		2		1	
		2		1		2	

Note) Flow direction should be from port 1 (A) to port 2 (B) for vacuum applications.

Option Specifications

Vacuum pilot valve VNB□□□□V

(Valve size 2 to 7)

It is used when the valve is to be operated by the main vacuum in the absence of pressurized air.

Specifications (Vacuum pilot type)

Fluid	Vacuum
Operating pressure range	-101 kPa to Atmospheric pressure
Pilot pressure range	-101 to -47.9 kPa

Symbol (Vacuum pilot type)

Type	Valve type	N.C.		N.O.	
		Normally closed	Normally open	Normally open	Double acting
Air operated		VNB□01□V		VNB□02□V	
		10 (P2)		12 (P1)	
		1		2	
		2		1	
External pilot solenoid		VNB□11□V		VNB□12□V	
		12 (P1)		12 (P1)	
		1		2	
		2		1	

Model

Model	Port size Rc	Orifice dia. ø (mm)	Flow characteristics				Weight (kg)	
			Measured by air		Measured by water		Air operated	External pilot solenoid
			C [dm ³ /(bar·sec)]	b	Cv	Av x 10 ⁻⁶ m ²		
VNB1□□□-6A	1/8	7	3.3	0.29	0.80	25	0.3	0.4
VNB1□□□-8A	1/4		4.6	0.17	1.0	29		
VNB1□□□-10A			4.7	0.18	1.1	31		
VNB2□□□-10A	3/8	11	9.6	0.40	2.6	71	0.6	0.7
VNB2□□□-10A		15	17	0.32	4.0	110		
VNB2□□□-15A	1/2	11	9.6	0.40	2.6	76		
VNB2□□□-15A		15	19	0.24	4.8	140		
VNB3□□□-20A	3/4	14	18	0.42	5.4	140	0.9	1.0
VNB3□□□-20A		20	35	0.13	7.4	270		

Model	Port size Rc	Flange ^{Note1)}	Orifice dia. ø (mm)	Flow characteristics		Weight (kg)	
				Cv	Effective area (mm ²)	Air operated	External pilot solenoid
VNB4□□□-25A	1	-	16	7	130	1.4	1.5
VNB4□□□-25A			25	12	220		
VNB5□□□-32A	1 1/4	-	22	11	210	2.5	2.6
VNB5□□□-32A			32	18	320		
VNB5□□□-32F	-	32	22	11	210	5.7	5.8
VNB5□□□-32F			32	18	320		
VNB6□□□-40A	1 1/2	-	28	19	330	4.1	4.2
VNB6□□□-40A			40	28	500		
VNB6□□□-40F	-	40	28	19	330	7.7	7.8
VNB6□□□-40F			40	28	500		
VNB7□□□-50A	2	-	33	29	520	6.3	6.4
VNB7□□□-50A			50	43	770		
VNB7□□□-50F	-	50	33	29	520	11.4	11.5
VNB7□□□-50F			50	43	770		

Note) The flange should be JIS B 2210 10K (ordinary style) or its equivalent.

Specifications

Fluid	Water/Oil/Air/Vacuum, etc.	
Fluid temperature	VNB□□□A, VNB□□□E	
	VNB□□□E	
Ambient temperature	-5 to 50°C ^{Note 1)} (Air operated type: 60°C)	
Proof pressure	1.5 MPa	
Applicable ^{Note 4)} pressure range	VNB□□□□	
External pilot air	Pressure	0.1 + 0.25 x (Operating pressure) to 0.25 + 0.25 x (Operating pressure) MPa ^{Note 3)} Refer to "Graph (1)" on page 477.
	Lubrication	Not required (Use turbine oil Class 1 ISO VG32, if lubricated. ^{Note 2)})
	Temperature	-5 to 50°C (Air operated type: 60°C)
Mounting orientation	Unrestricted ^{Note 5)}	

Note 1) No freezing

Note 2) Lubrication is not allowed in the case of seal material EPR.

Note 3) Adjust the operating pressure range from 0.125 MPa to 0.275 MPa for low vacuum.

Note 4) The pressure differential between Port 1 (A) and 2 (B) must not exceed the maximum operating pressure.

Note 5) For external pilot solenoid, it is recommended that the pilot solenoid valve be oriented either vertically upward or horizontally.

Pilot Solenoid Valve Specifications

Port size	6A to 25A	32A to 50A
Pilot solenoid valve ^{Note 1)}	SF4-□□□-23 SF4-□E-23-Q	VO307-□□□□ VO307-□E-1-Q
Electrical entry	Grommet, Grommet terminal Conduit terminal DIN terminal	Grommet, DIN terminal
Coil rated voltage (V)	AC (50/60 Hz) DC	100 V, 200 V, Other voltage (Semi-standard) 24 V, Other voltage (Semi-standard)
Allowable voltage fluctuation		-15% to +10% of rated voltage
Temperature rise		35°C or less (When rated voltage is applied.) 50°C or less (When rated voltage is applied.)
Apparent power	AC	Inrush Holding
	DC	5.6 VA (50 Hz), 5.0 VA (60 Hz) 3.4 VA (50 Hz), 2.3 VA (60 Hz)
Power consumption	DC	12.7 VA (50 Hz), 10.7 VA (60 Hz) 7.6 VA (50 Hz), 5.4 VA (60 Hz)
Manual override		Non-locking push type Other (Semi-standard) Non-locking push type

Note 1) For "How to Order" pilot solenoid valves, refer to page 479.

Note 2) Vacuum pilot type pilot solenoid valves will become VO301V-□□□□.

Note 3) Vacuum pilot type CE-compliant pilot solenoid valves will become VO307V-□E-Q.

Process Valve: 2 Port Valve For Flow Control **Series VNB**

How to Order Pilot Solenoid Valves

Valve size 1/2/3/4

SF4-5D□-23-Q
SF4-5D□-23

CE-compliant
* Electrical entry:
D or DZ only

Manual override

Nil	Non-locking push type
A*	Non-locking push type A (projecting)
B*	Slotted locking type B (tool required)

* Semi-standard

Electrical entry/With indicator light/
surge voltage suppressor

G	Grommet	—	CE-compliant
GS	Grommet with surge voltage suppressor	—	—
E	Grommet terminal	—	—
EZ	Grommet terminal with light/surge voltage suppressor	—	—
T	Conduit terminal	—	—
TZ	Conduit terminal with light/surge voltage suppressor	—	—
D	DIN terminal	●	—
DZ	DIN terminal with light/surge voltage suppressor	●	—

Coil rated voltage

1	100 VAC 50/60 Hz
2	200 VAC 50/60 Hz
3 Note 1)	110 VAC 50/60 Hz
4 Note 1)	220 VAC 50/60 Hz
5	24 VDC
6 Note 1)	12 VDC
7 Note 1)	240 VAC 50/60 Hz

Note 1) Semi-standard
Note 2) For other rated voltages, please consult with SMC.

Valve size 5/6/7 and vacuum pilot type

VO307□-5D1-Q

Body option

Nil	Standard
V	Vacuum pilot

Coil rated voltage

1	100 VAC 50/60 Hz
2	200 VAC 50/60 Hz
3 Note 1)	110 VAC 50/60 Hz
4 Note 1)	220 VAC 50/60 Hz
5	24 VDC
6 Note 1)	12 VDC
7 Note 1)	240 VAC 50/60 Hz

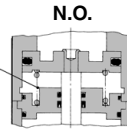
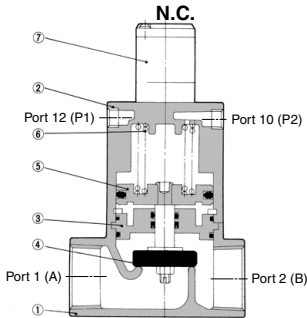
Note 1) Semi-standard
Note 2) For other rated voltages, please consult with SMC.

Electrical entry

G	Grommet	—	CE-compliant
GS	Grommet with surge voltage suppressor	—	—
D	DIN terminal	●	—
DZ	DIN terminal with light/surge voltage suppressor	●	—

Accessory
Function plate for VO307 (D sealing, with thread): DXT152-14-1A

Construction



* C.O. type does not have a return spring ⑤.

Component Parts

No.	Description	Material	Note
1	Body	Bronze Note 2)	Clear coated
2	Cover assembly	Aluminum alloy	Platinum silver painted
3 Note 1)	Plate assembly	Brass Note 2)	Seal material (NBR, FKM, EPR)
4 Note 1)	Valve element	Stainless steel or brass Note 2)	Seal material (NBR, FKM, EPR)
5	Piston assembly	Aluminum alloy	—
6	Return spring	Piano wire	—
7	Pilot solenoid valve	—	—

Note 1) Parts ③ and ④ are for selection of valve composition.
Note 2) The body option "S" is stainless steel, and "L" is aluminum.

Replacement Parts

No.	Description	Part no.										
		VNB1□□□ -6A, 8A, 10A	VNB2□□□ -10A, 15A	VNB3□□□ -20A	VNB4□□□ -25A	VNB5□□□ -32A, 32F	VNB5□□□ -32A, 32F	VNB6□□□ -40A, 40F	VNB6□□□ -40A, -40F	VNB7□□□ -50A, 50F	VNB7□□□ -50A, 50F	VNB7□□□ -4□□
3	Plate assembly	NBR	VN2-A3BA	VN3-A3BA	VN4-A3BA	VN5-A3BA	VN5-A3BA	VN6-A3BA	VN6-A3BA	VN7-A3BA	VN7-A3BA	VN7-A3BA
		FKM	VN2-A3BB	VN3-A3BB	VN4-A3BB	VN5-A3BB	VN5-A3BB	VN6-A3BB	VN6-A3BB	VN7-A3BB	VN7-A3BB	VN7-A3BB
4	Valve element (32 P to 50 P cone) in valve element assembly	NBR	VN2-A3BC	VN3-A3BC	VN4-A3BC	VN5-A3BC	VN5-A3BC	VN6-A3BC	VN6-A3BC	VN7-A3BC	VN7-A3BC	
		FKM	VN2-4BA	VN3-4BA	VN4-4BA	VN5-4BA	VN5-A4BA-3	VN6-4BA	VN6-A4BA-3	VN7-4BA	VN7-A4BA-3	
		EPR	VN2-4BB	VN3-4BB	VN4-4BB	VN5-4BB	VN5-A4BB-3	VN6-4BB	VN6-A4BB-3	VN7-4BB	VN7-A4BB-3	
		EPR	VN2-4BC	VN3-4BC	VN4-4BC	VN5-4BC	VN5-A4BC-3	VN6-4BC	VN6-A4BC-3	VN7-4BC	VN7-A4BC-3	
7	Pilot solenoid valve	SF4-□□□-23 (Refer to the table below.)										VO307-□□□1 (Refer to the table below.)

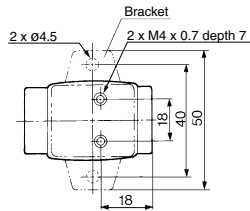
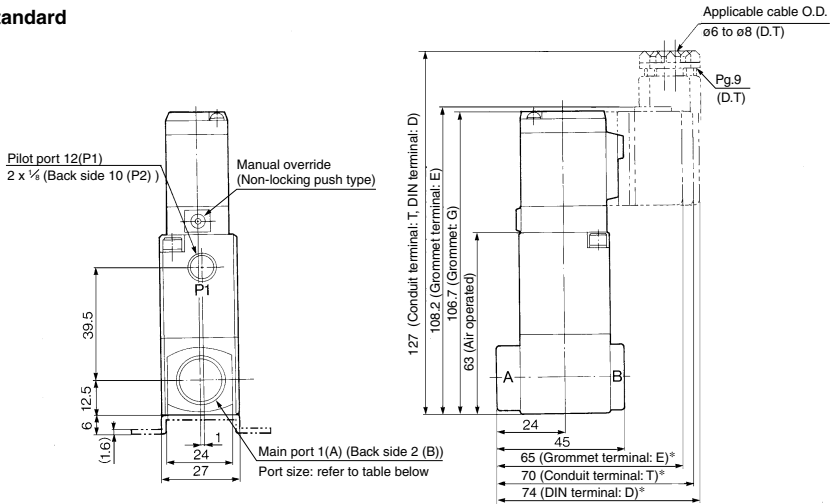
Note 1) In the case of body options "S" and "L", the materials of the part nos. ③ and ④ are as follows: (Example): VN1-A3B□A

However all brackets of valve element VNB 1 to 4 are made of stainless steel. (No need to add options "S" and "L"). L: Aluminum, S: Stainless steel
Note 2) Please request a factory repair.

Series VNB

Port size: 6A, 8A, 10A

Standard



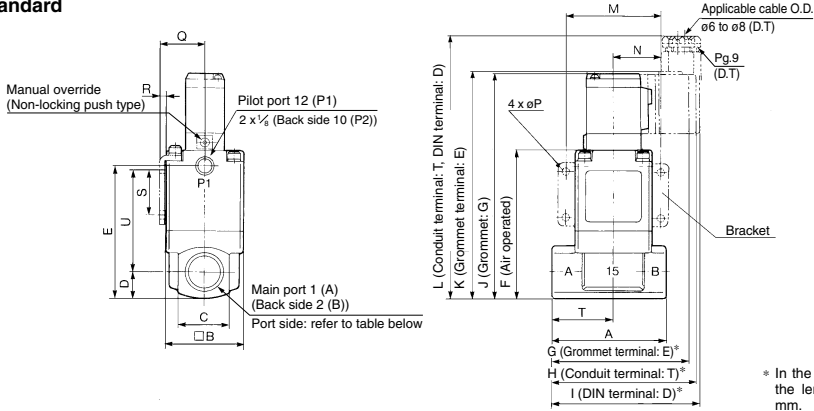
Model	Main port 1(A), 2(B)
VNB1□□□-6A	1/8
VNB1□□□-8A	1/4
VNB1□□□-10A	3/8

* In the case of "EZ" or "TZ", the length is longer by 10 mm.
 For "DZ", the length is longer by 17 mm.

Process Valve: 2 Port Valve For Flow Control **Series VNB**

Port size: 10A, 15A, 20A, 25A

Standard

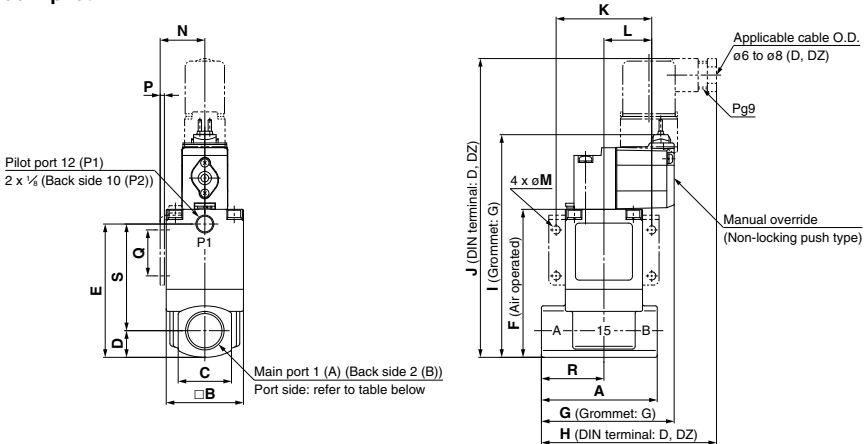


* In the case of "EZ" or "TZ", the length is longer by 10 mm.
For "DZ", the length is longer by 17 mm.

Model	Main port 1(A), 2(B)	A	B	C	D	E	F	G	H	I	J	K	L	M	N	P	Q	R	S	T	U
VNB2□□□-10A	3/8	63	42	28	14	72.5	80.5	75	80	84.5	124	125.5	144.5	52	26	4.5	24.3	2.3	25	34	55
VNB2□□□-15A	1/2	80	50	35	17.5	84	92	84	89	93.5	135.5	137	156	62	31	5.5	28.3	2.3	30	43	60.5
VNB3□□□-20A	3/4	90	60	44	22	100	108	90	95	99.5	151.5	153	172	72	36	6.5	33.3	2.3	35	49	73
VNB4□□□-25A	1	90	60	44	22	100	108	90	95	99.5	151.5	153	172	72	36	6.5	33.3	2.3	35	49	73

Port size: 10A, 15A, 20A, 25A

Vacuum pilot



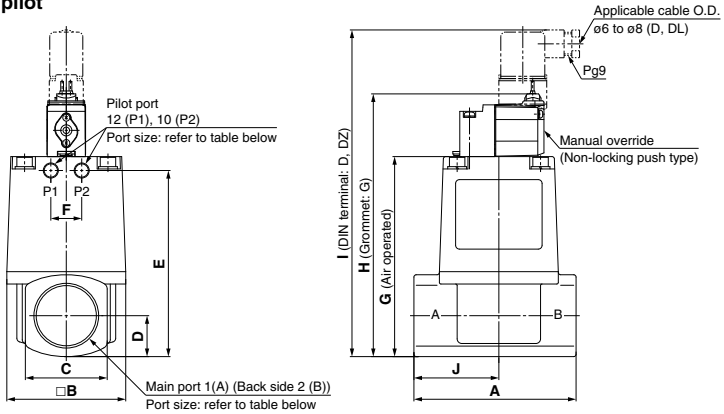
Model	Main port 1(A), 2(B)	A	B	C	D	E	F	G	H	I	J	K	L	M	N	P	Q	R	S
VNB2□□□V-10A	3/8	63	42	28	14	72.5	80.5	72.2	95.3	121.1	162.5	52	26	4.5	24.3	2.3	25	34	55
VNB2□□□V-15A	1/2	80	50	35	17.5	84	92	77.2	100.3	132.6	174	62	31	5.5	28.3	2.3	30	43	60.5
VNB3□□□V-20A	3/4	90	60	44	22	100	108	78.2	101.3	148.6	190	72	36	6.5	33.3	2.3	35	49	73
VNB4□□□V-25A	1	90	60	44	22	100	108	78.2	101.3	148.6	190	72	36	6.5	33.3	2.3	35	49	73

- VNA
- VNB
- SGC
- SGH
- VNC
- VNH
- VND
- VCC
- TQ

Series VNB

Port size: 32A, 40A, 50A

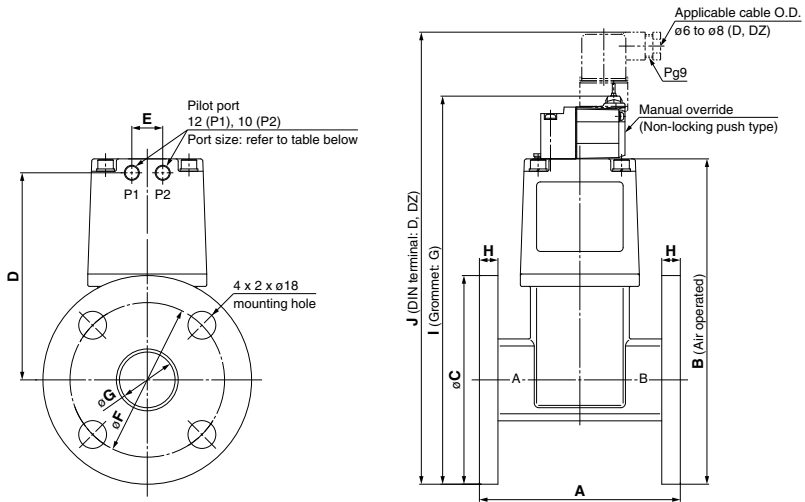
Standard/Vacuum pilot



Model	Main port 1(A), 2(B)	Pilot port 12(P1), 10(P2)	A	B	C	D	E	F	G	H	I	J
VNB5□□□□-32A	1 1/4	1/8	105	77	53	26.5	120.5	20	129.5	170.1	211.5	55
VNB6□□□□-40A	1 1/2	1/4	120	96	60	30	137	24	147	187.6	229	63
VNB7□□□□-50A	2	1/4	140	113	74	37	160	24	170	210.6	252	74

Port size: Flange: 32F, 40F, 50F

Standard/Vacuum pilot



Model	Applicable flange 1(A), 2(B)	Pilot port 12(P1), 10(P2)	A	B	C	D	E	F	G	H	I	J
VNB5□□□□-32F	32	1/8	130	210.5	135	134	20	100	36	12	251.1	292.5
VNB6□□□□-40F	40	1/4	150	226	140	146	24	105	42	12	266.6	308
VNB7□□□□-50F	50	1/4	180	250	155	162.5	24	120	54	14	290.6	332



Series VNB Specific Product Precautions

Be sure to read before handling. Refer to front matter 41 for Safety Instructions, and pages 17 to 19 for 2 Port Solenoid Valves for Fluid Control Precautions.

Design

Warning

Extended periods of continuous energization

If a valve is continuously energized for long periods, heat generation of the coil may result in reduced performance and shorter service life. This may also have an adverse effect on the peripheral equipment in proximity. Should a valve be continuously energized for long periods, or its daily energized state exceeds its non energized state, please use an energy saving type valve with DC specifications. Additionally, when using with AC, energizing for long periods of time continuously, select the air-operated valve and use the continuous duty type of the VT307 for a pilot valve.

Fluid Quality

Warning

If a fluid that contains foreign matter is used, foreign matter may enter the rod sliding part, causing malfunction or seal failure. If seal failure occurs in the rod sliding part, the fluid backflows in the pilot air piping and may enter units in the circuit connected to the pilot air piping, causing adverse effect. So, perform the maintenance work periodically or take preventive measures appropriately.

Mounting

Warning

- Do not apply external force to the coil section.**
When tightening is performed, apply a wrench or other tool to the outside of the piping connection parts.
- Do not warm the coil assembly with a heat insulator, etc.**
Use tape, heaters, etc., for freeze prevention on the piping and body only. They can cause the coil to burn out.
- Avoid sources of vibration, or adjust the arm from the body to the minimum length so that resonance will not occur.**

Piping

Caution

When high temperature fluids are used, use fittings and tubing with heat resistant features. (Self-align fittings, PTFE tubing, Copper tubing, etc.)

Wiring

Caution

- Applied voltage**
When electric power is connected to a solenoid valve, be careful to apply the proper voltage. Improper voltage may cause malfunction or coil damage.
- Confirm the connections.**
After completing the wiring, confirm that the connections are correct.

External Pilot

Warning

Pilot port piping

12 (P1) and 10 (P2) piping should be as follows according to the model.

Standard

Port	VNB□0□□	VNB□02□	VNB□03□	VNB□1½□
12 (P1)	External pilot	Bleed port	External pilot (*)	External pilot
10 (P2)	Bleed port	External pilot	External pilot (*)	Pilot exhaust

(*) If the pilot air is not supplied, the valve position will not be held. Pressurize Port 12 (P1) or Port 10 (P2) when using the product.

Vacuum pilot

Port	VNB□01V□	VNB□02V□	VNB□1½V□
12 (P1)	Bleed port	External pilot	External pilot
10 (P2)	External pilot	Bleed port	Pilot exhaust

Installing a silencer to the exhaust port and the bleed port is recommended for noise reduction and for dust entry prevention.

Mounting Direction of Pilot Solenoid Valve

Warning

With external pilot solenoids, the pilot solenoid valves are not splash proof specifications, and so care must be taken to get fluid on oneself such as when performing maintenance.

Caution

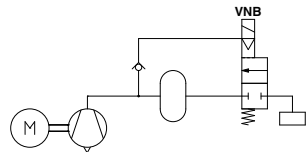
Direction of mounting

When replacing a valve, if an external pilot solenoid valve is mounted in the wrong direction, it may malfunction or leak air.

Vacuum Pilot

Caution

When using the VNB□□V. vacuum pilot, maintain the specified pilot pressure by providing a tank with an appropriate capacity or by acquiring the pilot pressure from an area near the vacuum pump.



VNA

VNB

SGC

SGH

VNC

VNH

VND

VCC

TQ