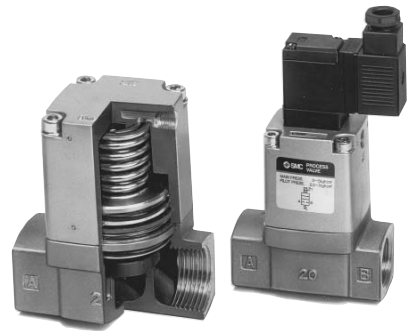


# Process Valve: 2 Port Valve For Flow Control Series **VNB**



Air operated

External pilot solenoid

## 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.

### 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 17-1-15. 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

Fluid	BC6: Standard			Aluminum: L			Stainless steel: S		
	NBR : A	FKM : B	EPR : C	NBR : A	FKM : B	EPR : C	NBR : A	FKM : B	EPR : C
Air (Standard, Dry)	●	●		●	●		●	●	
Low vacuum (Up to -101kPa torr)	●	●		●	●		●	●	
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 <small>(Note)</small>			●			●			●
Silicon oil		●						●	
Naphtha		●						●	
Ethylene glycol (up to 80°C)			●						●
Boiler water							●		●

### ⚠ Caution

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. Please contact SMC if using for other fluids, operating conditions, etc.

Note) 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")	

VC

VDW

VQ

VX2

VX

VX3

VXA

VN

LVC

LVA

LVH

LVD

LVQ

LQ

LVN

T/  
TIL

PA

PAX

PB

# Series VNB

## How to Order

### Seal material

<b>A</b>	NBR seals
<b>B</b>	FKM seals
<b>C</b>	EPR seals

Refer to "Table (1)" on page 17-2-13 for availability.

### Body option

<b>Nil</b>	Standard
<b>V*</b>	Vacuum pilot
<b>S**</b>	Stainless steel body
<b>L**</b>	Aluminum body

\*Valve size: 2 to 7  
\*\*Threaded port only

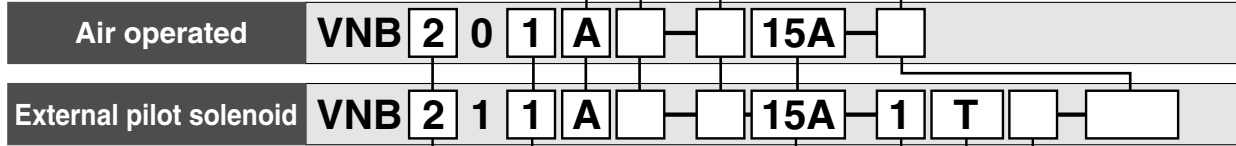
### Thread type

<b>Nil</b>	Rc
<b>F</b>	G
<b>N</b>	NPT
<b>T</b>	NPTF

### Bracket (valve size: 1/2/3/4.)

<b>Nil</b>	None
<b>B</b>	With bracket (VN□-16) * □ is valve size

Note 1) Valve size 1 comes with VN1-A16 (with thread).  
Note 2) Shipped after assembled at our factory.



### Valve size Valve type Port size

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

### Rated voltage

<b>1</b>	100 VAC 50/60 Hz
<b>2</b>	200 VAC 50/60 Hz
<b>3*</b>	110 VAC 50/60 Hz
<b>4*</b>	220 VAC 50/60 Hz
<b>5</b>	24 VDC
<b>6*</b>	12 VDC
<b>7*</b>	240 VAC 50/60 Hz
<b>9*</b>	Other

\* Option

### Manual override

**Nil: Non-locking push type**

**A: Non-locking extended type**

**B: Locking slotted type**

**Nil: Non-locking push type**

Valve size 1 to 4  
Valve size 5 to 7

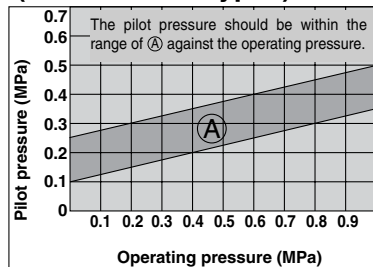
### Electrical entry/ With light/surge voltage suppressor

<b>G</b>	Grommet	Valve size 1 to 4
<b>GS</b>	Grommet with surge voltage suppressor	
<b>E</b>	Grommet terminal	
<b>EZ</b>	Grommet terminal with light/surge voltage suppressor	
<b>T</b>	Conduit terminal	Valve** size 5 to 7
<b>TZ*</b>	Conduit terminal with light/surge voltage suppressor	
<b>D</b>	DIN terminal	
<b>DZ</b>	DIN terminal with light/surge voltage suppressor	
<b>G</b>	Grommet	Valve** size 5 to 7
<b>GS</b>	Grommet with surge voltage suppressor	
<b>C</b>	Conduit	
<b>T</b>	Conduit terminal	
<b>TS</b>	Conduit terminal with surge voltage suppressor	
<b>TZ*</b>	Conduit terminal with light/surge voltage suppressor	
<b>TL*</b>	Conduit terminal with indicator light	
<b>D</b>	DIN terminal	
<b>DL</b>	DIN terminal with indicator light	

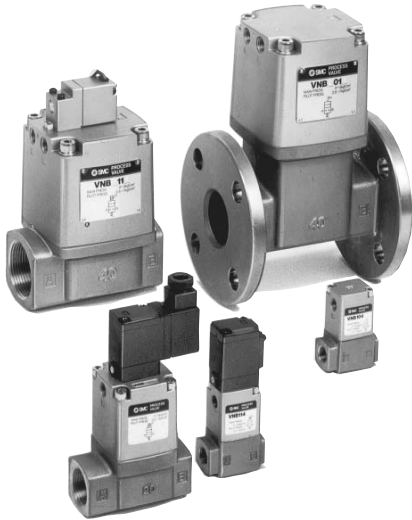
\* Except rated voltage 6, 7, 9.  
\*\* DZ: For DIN terminal with light/surge protector protection circuit, be sure to suffix -X200 at the end of the part number. In this case, pilot solenoid valve is VO307-□DZ.

Note) Air operated only

**Graph (1)**  
VNB□□□□□ Pilot Pressure (N.O. and C.O. types)



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



## Model

Model	Port size Rc	Orifice size $\phi$ (mm)	Flow characteristics				Weight (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	25	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	1/2	11	9.6	0.40	2.6	71	0.6	0.7
VNB2□□□-10A		15	17	0.32	4.0	110		
VNB2□4□-15A		11	9.6	0.40	2.6	76		
VNB2□□□-15A	3/4	15	19	0.24	4.8	140	0.9	1.0
VNB3□4□-20A		14	18	0.42	5.4	140		
VNB3□□□-20A		20	35	0.13	7.4	270		

VC□

VDW

VQ

VX2

VX□

VX3

VXA

VN□

LVC

LVA

LVH

LVD

LVQ

LQ

LVN

T/  
TIL

PA

PAX

PB

## JIS Symbol

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

## Option Specifications

### Vacuum pilot valve VNB□□□□□

(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.

## Valve Specifications

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

Model	Port size		Orifice size $\phi$ (mm)	Flow characteristics		Weight (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.

## Valve Specifications

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



Note 1) No freezing

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

Note 3) Adjust the operating pressure to 0.1 MPa for low vacuum.

## JIS Symbol (Vacuum pilot type)

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

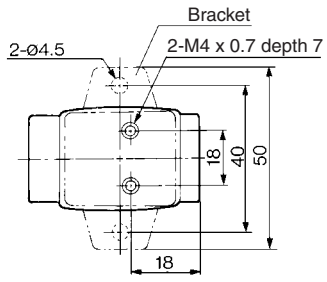
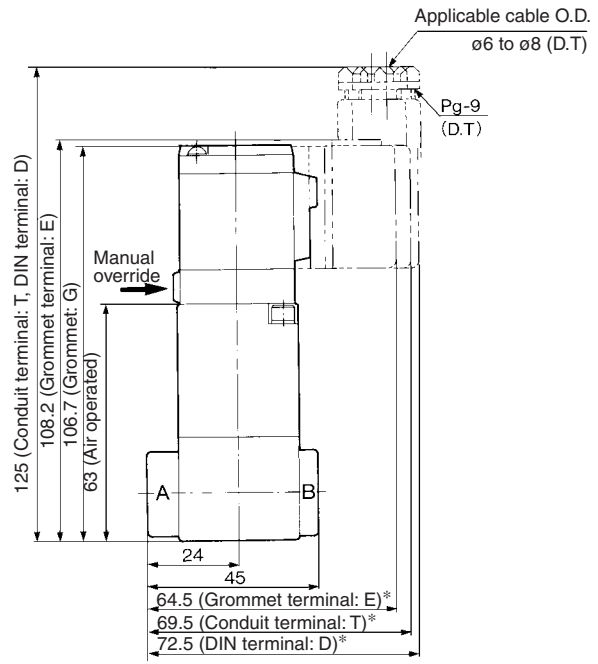
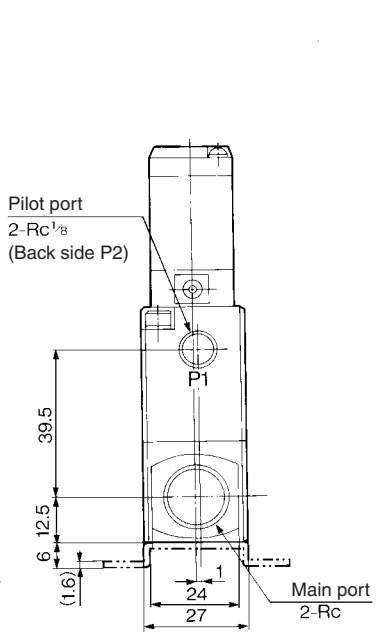
## Pilot Solenoid Valve Specifications

Port size		6A to 25A	32A to 50A, 32F to 50F
Pilot solenoid valve		SF4-□□□-23	V0301□-00 □□□
Electrical entry		Grommet, Grommet terminal, Conduit terminal, DIN terminal	Grommet, Conduit, DIN terminal, Other (Option)
Coil rated voltage (V)	AC (50/60 Hz)	100 V, 200 V, other voltage (Option)	
	DC	24 V, other voltage (Option)	
Allowable voltage fluctuation		-15% to +10% of rated voltage	
Coil insulation type		Class B or equivalent (130°C)	
Temperature rise		35°C or less (when rated voltage is applied.)	70°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
Manual override		Non-locking push type Other (Option)	Non-locking push type

# Series VNB

**Port size 6A, 8A, 10A**

**Standard**



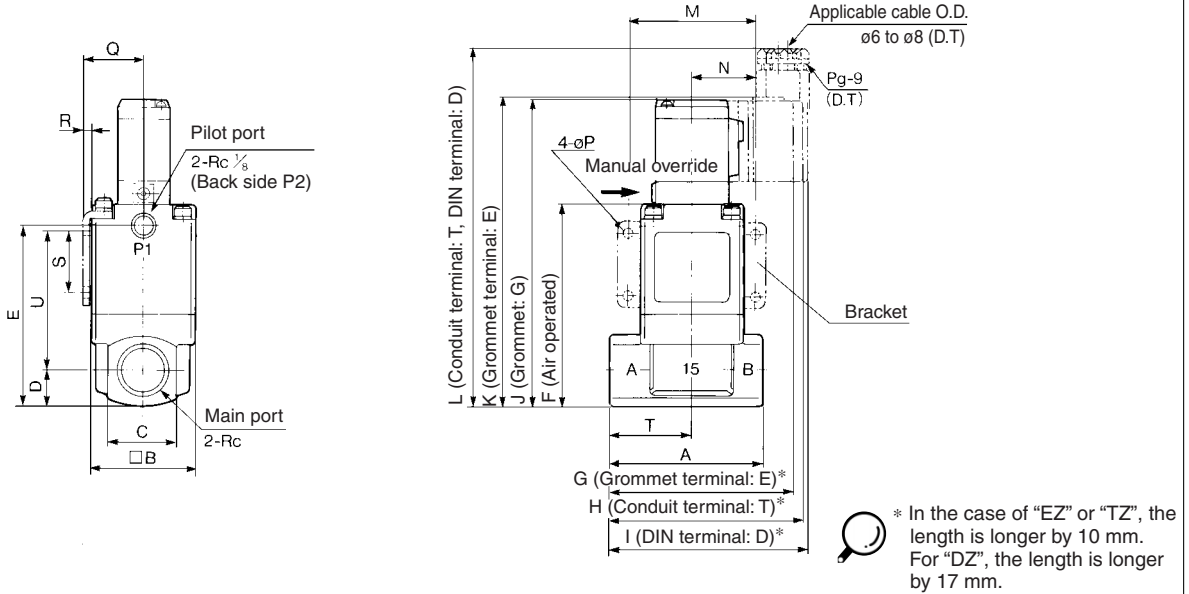
Model	Main port Rc
VNB1□□□-6A	1/8
VNB1□□□-8A	1/4
VNB1□□□-10A	3/8

\* 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

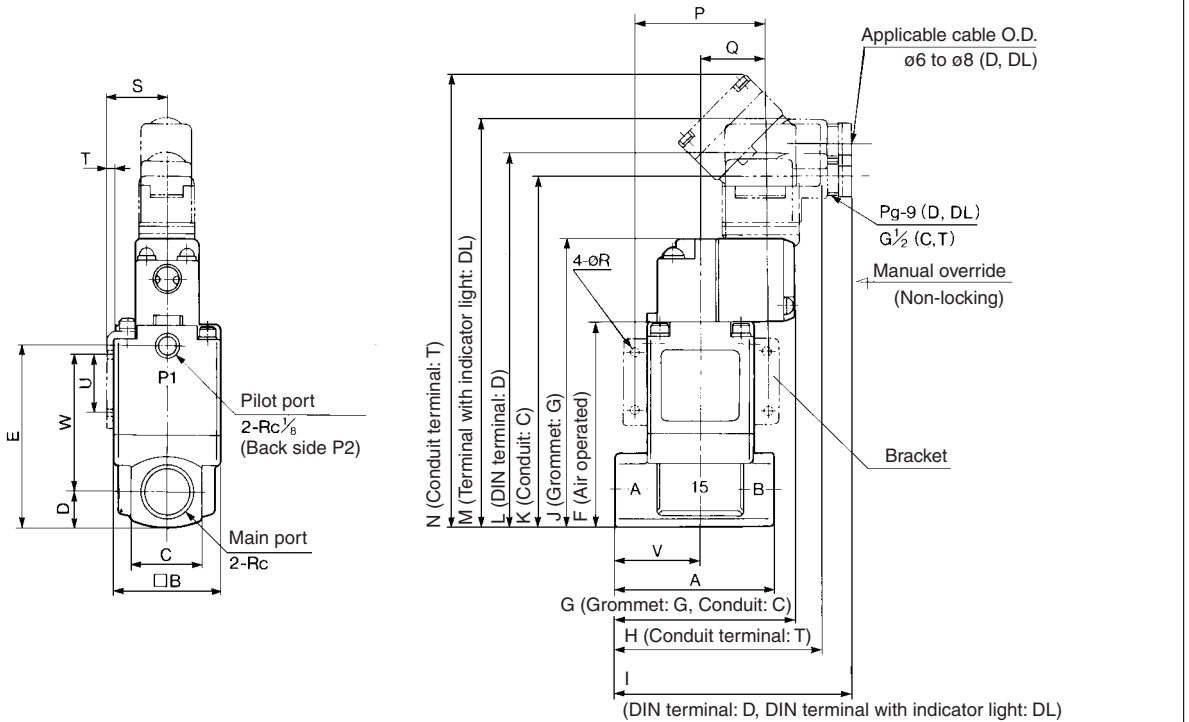


Model	Main port Rc	A	B	C	D	E	F	G	H	I	J	K	L	M	N	P	Q	R	S	T	U
VNB2□□□-10A	3/8	63	42	28	14	72.5	80.5	74.5	79.5	82.5	124	125.5	142.5	52	26	4.5	24.3	2.3	25	34	55
VNB2□□□-15A	1/2																				
VNB3□□□-20A	3/4	80	50	35	17.5	84	92	83.5	88.5	91.5	135.5	137	154	62	31	5.5	28.3	2.3	30	43	60.5
VNB4□□□-25A	1	90	60	40	20	100	108	89.5	94.5	97.5	151.5	153	170	72	36	6.5	33.3	2.3	35	49	73

- VC□
- VDW
- VQ
- VX2
- VX□
- VX3
- VXA
- VN□

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

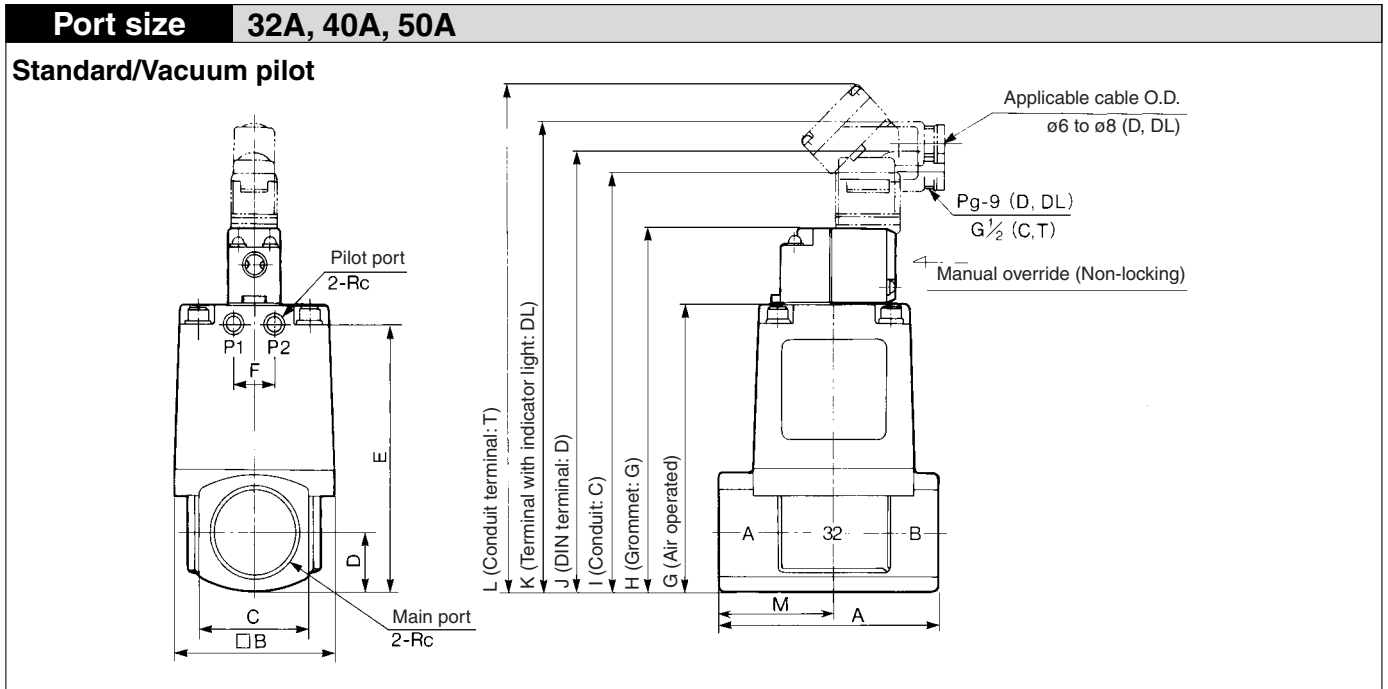
### Vacuum pilot



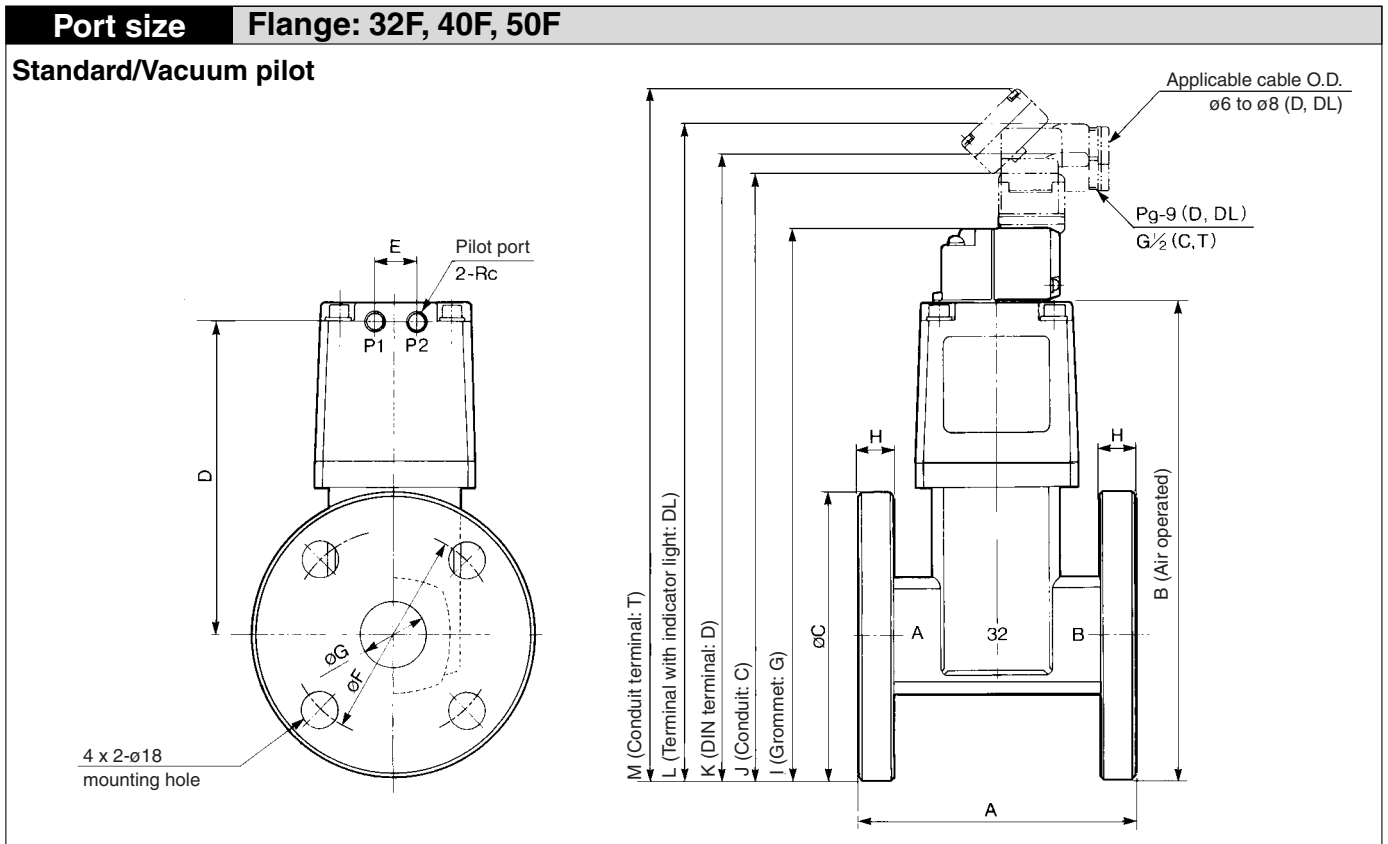
Model	Main port Rc	A	B	C	D	E	F	G	H	I	J	K	L	M	N	P	Q	R	S	T	U	V	W
VNB2□□□V-10A	3/8	63	42	28	14	72.5	80.5	75	87	97	114	126.5	170.5	173.5	180.5	52	26	4.5	24.3	2.3	25	34	55
VNB2□□□V-15A	1/2																						
VNB3□□□V-20A	3/4	80	50	35	17.5	84	92	80	92	102	125.5	138	182	185	192	62	31	5.5	28.3	2.3	30	43	60.5
VNB4□□□V-25A	1	90	60	40	20	100	108	81	93	103	141.5	154	198	201	208	72	36	6.5	33.3	2.3	35	49	73

- LVC
- LVA
- L VH
- LVD
- LVQ
- LQ
- LVN
- TI/  
TIL
- PA
- PAX
- PB

# Series VNB



Model	Main port Rc	Pilot port Rc	A	B	C	D	E	F	G	H	I	J	K	L	M
VNB5□□□□-32A	1 1/4	1/8	105	77	53	26.5	120.5	20	129.5	163	175.5	219.5	222.5	229.5	55
VNB6□□□□-40A	1 1/2	1/4	120	96	60	30	137	24	147	180.5	193	237	240	247	63
VNB7□□□□-50A	2	1/4	140	113	74	37	160	24	170	203.5	216	260	263	270	74



Model	Applicable flange	Pilot port Rc	A	B	C	D	E	F	G	H	I	J	K	L	M
VNB5□□□□-32F	32	1/8	130	210.5	135	134	20	100	36	12	244	256.5	300.5	303.5	310.5
VNB6□□□□-40F	40	1/4	150	226	140	146	24	105	42	12	259.5	272	316	319	326
VNB7□□□□-50F	50	1/4	180	250	155	162.5	24	120	54	14	283.5	296	340	343	350

## ⚠ Precautions

Be sure to read before handling.

Refer to page 17-6-3 for Safety Instructions and Solenoid Valve Precautions.

### External Pilot

#### ⚠ Caution

##### Pilot port P1 and P2 piping

Please arrange P1 and P2 piping as follows according to the model.

##### Standard

Port	VNB□□ $\frac{1}{4}$ □	VNB□□02□	VNB□□03□	VNB□□1 $\frac{1}{2}$ □
12 (P1)	External pilot	Bleed port	External pilot	External pilot
10 (P2)	Bleed port	External pilot	External pilot	Pilot exhaust

##### Vacuum pilot

Port	VNB□□01□V	VNB□□02□V	VNB□□1 $\frac{1}{2}$ □V
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

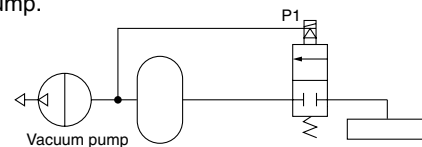
#### ⚠ Caution

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□□ $\frac{1}{2}$ □V N.C. 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.



### Piping

#### ⚠ Caution

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

VC□

VDW

VQ

VX2

VX□

VX3

VXA

VN□

LVC

LVA

LVH

LVD

LVQ

LQ

LVN

TI/  
TIL

PA

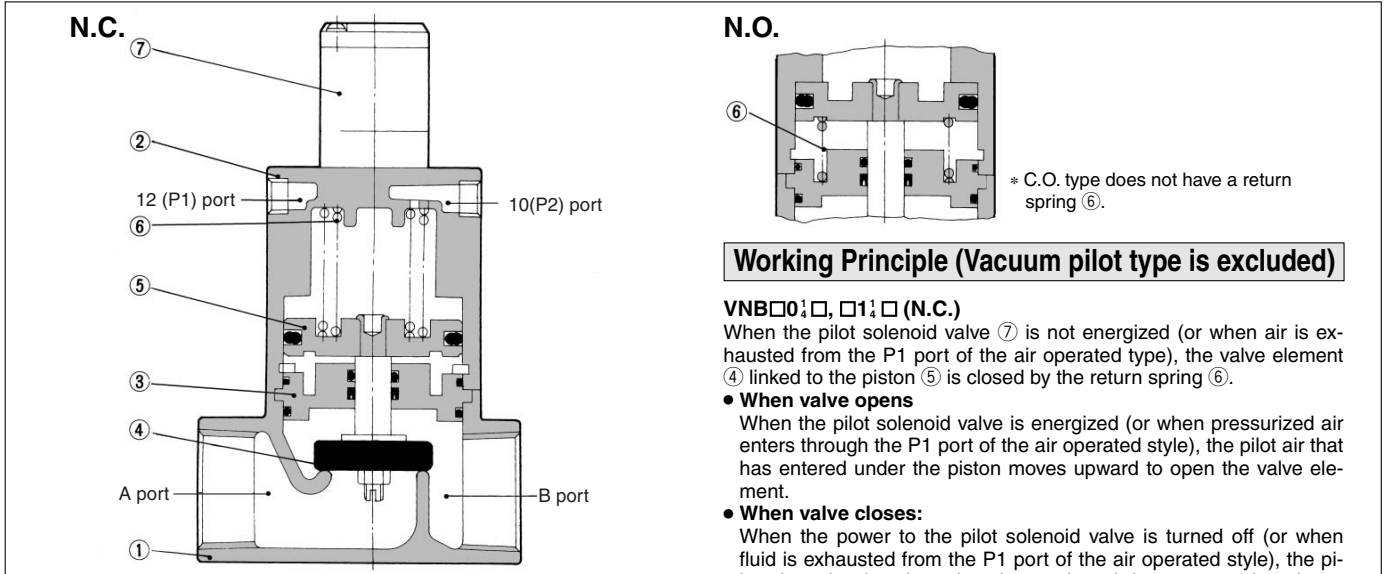
PAX

PB



# Series VNB

## Construction



### Component Parts

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

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

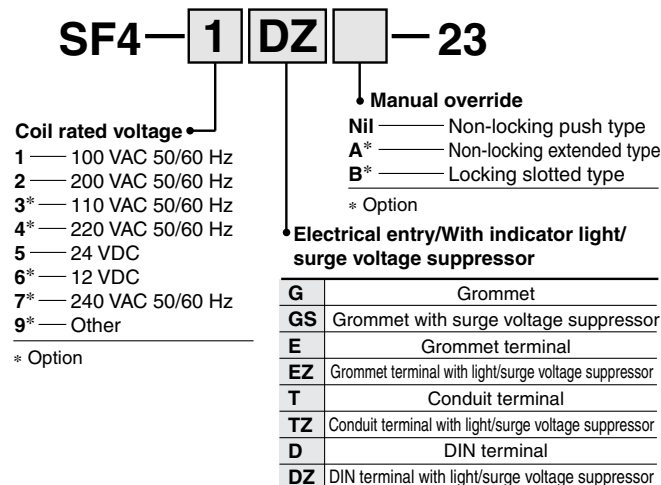
### Replacement Parts

No.	Description	Part no.											
		VNB1□□□ -6A, 8A, 10A	VNB2□□□ -10A, 15A	VNB3□□□ -20A	VNB4□□□ -25A	VNB5□□□ -32A, 32F	VNB5□4□ -32A, 32F	VNB6□□□ -40A, 40F	VNB6□4□ -40A, -40F	VNB7□□□ -50A, 50F	VNB7□4□ -50A, 50F		
Note) ③	Plate assembly	Valve material	NBR	VN1-A3BA	VN2-A3BA	VN3-A3BA	VN4-A3BA	VN5-A3BA	VN5-A3BA	VN6-A3BA	VN6-A3BA	VN7-A3BA	VN7-A3BA
			FPM	VN1-A3BB	VN2-A3BB	VN3-A3BB	VN4-A3BB	VN5-A3BB	VN5-A3BB	VN6-A3BB	VN6-A3BB	VN7-A3BB	VN7-A3BB
			EPR	VN1-A3BC	VN2-A3BC	VN3-A3BC	VN4-A3BC	VN5-A3BC	VN5-A3BC	VN6-A3BC	VN6-A3BC	VN7-A3BC	VN7-A3BC
Note) ④	Valve element	Valve material	NBR	VN1-4BA	VN2-4BA	VN3-4BA	VN4-4BA	VN5-A4BA	VN5-A4BA-3	VN6-A4BA	VN6-A4BA-3	VN7-A4BA	VN7-A4BA-3
			FPM	VN1-4BB	VN2-4BB	VN3-4BB	VN4-4BB	VN5-A4BB	VN5-A4BB-3	VN6-A4BB	VN6-A4BB-3	VN7-A4BB	VN7-A4BB-3
			EPR	VN1-4BC	VN2-4BC	VN3-4BC	VN4-4BC	VN5-A4BC	VN5-A4BC-3	VN6-A4BC	VN6-A4BC-3	VN7-A4BC	VN7-A4BC-3
⑦	Pilot solenoid valve	SF4□□□-23 (Refer to the table below.)						VO301□-00□□□ (Refer to the table below.)					

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

## How to Order Pilot Solenoid Valves

### Valve size 1/2/3/4



### Valve size 5/6/7

