

# Process Valve

## Series VNB

### 2 Port Valve For Flow Control

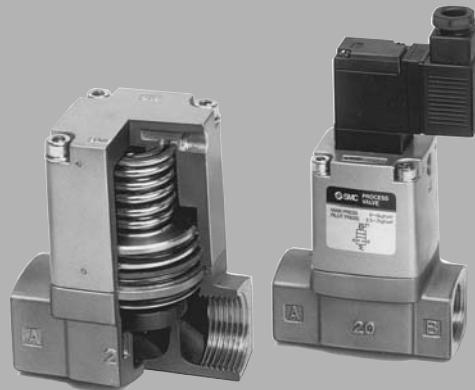
#### A wide variety of applicable fluids

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 Body 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
Wetted part Seal material									
Fluid									
Air (Standard, Dry)	●	●		●	●		●	●	
Low vacuum (Up to -101kPa)	●	●		●	●		●	●	
Carbon dioxide (CO <sub>2</sub> , 0.7 MPa or less)	●	●		●	●		●	●	
Carbon dioxide (CO <sub>2</sub> , 0.7 to 1 MPa)	●	●		●	●		●	●	
Nitrogen gas (N <sub>2</sub> )	●	●	●	●	●	●	●	●	●
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)	●	●		●	●		●	●	
Brake oil <sup>Note)</sup>	●	●	●	●	●	●	●	●	●
Silicon 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.

Note 3) Some brake oils are not allowed.

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	C	T	D	DL	S	Z	L	
1, 2, 3, 4	●	●		●	●		●	●	●	●
5, 6, 7	●	●	●	●	●	●	●	●	●	●

(Only "G") (Except "G")  
(Except "DL") (Only "T") (Only "T")

VNA

VNB

SGC

VNC

VNH

VND

VCC

# Process Valve: 2 Port Valve For Flow Control

# Series VNB



[Option]

\* Electrical entry: D or DZ only.

## How to Order

A	NBR seals
B	FKM seals
C	EPR seals

Refer to Table (1) for availability.

Nil	Standard
S*	Stainless steel body
L*	Aluminum body

\* Threaded port only

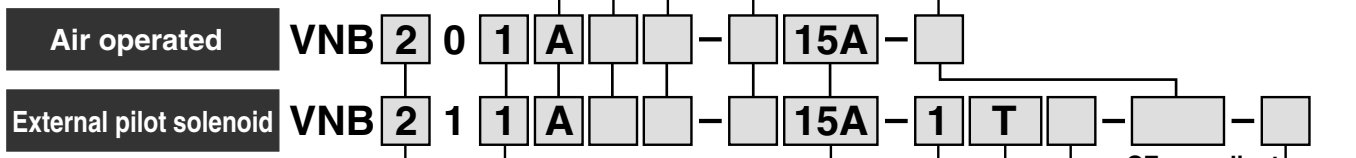
Nil	Standard
V	Vacuum pilot type

Note) Symbol V is for vacuum pilot valve specification, for both main pressure and pilot pressure, valve size 2 to 7.

Nil	Rc
F	G
N	NPT
T	NPTF

Nil	None
B>Note)	With bracket

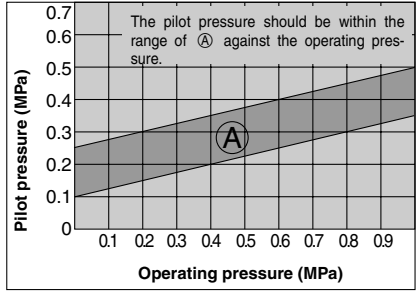
Note) Only valve sizes 1, 2, 3 and 4. Shipped after assembled at our factory. Bracket part no.  
Valve size 1: VN1-A16 (with thread)  
Valve sizes 2 to 4: VN□-16  
↓ 2 to 4



Symbol	Orifice dia. (mm)	Symbol				Symbol	Port size Rc
		1 N.C. 0.5 MPa	2 N.O. 1 MPa	3 Note 1) C.O. 1 MPa	4 N.C. 1 MPa		
1	ø7	—	●	●	●	6A	1/8
		—	●	●	●	8A	1/4
		—	●	●	●	10A	3/8
2	ø11 ø15	—	—	—	●	10A	3/8
		●	●	●	—	15A	1/2
		●	●	●	—	—	—
3	ø14 ø20	—	—	—	●	20A	3/4
		●	●	●	—	—	—
4	ø16 ø25	—	—	—	●	25A	1
		●	●	●	—	—	—
5	ø22 ø32	—	—	—	●	32A	1 1/4
		●	●	●	—	32F	1 1/4 B Flange
		●	●	●	—	—	—
6	ø28 ø40	—	—	—	●	40A	1 1/2
		●	●	●	—	40F	1 1/2 B Flange
		●	●	●	—	—	—
7	ø33 ø50	—	—	—	●	50A	2
		●	●	●	—	—	—
		●	●	●	—	50F	2B Flange

Note 1) Air operated only  
Note 2) The valve type symbols for vacuum pilot type are 1 (N.C.) and 2 (N.O.) only.

**Graph (4) VNB□□□□ Pilot Pressure (N.O. and C.O. types)**



1	100 VAC 50/60 Hz
2	200 VAC 50/60 Hz
Note 2) 3	110 VAC 50/60 Hz
Note 2) 4	220 VAC 50/60 Hz
5	24 VDC
Note 2) 6	12 VDC
Note 2) 7	240 VAC 50/60 Hz
Note 2) 9	Other

Note 1) Electrical entry: D or DZ only  
Note 2) Semi-standard

Nil	—
Q	CE compliant*

\* Electrical entry: D or DZ only

**Manual override**

<p><b>Nil:</b> Non-locking push type</p> <p><b>A:</b> Non-locking push type A (projecting)</p>	Valve size 1 to 4
<p><b>B:</b> Slotted locking type B (tool required)</p>	
<p><b>Nil:</b> Non-locking push type</p>	Valve size 5 to 7

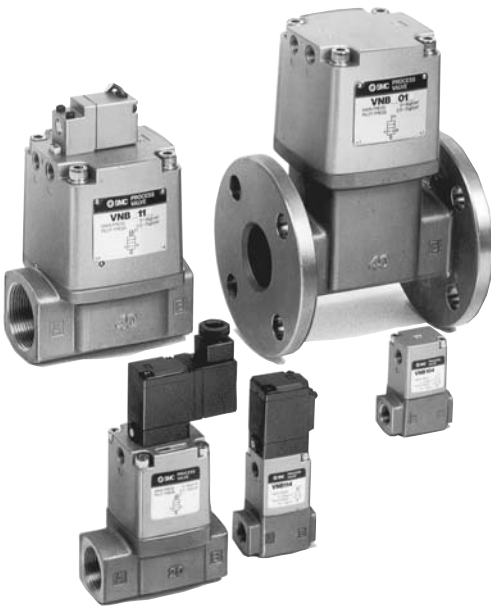
Note) Semi-standard

Symbol	Electrical entry	Valve size
G	Grommet	Valve size 1 to 4
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	
G	Grommet	Valve size 5 to 7
GS	Grommet with surge voltage suppressor	
C	Conduit	
T	Conduit terminal	
TS	Conduit terminal with surge voltage suppressor	
TZ>Note 1)	Conduit terminal with light/surge voltage suppressor	
TL>Note 1)	Conduit terminal with indicator light	
D	DIN terminal	
DL	DIN terminal with indicator light	

D	DIN terminal	Valve size
DZ	DIN terminal with light/surge voltage suppressor	1 to 7

Note 1) Except rated voltage 6, 7, 9.  
Note 2) For valve sizes 5 to 7 of the DZ DIN terminal with light/surge voltage suppressor, be sure to add suffix -X200 at the end of the part number. (For CE compliant product, -X200 is not required.) In this case, the pilot solenoid valve is VO307-□DZ.

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



## Model

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

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

## JIS Symbol

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

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

## JIS Symbol (Vacuum pilot type)

Type	Valve type	N.C.	N.O.
		Normally closed	Normally open
Air operated		VNB□01□V	VNB□02□V
		VNB□11□V	VNB□12□V
External pilot solenoid			
		VNB□11□V	VNB□12□V

## Specifications

Fluid	Water/Oil/Air/Vacuum, etc.		
Fluid temperature	VNB□□□A, VNB□1□□	-5 to 60°C <sup>Note 1)</sup>	
Fluid temperature	VNB□0□□	-5 to 99°C <sup>Note 1)</sup> (Water, Oil etc. Air Operated only)	
Ambient temperature	-5 to 50°C <sup>Note 1)</sup> (Air operated type: 60°C)		
Proof pressure	1.5 MPa		
Applicable <sup>Note 4)</sup> pressure range	VNB□□1□	Low vacuum to 0.5 MPa	
	VNB□□□□	Low vacuum to 1 MPa	
External pilot air	Pressure	VNB□□□□	0.25 to 0.7 MPa
		VNB□□□□	0.1 + 0.25 x (Operating pressure) to 0.25 + 0.25 x (Operating pressure) MPa <sup>Note 3)</sup> Refer to "Graph (1)" on page 366.
	Lubrication	Not required (Use turbine oil Class 1 ISO VG32, if lubricated. <sup>Note 2)</sup>	
	Temperature	-5 to 50°C (Air operated type: 60°C)	
Mounting orientation	Unrestricted <sup>Note 5)</sup>		

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, 32F to 50F	32A to 50A, 32F to 50F, CE compliant
Pilot solenoid valve	SF4-□□□-23		VO301□-00□□□	VO307□-00□□□-Q
Electrical entry	Grommet, Grommet terminal, Conduit terminal, DIN terminal		Grommet, Conduit, DIN terminal, Other (Option)	DIN terminal
Coil rated voltage (V)	AC (50/60 Hz)		100 V, 200 V, other voltage (Semi-standard)	
	DC		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)		70°C or less (when rated voltage is applied)	50°C or less (when rated voltage is applied)
Apparent power	AC	Inrush	5.6 VA (50 Hz), 5.0 VA (60 Hz)	
		Holding	3.4 VA (50 Hz), 2.3 VA (60 Hz)	
Power consumption	DC		1.8 W (without light), 2W (with light)	
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 368.  
 Note 2) Vacuum pilot type pilot solenoid valves will become VO301V-00□□□.  
 Note 3) Vacuum pilot type CE compliant pilot solenoid valves will become VO307V-□□□-Q.