For General Purpose

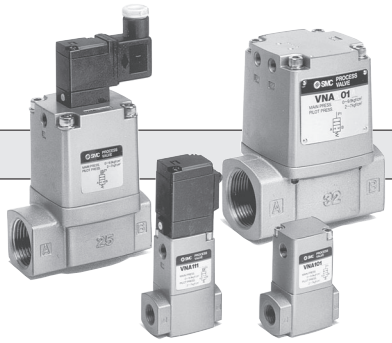
2/3 Port Valve

Process Valve/Series VN

- ■The cylinder operation by external pilot air
- ■Can be operated with pressure differential zero.
- ■Wide variations

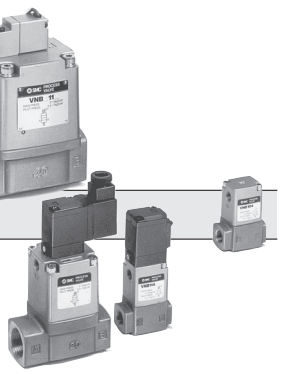
Series VNA

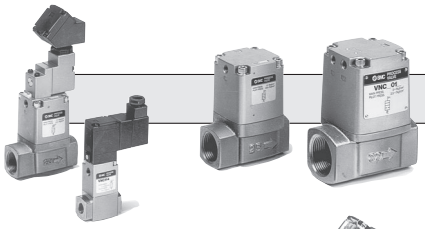
For controlling pneumatic systems or air-hydro circuits.
A balance poppet that enables air to flow forward or backward.



Series VNB

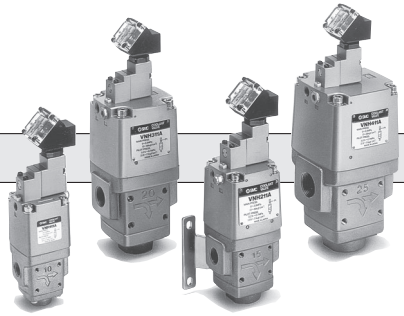
For controlling various fluids
Can operate with a wide range of fluids, such as air, water, oil, gas, vacuum, etc., by selecting the body material and the seal material.





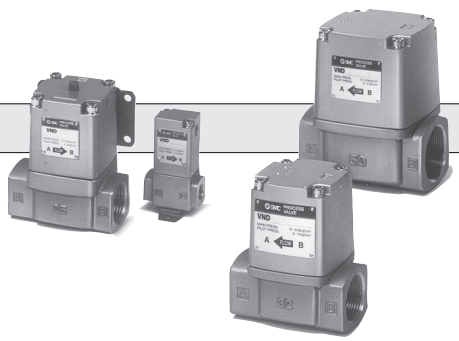
Series VNC

For controlling the cutting oils and coolants used in machine tools.
Metal seals are used for preventing foreign matter such as cutting chips from entering.
Maximum operating pressure: 0.5MPa, 1MPa



Series VNH

For controlling the high pressure cutting oils and coolants used in machine tools.
Maximum operating pressure: 3.5MPa, 7MPa



Series VND

For steam control
PTFE seal adopted
With indicator (Option)

Process Valve

Series			Process valve Series **VNA**			Process valve Series **VNB**			Coolant valve Series **VNC**		Coolant valve for high pressure Series **VNH**	Steam valve Series **VND**	
Valve Style			N.C.	N.O.	C.O.	N.C.	N.O.	C.O.	N.C.	N.O.	N.C.	N.C.	N.O.
Applicable fluid	Water		—	—	—	●	●	●	—	—	—	—	—
	Air		●	●	●	●	●	●	—	—	—	—	—
	Oil		●	●	●	●	●	●	●	●	●	—	—
	Low vacuum (1 Torr)		—	—	—	●	●	●	—	—	—	—	—
	Coolant		—	—	—	—	—	—	●	●	●	—	—
	Steam		—	—	—	—	—	—	—	—	—	●	●
Port size	Rc G NPT NPTF	1/8	●	●	●	●	●	●	●	●	—	●	●
		1/4	●	●	●	●	●	●	●	●	—	●	●
		3/8	●	●	●	●	●	●	●	●	●	●	●
		1/2	●	●	●	●	●	●	●	●	●	●	●
		3/4	●	●	●	●	●	●	●	●	●	●	●
		1	●	●	●	●	●	●	●	●	●	●	●
		1 1/4	●	●	●	●	●	●	●	●	—	●	●
		1 1/2	●	●	●	●	●	●	●	●	—	●	●
		2	●	●	●	●	●	●	●	●	—	●	●
Page			P.4.2-3 to P.4.2-10			P.4.2-11 to P.4.2-18			P.4.2-19 to P.4.2-26		P.4.2-27 to P.4.2-32	P.4.2-33 to P.4.2-40	

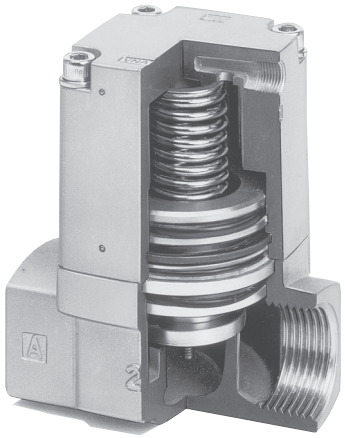
2 Port Valve for Comressed Air and Air-hydro Circuit Control

Process Valve

Series VNA

Universal 2 Port Valve

Exclusively for air pressure system and air-hydro circuit control



The cylinder operation by external pilot air

The balance poppet permits normal and reverse flow.

Operation from 0 MPa is possible

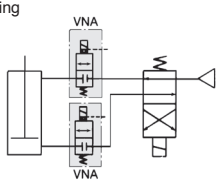
Wide variations

N.C., N.O., C.O., are available. Screw-in styles, 6A to 50A, are standardized.

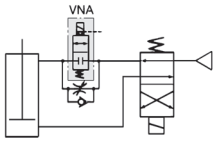
Compressed Air

Air pressure circuit: Application examples

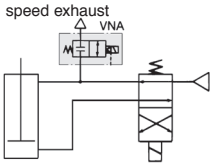
Actuator stop valve
Emergency stop, intermediate stop, inching



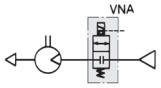
Actuator skip valve
Terminal deceleration, intermediate deceleration, accelerative start



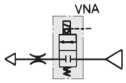
Actuator exhaust valve
High speed operation, high-speed exhaust



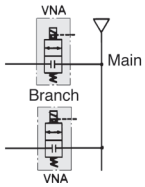
Air motor driving valve



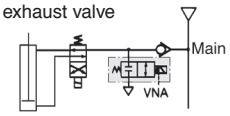
Air blow valve



Line stop valve

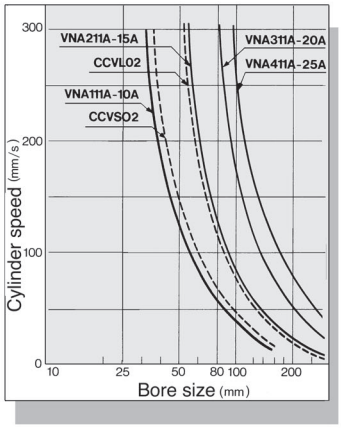


Residual line pressure exhaust valve



Air-hydro

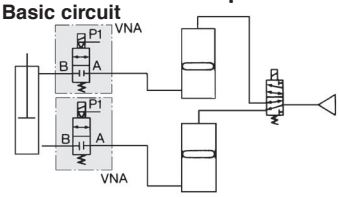
Operation capacity when used in air-hydro units

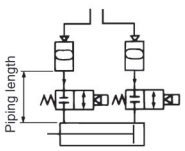


This series can supplement the capacity of conventional air-hydro valve units. They are suited to operate large bore cylinders as well as to simultaneously operate mutliple cylinders and suspend their operation. Thus they can be used in the same as the convetional air-hydro units.

Air-hydro circuit: Application example

Basic circuit





Condition

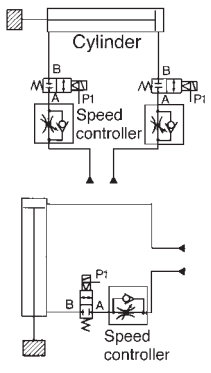
Supply Pressure	0.49MPa	
Hydraulic fluid	ISO VG32	
Load	No load	
Piping length	1m	
Piping dia.	VNA111A CCVSO2	3/8B(9 mm)
	VNA111A CCVSO2	1/ 2B(13 mm)
	VNA311A	3/4B(19 mm)
	VNA411A	1B(25 mm)

Refer to Best Pneumatics 2 for further information on air-hydro.

⚠ Caution

When speed controller is mounted

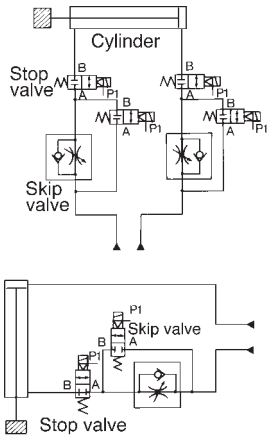
Connect a speed controller (Series AS etc.) to A port (cast in body A)of VNA*11 (in order to protect the speed control valve from surges when cylinder operation is suspended, thus improving stopping accuracy)



⚠ Caution

Skip valve function

Combination of 2 or more valves of Series VNA provides a skip valve function. Connect the skip valve to the A port side of a stop valve as in the case of the speed control valve.



How to Order

Seal material

A	NBR seal
B	FKM seal
C	EPR seal

Refer to Table ① for application.

Thread

—	Rc
F	G
N	NPT
T	NPTF

Bracket

—	Without bracket
B	With bracket

Only valve size 1, 2, 3, 4.

Air operated VNA 2 0 1 A F 15A □

External pilot solenoid VNA 2 1 1 A F 15A 1 D □ □ Q

Manual override
Non-locking push style

Valve size

Valve style

Port size

Symbol	Orifice size (mm)	Symbol 1 N.C.	Symbol 2 N.O.	Symbol 3 Note) C.O.	Symbol	Port size RC(PT)
1	ø10	●	●	●	**6A**	1/8
		●	●	●	**8A**	1/4
		●	●	●	**10A**	3/8
2	ø15	●	●	●	**10A**	3/8
		●	●	●	**15A**	1/2
3	ø20	●	●	●	**20A**	3/4
4	ø25	●	●	●	**25A**	1
5	ø32	●	●	●	**32A**	1 1/4
6	ø40	●	●	●	**40A**	1 1/2
7	ø50	●	●	●	**50A**	2

Note) Only air operated type.

Electrical entry/Indicator light and surge voltage suppressor

D	DIN connector
DL	DIN connector with indicator light and surge suppressor

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
9	Less than 250 VAC and 50 VDC

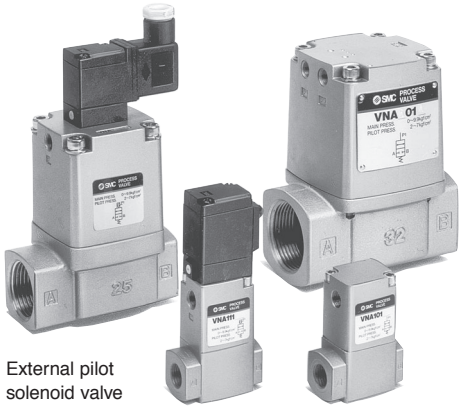
Order Made Contact SMC for other voltages (9)

Protective class
class I (Mark: ⏚)..... DIN terminal type

Table ① Applicable fluids

Model	**VNA□□□A** (Valve material: NBR seal)	**VNA□□□B** (Valve material: FPM seal)	**VNA□□□C** (Valve material: EPR seal)
Applicable fluids	Air(standard dry) CO_2 (0.7 MPa Max.) Nitrogen gas(N2) Freon 11, 113, 114, Turbine oil(40 to 100 cst), Hydraulic fluid	Argon, Helium, Turbine oil, Hydraulic fluid (99C)	CO_2 (0.7 MPa max.)

⚠ Caution Contact SMC on other fluids, operating conditions, etc.



External pilot solenoid valve

Air operated valve

Model

Model	Port Size Rc(PT)	Orifice size ø (mm)	Flow rate		Weight (kg)	
			Nℓ/min	Effective area (mm^2)	Air operated	Solenoid
VNA1□□□-6A	1/8	10	687.05	13	0.1	0.2
VNA1□□□-8A	1/4		1275.95	23		
VNA1□□□-10A	3/8		1963.00	35		
VNA2□□□-10A	3/8	15	3729.70	70	0.3	0.4
VNA2□□□-15A	1/2		4907.50	90		
VNA3□□□-20A	3/4	20	7852.00	140	0.5	0.6
VNA4□□□-25A	1	25	11778.00	220	0.8	0.9
VNA5□□□-32A	1 1/4	32	17667.00	320	1.3	1.4
VNA6□□□-40A	1 1/2	40	27482.00	500	2.1	2.2
VNA7□□□-50A	2	50	42204.00	770	3.1	3.2

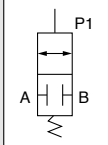
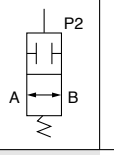
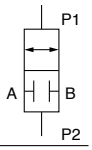
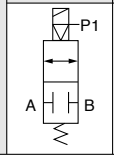
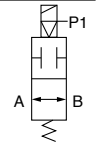
Valve Specifications

Fluid		Refer to table ① on page 4.2-4.
Fluid temperature	VNA□□□A	–5 to 60°C (1)
	VNA□□□B/□□□C	–5 to 99°C (1) (Only air operated)
Ambient temperature		–5 to 50°C (Air operated: 60°C) (1)
Proof pressure		1.5MPa
Operating pressure range		0 to1MPa
External pilot air	Pressure range	0.2 to 0.7MPa
	Lubrication	Not required (Use turbine oil No.1 (ISO VG32) if lubricated) (2)
	Temperature	–5°C to 50°C(Air operated: 60°C)

Note 1) No freezing

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

Symbol

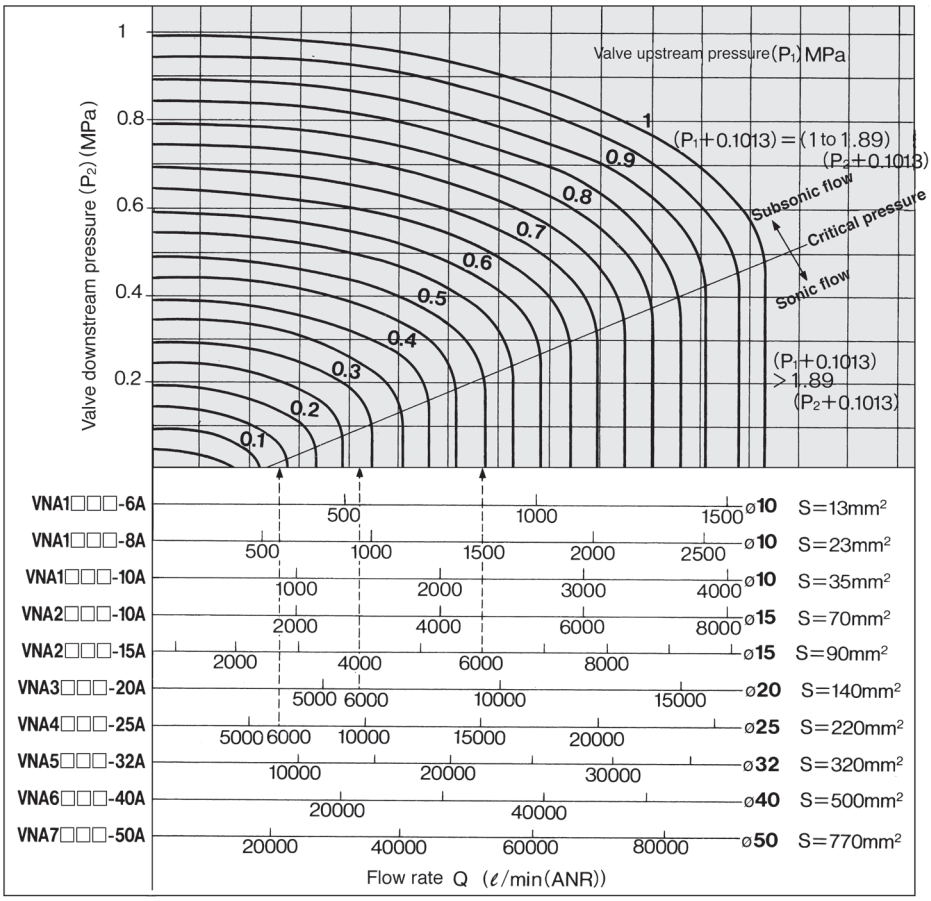
Style \ Valve	N.C. Normally closed	N.O. Normally open	C.O. Double acting
Air operated	**VNA□01** 	**VNA□02** 	**VNA□03** 
External pilot solenoid	**VNA□11** 	**VNA□12** 	

Pilot Solenoid Valve Specifications

Port size			6A to 25A	32A to 50A
Pilot solenoid valve			**SF4-□□□-23**	**VO301-00 □□□**
Electrical entry			DIN connector	DIN connector
Coil rated voltage(V)	AC(50/60Hz)		100V, 200V	Others(Option)
	DC		24V, Others(Option)	
Allowable voltage			–15% to +10%(rated voltage)	
Coil insulation			Class B or equivalent (130°C)	
Temperature rise			≤35°C (Application of rated voltage)	≤70°C (Application of rated voltage)
Apparent power	AC	Inrush	5.6VA(50Hz), 5.0VA(60Hz)	12VA(50Hz), –10.5VA(60Hz)
		Holding	3.4VA(50Hz), 2.3VA(60Hz)	7.5VA(50Hz), 6VA(60Hz)
Power consumption	DC		1.8W	4.8W
Manual override			Non-locking push style Others (Option)	Non-locking push style

Flow Characteristics

Air



How to Read The Graph

In the sonic flow region: For a flow of 6000 (ℓ/min)
VNA4mmm(Orifice ø25)....P1 ≅ 0.14MPa
VNA4mmm(Orifice ø20)....P1 ≅ 0.28MPa
VNA4mmm(Orifice ø15)....P1 ≅ 0.5MPa

How to Calculate Flow

<Air and other gases>

①Equation in the domain of subsonic flow

• Calculation by Cv factor

$$Q=4080 \cdot Cv \cdot \sqrt{\frac{\Delta P(P_2+0.1013)}{G}} \cdot \sqrt{\frac{273}{273+\theta}}$$

..... ℓ/min (ANR)

• Calculation by effective area

$$Q=226 \cdot S \cdot \sqrt{\frac{\Delta P(P_2+0.1013)}{G}} \cdot \sqrt{\frac{273}{273+\theta}}$$

..... ℓ/min (ANR)

②Equation in the domain of sonic flow

• Calculation by Cv factor

$$Q=2040 \cdot Cv \cdot (P_1+0.1013) \frac{1}{\sqrt{G}} \cdot \sqrt{\frac{273}{273+\theta}}$$

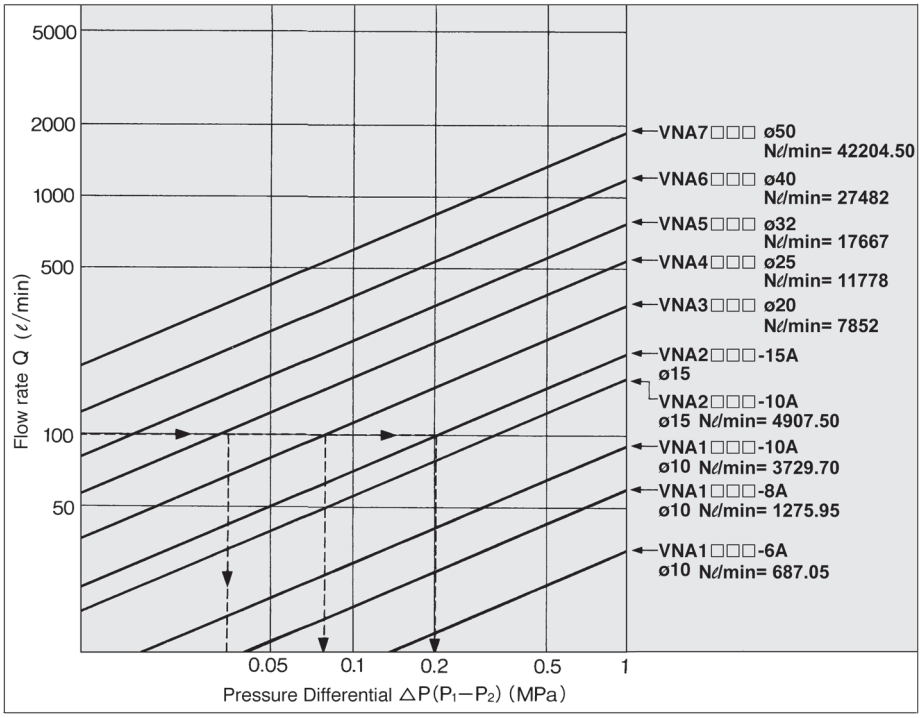
..... ℓ/min (ANR)

• Calculation by effective area

$$Q=113 \cdot S \cdot (P_1+0.1013) \frac{1}{\sqrt{G}} \cdot \sqrt{\frac{273}{273+\theta}}$$

..... ℓ/min (ANR)

Turbine oil (ISO VG32)



How to Read The Graph

In case of a flow of oil 100 ℓ/min:
VNA4□□□(Orifice ø24)....△P ≅ 0.035MPa
VNA4□□□(Orifice ø20)....△P ≅ 0.08MPa
VNA4□□□(Orifice ø15)....△P ≅ 0.2MPa

How to Calculate Flow

• Calculation by Cv factor

$$Q=14.2 \cdot Cv \cdot \sqrt{\frac{10.2\Delta P}{G}}$$ .....ℓ/min

• Calculation by effective area

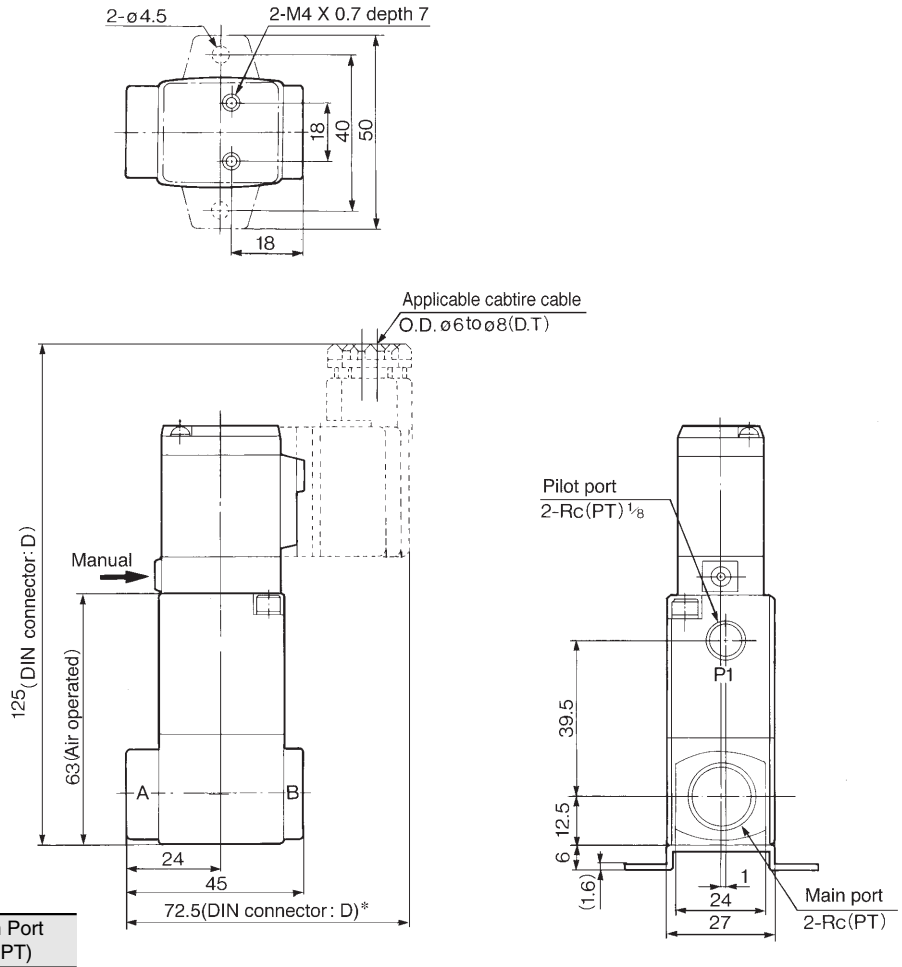
$$Q=0.8 \cdot S \cdot \sqrt{\frac{10.2\Delta P}{G}}$$ .....ℓ/min

Note) Calculation error of fluid with viscosity of 50 cSt or less will be very small.

Symbol

Q : Flow rate (Air and other gases ℓ/min (ANR))
(Water and other liquids ℓ/min)
△P: Pressure differential (P_1-P_2)
P_1 : Upstream pressure (MPa)
P_2 : Downstream pressure (MPa)
θ : Temperature of air and other gases (°C)
S : Effective area (mm²) S ≅ 17667. Nℓ/min
Cv : Cv factor (/)
G : Specific gravity (/) Air/Water=1

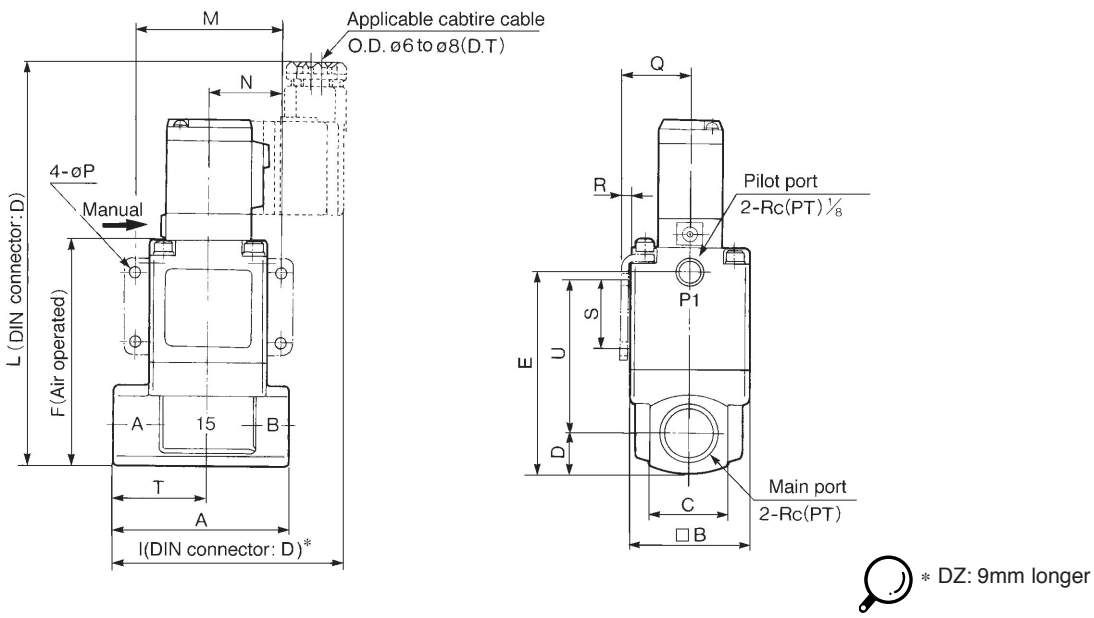
Port size 6A, 8A, 10A



Model	Main Port Rc(PT)
VNA1□□□-6A	1/8
VNA1□□□-8A	1/4
VNA1□□□-10A	3/8

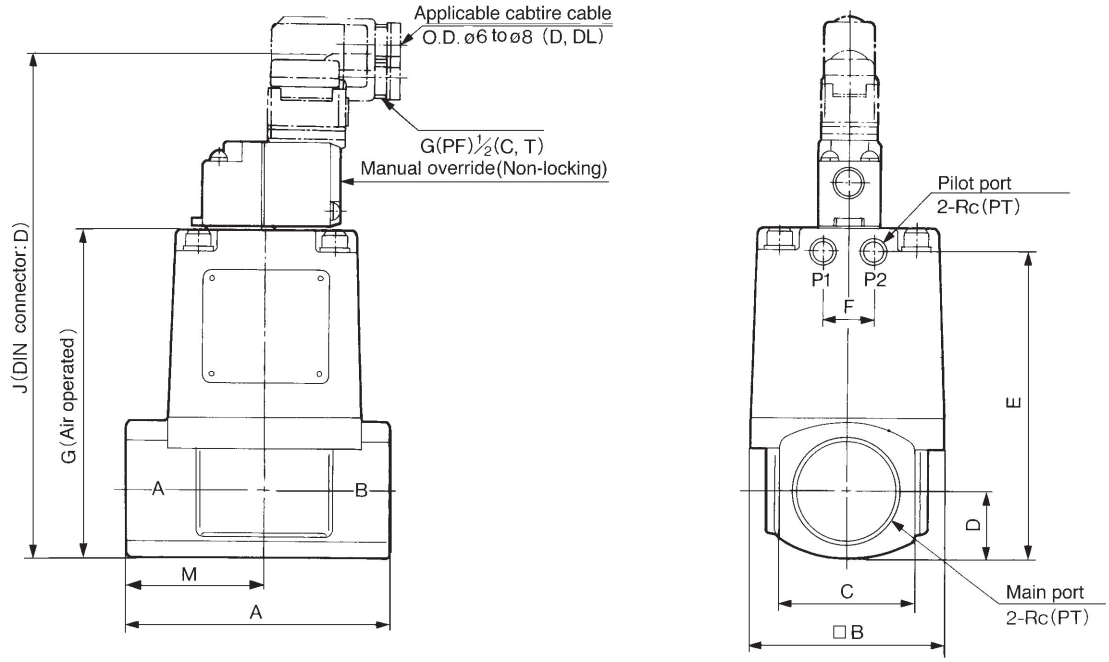
* DZ: 9mm longer

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



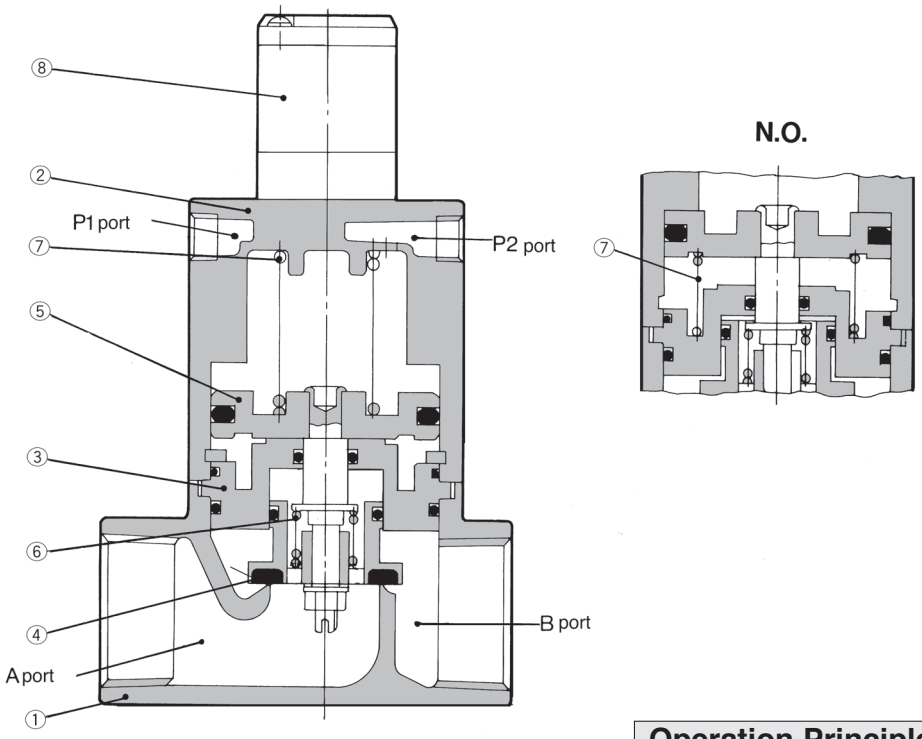
Model	Main Port Rc(PT)	A	B	C	D	E	F	I	L	M	N	P	Q	R	S	T	U
VNA2□□□-10A	3/8	63	42	28	14	72.5	80.5	82.5	142.5	52	26	4.5	24.3	2.3	25	34	55
VNA2□□□-15A	1/2																
VNA3□□□-20A	3/4	80	50	35	17.5	84	92	91.5	154	62	31	5.5	28.3	2.3	30	43	60.5
VNA4□□□-25A	1	90	60	40	20	100	108	97.5	170	72	36	6.5	33.3	2.3	35	49	73

Port size 32A, 40A, 50A



Model	Main Port Rc(PT)	Pilot port Rc(PT)	A	B	C	D	E	F	G	J	M
VNA5□□□-32A	1 1/4	1/8	105	77	53	26.5	120.5	20	129.5	219.5	55
VNA6□□□-40A	1 1/2	1/4	120	96	60	30	137	24	147	237	63
VNA7□□□-50A	2	1/4	140	113	74	37	160	24	170	260	74

Construction



Component Parts

Nº	Designación	Material	Nota
①	Cuerpo	Aleación de aluminio	Pintado en platino
②	Cubierta	Aleación de aluminio	Pintado de platino
③(1)	Conjunto placa	Aleación de aluminio	Material de la válvula:(NBR, FPM, EPR)
④(1)	Elemento válvula	Aleación de aluminio	Material de la válvula(NBR, FPM, EPR)
⑤	Pistón completo	Aleación de aluminio	—
⑥	Muelle	Acero inoxidable	—
⑦	Muelle de recorrido	Alambre de acero	—
⑧	Electroválvula de pilotaje	—	—

Nota 1) Piezas ③, ④ son para la selección de la composición de la válvula.

Operation Principles

VNA□01□, □11□ (N.C.)

When the pilot solenoid valve ⑧ is not energized (or when air is exhausted from the P1 port of the air operated style),the valve element ④ linked to the piston ⑤ is closed by the return spring ⑦.

●When valve element opens

When the pilot solenoid valve is energized (or when pressuried air enters through the P1 port of the air operated style), the pilot air that has entered under the piston moves it upward to open the valve element.

●When valve element opens

When the power to the pilot solenoid valve is turned off (or when air is exhausted from the P1 port of the air operated style), the pilot air under the piston is exhausted, and the return spring closes the valve element.

VNA□02□, □12□ (N.O.)

In contrast with the N.C., when the power to the pilot solenoid valve is turned off (or when air is exhausted from the P2 port of the air operated style), the valve is held open by the return spring. When the pilot solenoid valve is energized (or when pressurized air enters through the P2 port of the air operated style), the valve element closes.

VNA□03□ (C.O.)

The valve element of the C.O. type, which has no return spring, is in an arbitary position when air is exhausted through the P1 and P2 ports. When pressurized air enters the P1 port (exhaust from the P2 port), the valve element opens, and it closes when pressurized air enters the P2 port (exhaust from the P1 port).

Replacement Parts

No.	Description			Part No.						
				VNA1□□A -6A, 8A, 10A	VNA2□□□ -10A, 15A	VNA3□□□ -20A	VNA4□□□ -25A	VNA5□□□ -32A	VNA6□□□ -40A	VNA7□□□ -50A
③	Plate assembly	Valve material	NBR	VN1-A3AA	VN2-A3AA	VN3-A3AA	VN4-A3AA	VN5-A3AA	VN6-A3AA	VN7-A3AA
			FKM	VN1-A3AB	VN2-A3AB	VN3-A3AB	VN4-A3AB	VN5-A3AB	VN6-A3AB	VN7-A3AB
			EPR	VN1-A3AC	VN2-A3AC	VN3-A3AC	VN4-A3AC	VN5-A3AC	VN6-A3AC	VN7-A3AC
④	Valve disc (Valve disc a'ssy for 25A-50A)	Valve material	NBR	VN1-4AA	VN2-4AA	VN3-4AA	VN4-A4AA	VN5-A4AA	VN6-A4AA	VN7-A4AA
			FKM	VN1-4AB	VN2-4AB	VN3-4AB	VN4-A4AB	VN5-A4AB	VN6-A4AB	VN7-A4AB
			EPR	VN1-4AC	VN2-4AC	VN3-4AC	VN4-A4AC	VN5-A4AC	VN6-A4AC	VN7-A4AC
⑧	Pilot solenoid valve			SF4-□□□-23 (Refer to p.4.2-10 for details)				VO301-00□□□ (Refer to p.4.2-10 for details)		

How to Order Pilot Solenoid Valve

Valve size 1, 2, 3, 4

SF4 — 1 DZ — 23 — Q

Coil 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
- **9** — Less than 250 VAC and 50 VDC

Electrical entry/Indicator light and surge voltage suppressor.

D	DIN connector
DZ	DIN connector with indicator light and surge voltage suppressor

Manual override/classification
- **—** — Non-locking push style

Order Made Contact SMC for other voltages (9)

Protective class
class I (Mark: ⏚)..... DIN terminal type

Valve size 5, 6, 7

VO301-00 □ □ □ — Q

Coil 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
- **9*** — Other less than 250VAC and 50 VDC

* Option

Electrical entry
- **D** — DIN connector
- **DL*** — DIN connector with indicator light

* Option

Surge voltage suppressor
- **—** — None
- **S** — Surge voltage suppressor (Except for DL)

Note 1) When the electrical entry is D, the pilot solenoid valve parts are as follows:

VO301-00□D□-X302
- Indicator light and surge voltage suppressor
- Coil rated voltage

⚠ Precautions

External Pilot

⚠ Caution

Pilot port piping

Please arrange P_1 and P_2 piping as follows according to the model.

Port	VNA□01□	VNA□02□	VNA□03□	VNA□1$\frac{1}{2}$□
P1	External pilot	Bleed port	External pilot	Pilot exhaust
P2	Bleed port	External pilot	External pilot	Pilot exhaust

It is recommended to mount a silencer in the EXH port and the bleed port for noise reduction and dust entry prevention.

Piping

⚠ Caution

To use the piping with a high temperature fluid, use heat resistant fittings and tubes.
(Self-align fittings, tube copper pipe, etc.)

Use with Air-hydro Unit

⚠ Warning

1.Piping

When operation is suspended, surge pressure will be generated between the cylinder and VNA□11A. To directly thread in the cylinder, use durable fittings (SUS square nipples etc,) instead of ductile iron fittings (JIS B 2301) or steel pipe fittings (JIS B 2302).
When VNA□11A is to be installed away from the cylinder, use a high-pressure rubber hose (JIS B 6349) instead of steel pipe as much as possible.

⚠ Caution

1.Air bleeding

Valves of Series VNA have no air bleeding port. Bleed air from the middle piping. Bleeding by a vaccum pump is more effective.

2.Hydraulic fluid

Turbine oil, Grade 1, ISO VG32, with petroleum hydraulic fluid is recommended.

3.Speed control valve

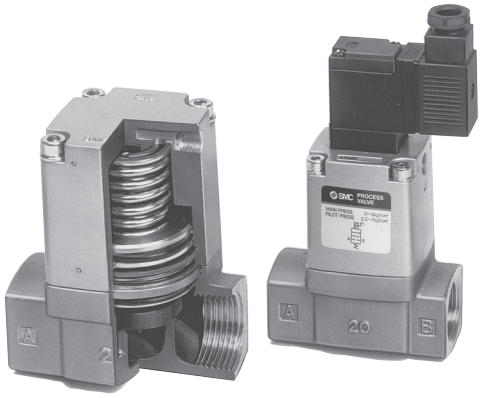
The combination shown in the following table is recommended to bring the best of Series VNA. (Piping: JIS K 6349 high pressure hose)

Combination of Series VNA and flow control valve (Series AS)

	VNA	AS	Piping (I.D.)
10A	111	420-03	$\frac{3}{8}$ B(ø9.5)
15A	211	420-04	$\frac{1}{2}$ B(ø12.7)
20A	311	500-06	$\frac{3}{4}$ B(ø19.1)
25A	411	600-10	1B(ø25.4)
32A	511	800-12	1$\frac{1}{4}$ B(ø31.8)
40A	611	900-14	1$\frac{1}{2}$ B(ø38.1)
50A	711	900-20	2B(ø50.8)

2 Port Valve for Flow Control Process Valve

Series VNB



Air operated　　External pilot solenoid

Extensive applicable fluids

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

The cylinder operated by external pilot air

Many variations

The N.C, N.O, and C.O. types are available.

Selection procedures

1 Fluid

- Refer to Table ① to check that the desired fluid is applicable.
- Select the body and sealing materials that best suit the fluid to be used.

2 Flow characteristics (Air and water)

- To find the flow rate of air or water, refer to the table of flow rate charactertics on page 4.2-14. 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.

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.1MPa (normally closed) types. Select the proper one according to the operating conditions.

4 Supply voltage and electrical entry (External pilot solenoid)

- Select AC or DC power supply, and select the proper method of electrical entry according to Table ③.

Table ① Applicable fluid check list

Body material	Copper alloy: Standard			Aluminium: L			Stainless steel: S		
Seal material	NBR : A	FKM : B	EPR : C	NBR : A	FKM : B	EPR : C	NBR : A	FKM : B	EPR : C
Fluid									
Air (Standard, Dry)	●	●		●	●		●	●	
Low vacuum (1 Torr)	●	●		●	●		●	●	
Carbon dioxide (CO_2, 0.7MPa or less)	●			●			●		
Carbon dioxide (CO_2, 0.7 to 1MPa)		●				●			●
Nitrogen gas (N_2)	●	●	●	●	●	●	●	●	●
Argon	●	●		●	●		●	●	
Helium		●			●			●	
Water (Standard, up to 60°C)	●						●		
Water (up to 99°C only air operated)		●	●					●	●
Turbine oil	●	●		●	●		●	●	
Spindle oil		●			●			●	
Fuel oil class 3		●			●			●	
Silicone oil		●						●	
Naphtha		●						●	
Ethylene glycol (bis 80°C)			●						●
Boiler water							●		●

⚠ Caution

When fluid permits application of multiple body and sealing material, select the best ones according to the ambient environment (FKM or EPR seal material for high temperature) and other conditions (corrosion resistance and viscosity). Contact SMC on other fluids, operating conditions, etc..

Table ② Valve size, port size combinations

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

Table ③ Combination of electrical entry and light/surge voltage suppressor

Valve size	Electrical entry	Indicator light and surge suppressor	Manual override
	D	Z	
1, 2, 3, 4	●	●	●
5, 6, 7	●	●	

How to Order

Body material option

—	Standard
S	Stainless steel body
L	Aluminum body

Pilot system option

—	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.

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

—	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)

Seal material

A	NBR seals
B	FKM seals
C	EPR seals

Refer to Table (1) for availability.

Thread type

—	Rc
F	G
N	NPT
T	NPTF

Air operated EVNB 2 0 1 A □ □ – F 15A – □

External pilot solenoid EVNB 2 1 1 A □ □ – F 15A – 1 D □ – □ – Q

Valve size / **Valve type** / **Port size**

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

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

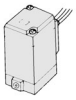
Rated voltage

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

Note 1) Semi-standard
Note 2) Contact SMC for other voltages

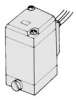
Manual override

—: Non-locking push type



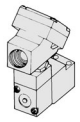
A: Non-locking push type A (projecting) Note)

B: Slotted locking type B (tool required) Note)



Valve size 1 to 4

—: Non-locking push type



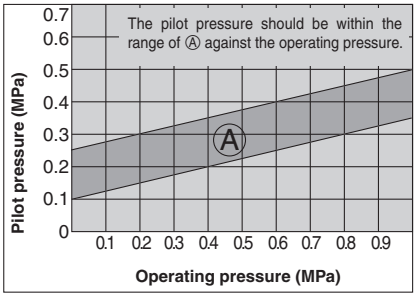
Valve size 5 to 7

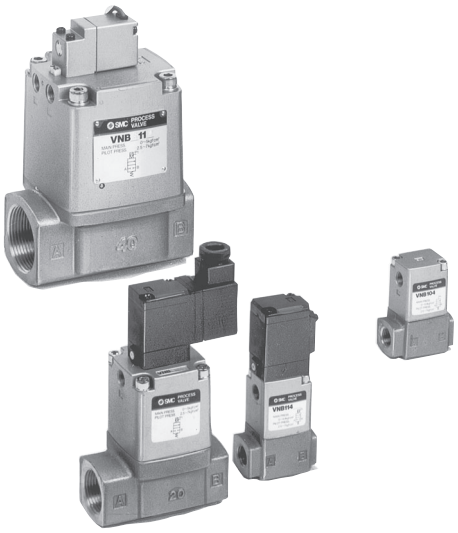
Note) Semi-standard

Electrical entry/With light/surge voltage suppressor

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

Graph (4) VNB□□ 2/3 □ Pilot Pressure (N.O. and C.O. types)

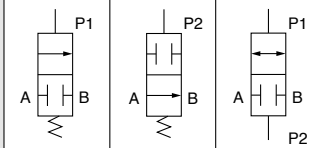
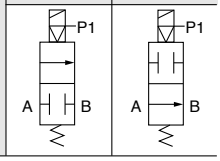




Model

Model	Port size	Orifice size ø (mm)	Flow rate		Weight (kg)	
			Nℓ/min	Effective area (mm²)	Air operated	External pilot solenoid
VNB1□□□-6A	1/8	7	687.05	13	0.3	0.4
VNB1□□□-8A	1/4		981.50	18		
VNB1□□□-10A	3/8		1275.95	23		
VNB2□4□-10A		11	2453.75	45	0.6	0.7
VNB2□□□-10A		15	3729.70	70		
VNB2□4□-15A	1/2	11	2944.50	55		
VNB2□□□-15A		15	4907.50	90		
VNB3□4□-20A	3/4	14	4907.50	90	0.9	1.0
VNB3□□□-20A		20	7852.00	140		
VNB4□4□-25A	1	16	6870.50	130	1.4	1.5
VNB4□□□-25A		25	11778.0	220		
VNB5□4□-32A	1 1/4	22	10796.50	210	2.5	2.6
VNB5□□□-32A		32	17667.0	320		
VNB6□4□-40A	1 1/2	28	18648.50	330	4.1	4.2
VNB6□□□-40A		40	27482.0	500		
VNB7□4□-50A	2	33	28463.50	520	6.3	6.4
VNB7□□□-50A		50	42204.50	770		

Symbol

Style \ Valve	N.C. Normally closed	N.O. Normally open	C.O. Double ading
	VNB□0$^{1}_{4}$	**VNB□02**	**VNB□03**
Air operated			
	VNB□1$^{1}_{4}$	**VNB□12**	
External pilot solenoid			

Option Specifications

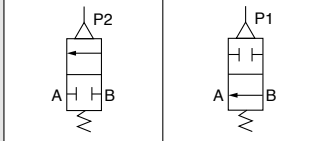
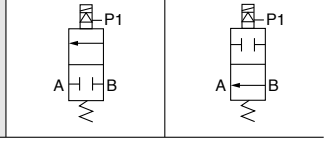
Vacuum pilot valve VNB□□□□V

(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.

Valve Specifications

Fluid	Vacuum
Pressure range	1 to 760 Torr
Pilot pressure range	1 to 400 Torr

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

Valve Specifications

Fluids			Water, Oil, Air, Vaccum, etc.
Fluid temperature	**VNB□□□A**		–5 to 60°C (1)
	VNB□□□ $^{B}_{C}$		–5 to 99°C (1) (Water, oil etc. Only air operated)
Ambient temperature			–5 to 50°C(Air operated type: 60°C) (1)
Proof pressure			1.5MPa
Applicable press. range	**VNB□□1□**		Low vacuum to 0.5MPa
	VNB□□$^{2}_{3}$□		Low vacuum to 1MPa
External pilot air	Press.	**VNB□□$^{1}_{4}$□**	0.25 to 0.7MPa
		VNB□□$^{2}_{3}$□	0.1 to 0.5MPa See Table 4 on page P.
	Lubrication		Not required (Use turbine oil No.1 (ISO VG32), if lubricated.) (2)
	Temperature		–5 to 50°C (Air operated: 60°C) (1)

Note 1) No freezing Note 2) Lubrication is not allowed in case of seal material EPR.

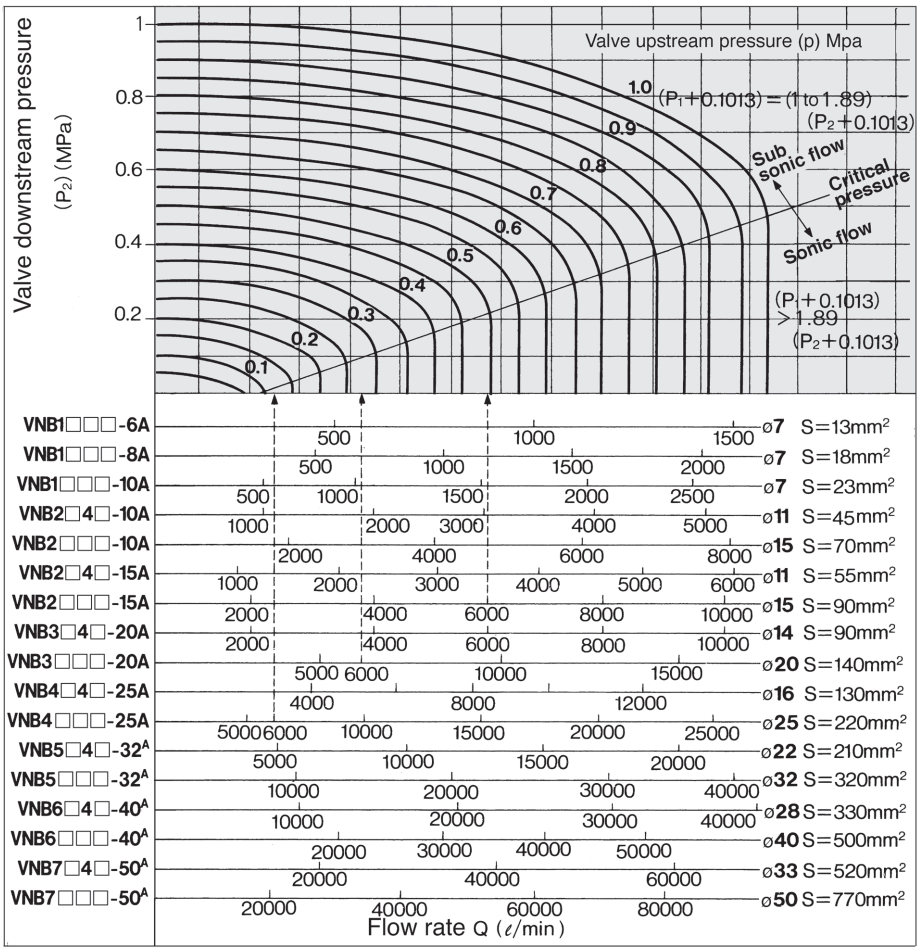
Pilot Solenoid Specifications

Port size			6A to 25A	32A to 50A
Pilot solenoid valve			**SF4-□□□-23-Q**	**VO307-□$^{D}_{DZ}$1-Q**
Electrical entry			DIN connector	DIN connector
Coil rated voltage	AC (50/60Hz)		100V, 200V, Others (Option)	
	DC		24V, Others (Option)	
Allowable voltage			–15% to +10%of rated voltage	
Coil insulation			Class B or equivalent (130°C)	
Temperature rise			≤35°C (Application of rated voltage)	≤50°C (Application of rated voltage)
Apparent power	AC	Inrush	5.6VA(50Hz), 5.0VA(60Hz)	12.7VA(50Hz), 10.7VA(60Hz)
		Holding	3.4VA(50Hz), 2.3VA(60Hz)	7.6VA(50Hz), 5.4VA(60Hz)
Power consumption	DC		1.8W	4W
Manual override			Non-locking push style Others (Option)	Non-locking push style

Note) Vacuum pilot type pilot solenoid valves will become VO307V-□$^{D}_{DZ}$1-Q.

Flow Characteristics

Air



How to Read The Graph

In the sonic flow region: For a flow of 6000 (ℓ/min)
VNB4□□□ (Orifice ø25).....P1 ≅ 0.14MPa
VNB4□□□ (Orifice ø20).....P1 ≅ 0.28MPa
VNB4□□□ (Orifice ø15).....P1 ≅ 0.5MPa

How to Calculate Flow

<Air and other gases>

①Equation in the domain of subsonic flow

- Calculation by Cv factor

$$Q=4080\cdot Cv\cdot\sqrt{\frac{\Delta P(P_2+0.1013)}{G}}\cdot\sqrt{\frac{273}{273+\theta}}$$

..... ℓ/min (ANR)

- Calculation by effective area

$$Q=226\cdot S\cdot\sqrt{\frac{\Delta P(P_2+0.1013)}{G}}\cdot\sqrt{\frac{273}{273+\theta}}$$

..... ℓ/min (ANR)

②Equation in the domain of sonic flow

- Calculation by Cv factor

$$Q=2040\cdot Cv\cdot(P_1+0.1013)\frac{1}{\sqrt{G}}\cdot\sqrt{\frac{273}{273+\theta}}$$

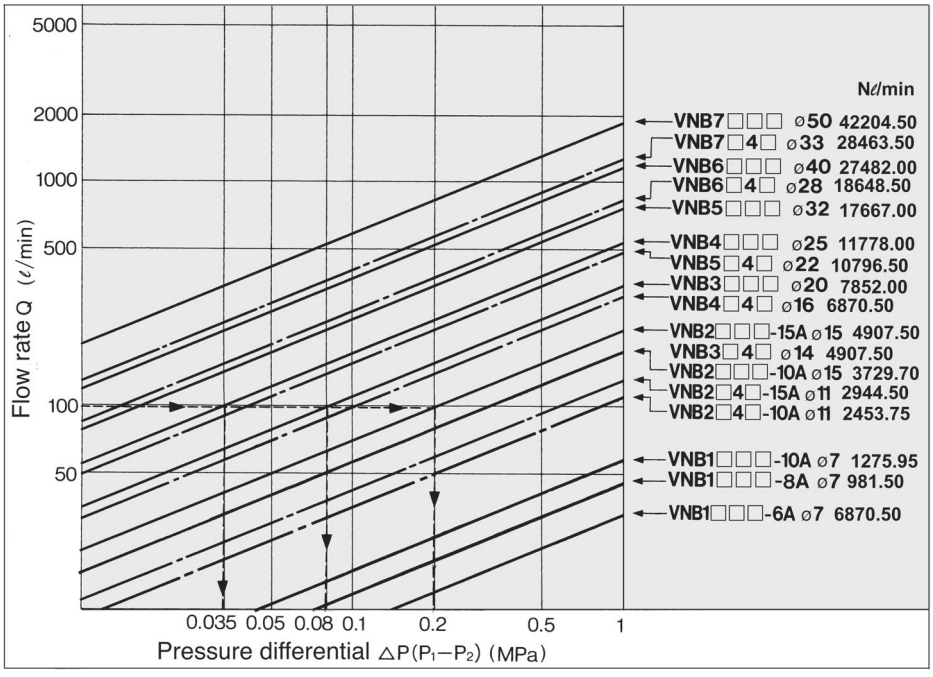
..... ℓ/min (ANR)

- Calculation by effective area

$$Q=113\cdot S\cdot(P_1+0.1013)\frac{1}{\sqrt{G}}\cdot\sqrt{\frac{273}{273+\theta}}$$

..... ℓ/min (ANR)

Water



How to Read The Graph

In case of a flow of 100 ℓ/min:
VNB4□□□ (Orifice ø25).....△P to 0.035MPa
VNB4□□□ (Orifice ø20).....△P to 0.08MPa
VNB4□□□ (Orifice ø15).....△P to 0.2MPa

How to Calculate Flow

- Calculation by Cv factor

$$Q=14.2\cdot Cv\cdot\sqrt{\frac{10.2\Delta P}{G}}$$ .....ℓ/min

- Calculation by effective area

$$Q=0.8\cdot S\cdot\sqrt{\frac{10.2\Delta P}{G}}$$ .....ℓ/min

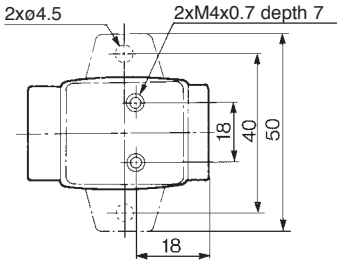
Note) Calculation error of fluid with viscosity of 50cSt or less will be very small.

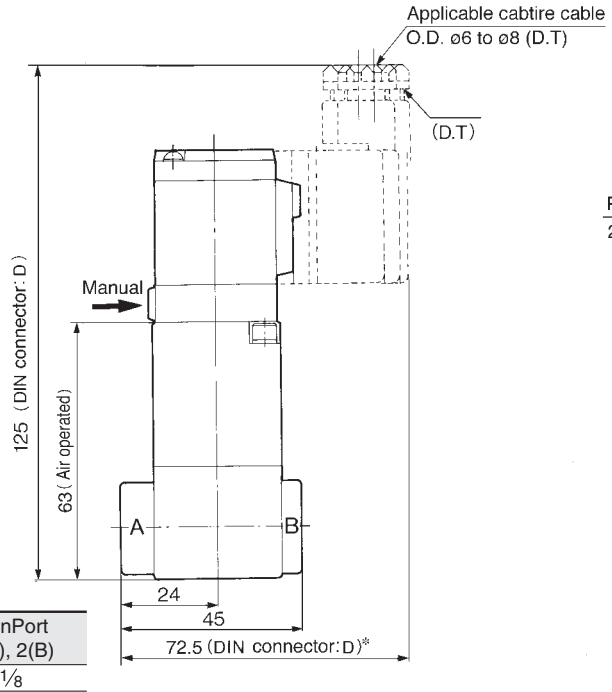
Symbol

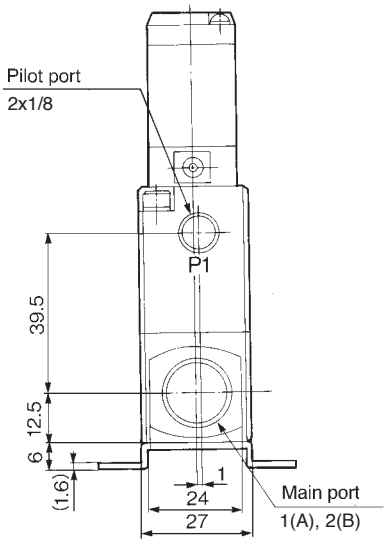
Q : Flow rate (Air and other gases ℓ/min(ANR))
(Water and other fluids ℓ/min)
△P: Pressure differential(P1−P2)
P1 : Upstream pressure (MPa)
P2 : Downstream pressure (MPa)
θ : Temperature of air and other gases (°C)
S : Effective area(mm²) S ≅ 17667. Nℓ/min
Cv : Cv factor (/)
G : Specific gravity (/) Air/Water=1

Port size 6A, 8A,10A

Standard







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

∗ DZ is 9 mm longer

⚠ Precautions

External Pilot

⚠ Caution

Pilot port piping

Please arrange P_1 and P_2 piping as follows according to the model.

Standard

Port	VNB□0 1/4 □	VNB□02□	VNB□03□	VNB□1 1/4 □
P1	External pilot	Bleed port	External pilot	External pilot
P2	Bleed port	External pilot	External pilot	Pilot exhaust

Vacuum pilot

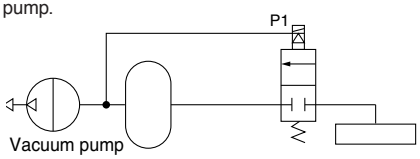
Port	VNB□01□V	VNB□02□V	VNB□1 1/2 □V
P1	Bleed port	External pilot	External pilot
P2	External pilot	Bleed port	Pilot exhaust

It is recommended to mount a silencer in the EXH port and the bleed port for noise reduction and dust entry prevention.

Vacuum Pilot

⚠ Caution

When using the VNB□¦1□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.



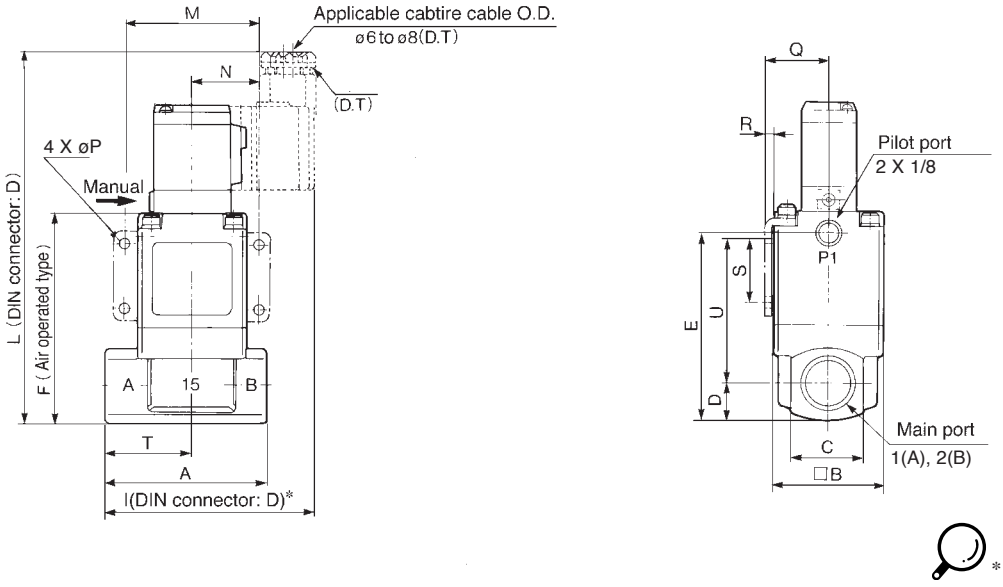
Piping

⚠ Caution

To use the piping with a high temperature fluid, use heat resistant fittings and tubes. (Self-align fittings, tube copper pipe, etc.)

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

Standard

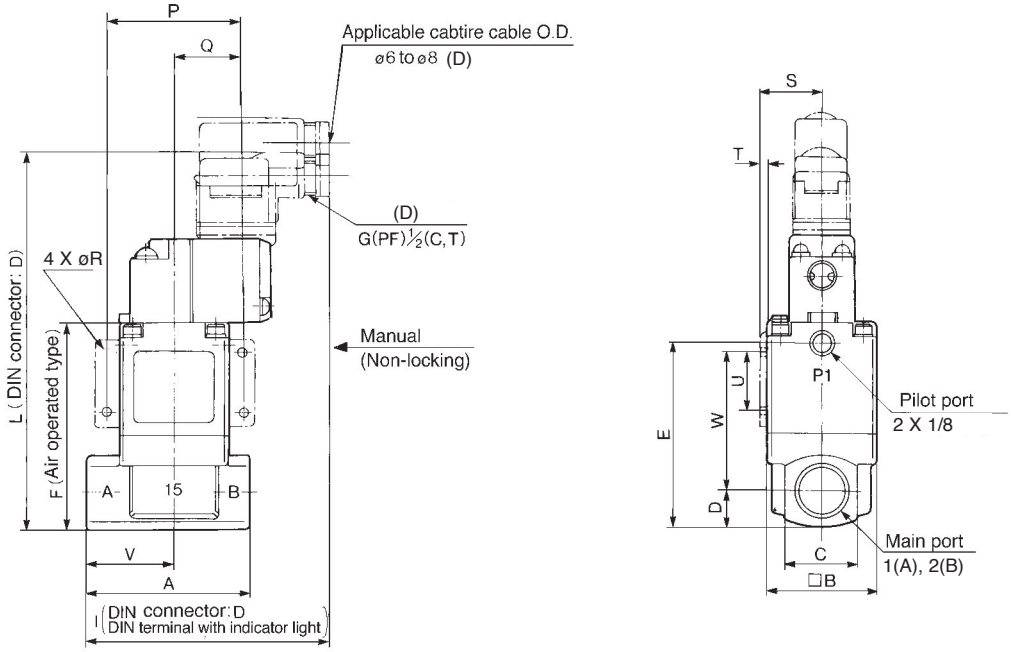


* DZ is 9 mm longer.

Model	Main port 1(A), 2(B)	A	B	C	D	E	F	I	L	M	N	P	Q	R	S	T	U
VNB2□□□-10A	3/8	63	42	28	14	72.5	80.5	82.5	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	91.5	154	62	31	5.5	28.3	2.3	30	43	60.5
VNB4□□□-25A	1	90	60	42	22	100	108	97.5	170	72	36	6.5	33.3	2.3	35	49	73

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

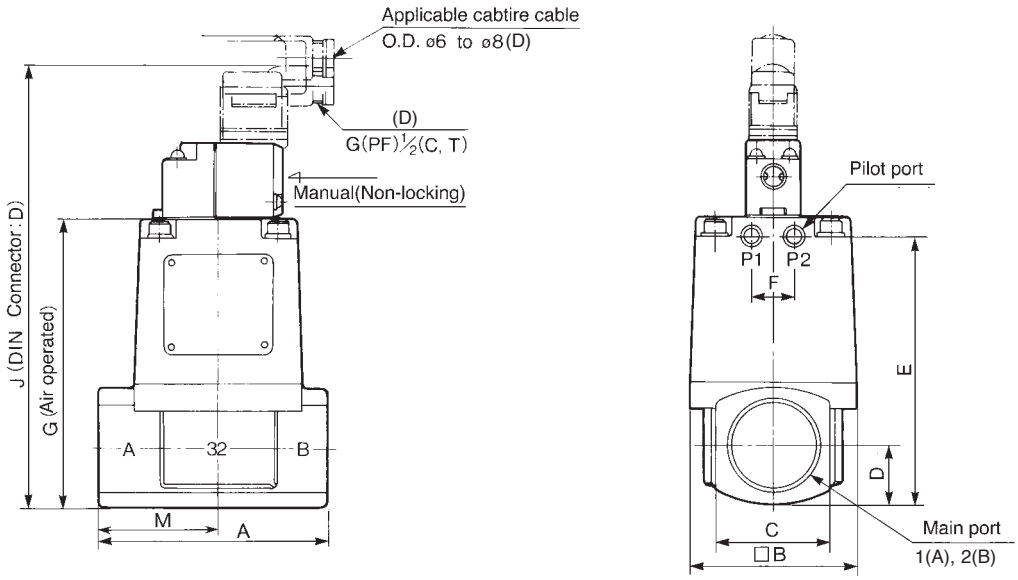
Vacuum pilot



Model	Main port 1(A), 2(B)	A	B	C	D	E	F	I	L	P	Q	R	S	T	U	V	W
VNB2□□□V-10A	3/8	63	42	28	14	72.5	80.5	97	170.5	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	102	182	62	31	5.5	28.3	2.3	30	43	60.5
VNB4□□□V-25A	1	90	60	42	22	100	108	103	198	72	36	6.5	33.3	2.3	35	49	73

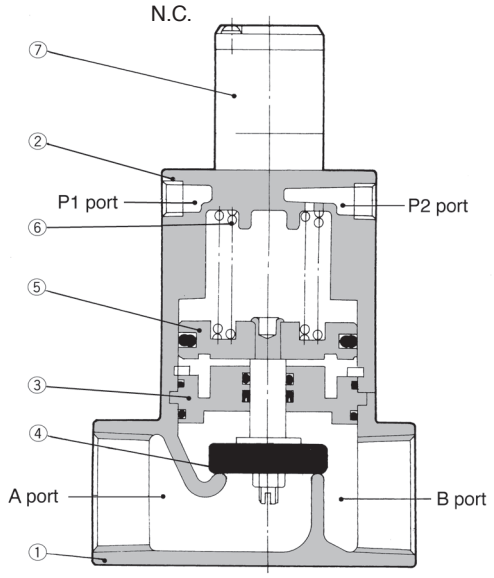
Port size 32A, 40A, 50A

Standard/Vacuum pilot



Model	Main port 1(A), 2(B)	Pilot port	A	B	C	D	E	F	G	J	M
VNB5□□□□-32A	1 1/4	1/8	105	77	53	26.5	120.5	20	129.5	219.5	55
VNB6□□□□-40A	1 1/2	1/4	120	96	60	30	137	24	147	237	63
VNB7□□□□-50A	2	1/4	140	113	74	37	160	24	170	260	74

Construction



Component Parts

No.	Description	Material	Note
①	Body	Bronze*	Clear coated
②	Cover assembly	Aluminium alloy	Platinum silver painted
③	Plate assembly	Brass*	Valve material (NBR, FKM, EPR)
④	Valve element	(NBR, FKM, EPR)	Stainless steel or brass
⑤	Piston assembly	Aluminium 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.

Principles of Operation (The vacuum pilot style is excluded)

VNB□0 1/4□, □1 1/4 1□ (N.C.)
When the pilot solenoid valve ⑦ is not energized (or when air is exhausted from the P_1 port of the air operated type), the valve element ④ linked to the piston ⑤ is closed by the return spring ⑥.

• When valve element opens
When the pilot solenoid valve is energized (or when pressurized air enters through the P_1 port of the air operated style), the pilot air that has entered under the piston moves upward to open the valve element.

• When valve element closes
When the power to the pilot solenoid valve is turned off (or when fluid is exhausted from the P_1 port of the air operated style), the pilot air under the piston is exhausted, and the return spring closes the valve element.

VNB□ 02□, □12□ (N.O.)
In contrast wth the N.C., when the power to the pilot solenoid valve is turned off (or when air is exhausted from the P_2 port of the air operated style), the valve is held open by the return spring. When the pilot solenoid valve is energized (or when pressurized air enters through the P_2 port of the air operated style), the valve element closes.

VNB □ 03□ (C.O.)
The valve element for the C.O. type, which has no return spring, is in an arbitary position when air is exhausted through the P_1 and P_2 ports. When pressurized air enters the P_1 port (exhaust from the P_2 port), the valve element opens, and it closes when pressurized air enters the P_2 port (exhaust from the P_1 port).

Replacement Parts

No.	Description			Part No.									
				VNB1□□□ -6A, 8A, 10A	VNB2□□□ -10A, 15A	VNB3□□□ -20A	VNB4□□□ -25A	VNB5□□□ -32A	VNB5□4□ -32A	VNB6□□□ -40A	VNB6□4□ -40A	VNB7□□□ -50A	VNB7□4□ -50A
③(1)	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
			FKM	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
④(1)	Valve element (2)	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
			FKM	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-Q				VO307-□ D/DZ 1-Q					

Note 1) In the casesy of body options "S" and "L", the materials of the parts Nos. ③ and ④ are as follows: (Example): VN1-A3B□A
└ L: Aluminium, S: Stainless steel
Note 2) 32A to 50A come in valve element assembly

However all brackets of valve element of VNB 1 to 4 are made of stainless steel. (No need to add options “S” and “L”.)

How to Order Pilot Solenoid Valve

Valve size 1, 2, 3, 4

SF4 — 1 | DZ | □ — 23 — Q

Coil 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
- **9*** — Other

* Option

Manual override

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

* Semi-standard

Electrical entry and indicator light and surge voltage suppressor

D	DIN connector
DZ	DIN connector with indicator light and surge suppressor

Order Made Contact SMC for other voltages (9)

Protective class
class I (Mark:⏚)..... DIN terminal type

Valve size 5, 6, 7 and vacuum pilot type

VO301 □ – 5 | D | 1 – Q

Body option

—	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 voltages, please consult with SMC

Electrical entry

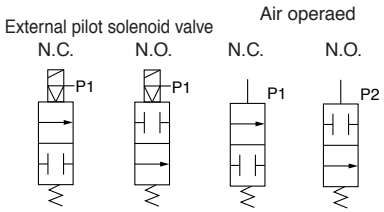
D	DIN terminal
DZ	DIN terminal with light/surge voltage suppressor

Accessory
Function plate for VO307: DXT152-14-1A

Air Operated Valve/External Pilot Solenoid Coolant Valve

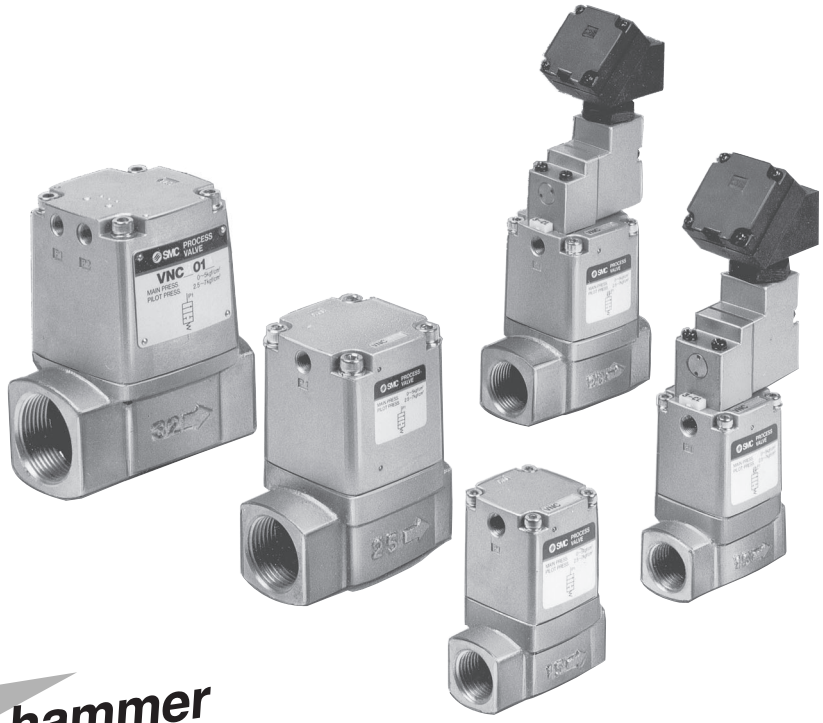
Series VNC

Cylinder operated by the external pilot



Wide selection of port sizes and variations

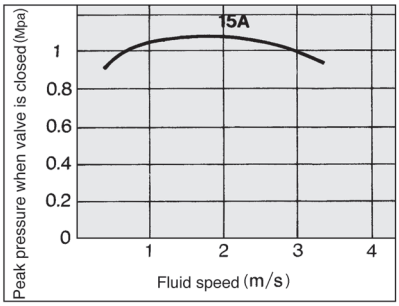
Thread (6A to 50A)



Low water hammer

Max.1.2MPa

In case of VNC211A(N.C. 0.5MPa)



Conditions:
Piping length/30m
Steel tube, full pressure/0.5MPa

Large flow capacity

Nℓ/min 687 to 42204

How to Order

Seal material

A	NBR seal
B	FKM seal

Thread

—	Rc
F	G
N	NPT
T	NPTF

Bracket

—	None
B	With bracket

Valve size: 1, 2, 3, 4.

Air operated

VNC [2] 0 [1] [A] – [F] [15A] – [ ] **(Except for valve size 8, 9)**

External pilot solenoid

VNC [2] 1 [1] [A] – [F] [15A] – [1] [D] [ ] – [ ] – Q

Manual override
Non-locking push style

Valve size

Symbol	Orifice size (mm)
1	ø7
2	ø15(ø11)
3	ø20(ø14)
4	ø25(ø16)
5	ø32(ø22)
6	ø40(ø28)
7	ø50(ø33)

Valve style

Symbol	1 N.C. 0.5MPa	2 N.O. 1MPa	4 N.C. 1MPa
1	—	●	●
	—	●	●
	—	●	●
2	●	●	●
	●	●	●
3	●	●	●
4	●	●	●
5	●	●	●
6	●	●	●
7	●	●	●

Port size

Symbol	Port size Rc(PT)
6A	1/8
8A	1/4
10A	3/8
10A	3/8
15A	1/2
20A	3/4
25A	1
32A	1 1/4
40A	1 1/2
50A	2

Rated voltage

—	Air operated
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
9	Less than 250 VAC and 50 VDC

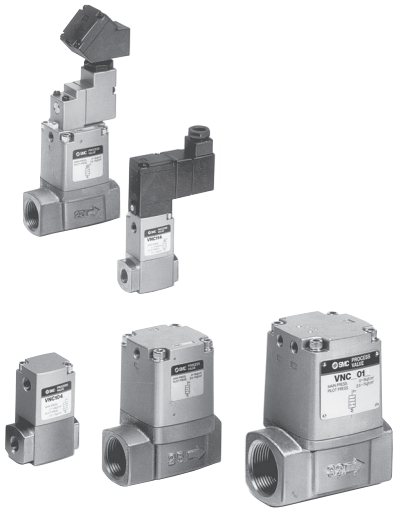
Electrical entry/Indicator light and surge voltage suppressor

D	DIN connector
DZ	DIN connector with indicator and surge suppressor

( ): In case of N.C.; 1MPa

Order Made Contact SMC for other voltages (9)

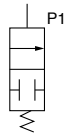
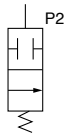
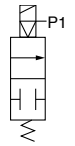
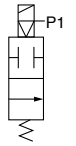
Protective class
class I (Mark:⏚)..... DIN terminal type



Model

Model	Port size		Orifice size ø (mm)	Flow rate		Weight (kg)	
	Rc(PT)	Flange(1)		Nℓ/min	Effe. area (mm²)	Air operated	External pilot solenoid
VNC1□□□-6A	1/8	—	7	687.05	13	0.2	0.3
VNC1□□□-8A	1/4	—		981.50	18		
VNC1□□□-10A	3/8	—		1275.95	23		
VNC2□4□-10A			11	2453.75	45	0.5	0.7
VNC2□□□-10A			15	3729.70	70		
VNC2□4□-15A	1/2	—	11	2944.50	55		
VNC2□□□-15A			15	4907.50	90		
VNC3□4□-20A	3/4	—	14	4907.50	90	0.8	1.0
VNC3□□□-20A			20	7852.00	140		
VNC4□4□-25A	1	—	16	6870.50	130	1.2	1.4
VNC4□□□-25A			25	11778.00	220		
VNC5□4□-32A	1 1/4	—	22	10796.50	210	2.2	2.4
VNC5□□□-32A			32	17667.00	320		
VNC6□4□-40A	1 1/2	—	28	18648.50	330	3.6	3.8
VNC6□□□-40A			40	27482.00	500		
VNC7□4□-50A	2	—	33	28463.50	520	5.5	5.7
VNC7□□□-50A			50	42204.50	770		

Symbol

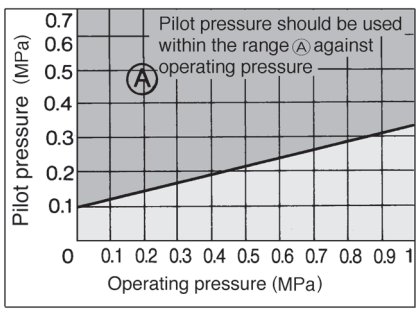
Operation \ Valve style	N.C.	N.O.
	VNC□0 1/4 □	**VNC□02□**
Air operated		
	VNC□0 1/4 □	**VNC□12□**
External pilot operated		

Valve Specifications

Applicable fluids		Coolant
Fluid temperature	**VNC□□□A**	–5 to 60°C
	VNC□□□B	–5 to 60°C (If over 60°C, consult SMC on air operated style)
Ambient temperature		–5 to 50°C(Air operated: 60°C)
Proof pressure		1.5MPa
Applicable pressure range	**VNC□□1□**	0 to 0.5MPa
	VNC□□ 2/4 □	0 to1MPa
External pilot air	Pressure **VNC□□ 1/4 □**	0.25 to 0.7MPa
	Pressure **VNC□□2□**	0.1 to 0.7MPa
	Lubrication	Refer to table 1: Not required (ISO VG32)
	Temperature	– 5 to 50°C (Air operated: 60°C)

∗ No freezing allowed

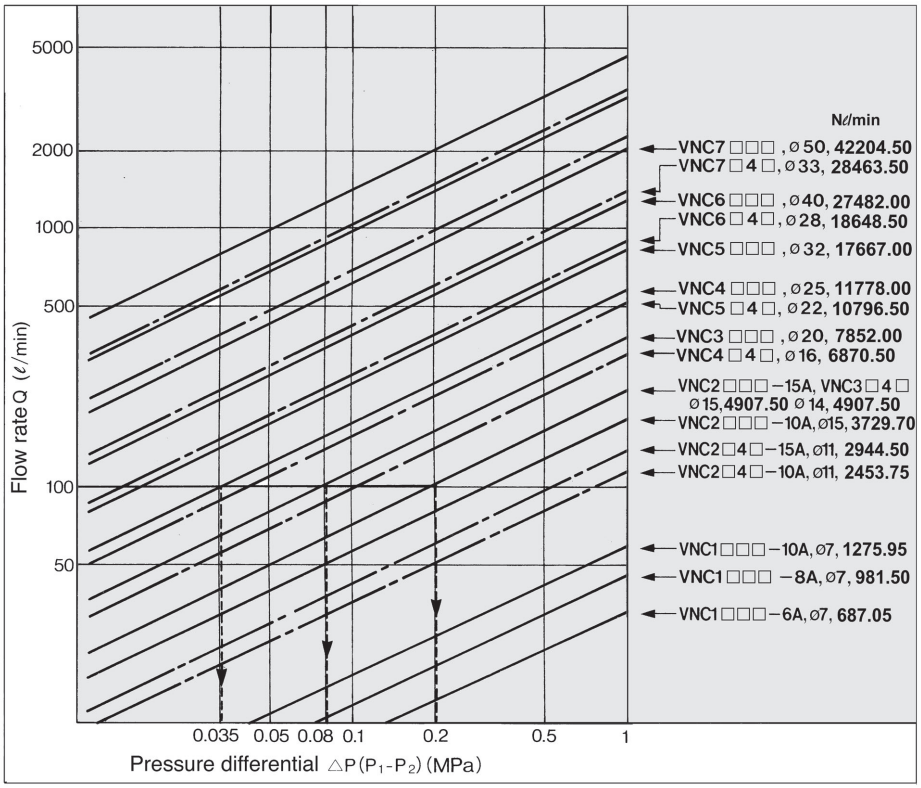
Table ① Operating pressure vs pilot pressure



Pilot Solenoid Valve Specifications

Model			**VNC1□□□**	**VNC2□□□to 9□□□**
Pilot solenoid valve			SF4-□□□-23	VO301-00□T□-X302
Electrical entry			DIN Connector	DIN Connector
Coil rated voltage	AC (50/60 Hz)		100V, 200V	others (Option)
	DC		24V, others (Option)	
Allowable voltage range			–15% to +10% of rated voltage	
Coil insulation			Class B or equivalent (130°C)	
Temperature rise			35°C or less	70°C or less
Apparent power	AC	In-rush	5.6VA (50Hz) 5.0VA (60Hz)	12VA (50Hz) 10.5VA (60Hz)
		Holding	3.4VA (50Hz) 2.3VA (60Hz)	7.5VA (50Hz) 6VA (60Hz)
Power consumption	DC		1.8W	4.8W
Manual override			Non-locking push style, Option	Non-locking push style

Flow Charactertistics



How to Read The Graph

Pressure differential when using a coolant (flow rate 100ℓ/min) VNC4□□□(Orifice size ø 25): ΔP ≅ 0.035MPa, VNC2□□□ (Orifice size ø 15): ΔP ≅ 0.2MPa

How to Calculate Flow

• Calculation by Cv factor

$$Q=14.2 \cdot Cv \cdot \sqrt{\frac{10.2\Delta P}{G}} \quad \ldots\ldots \ell/\text{min}$$

• Calculation by effective area

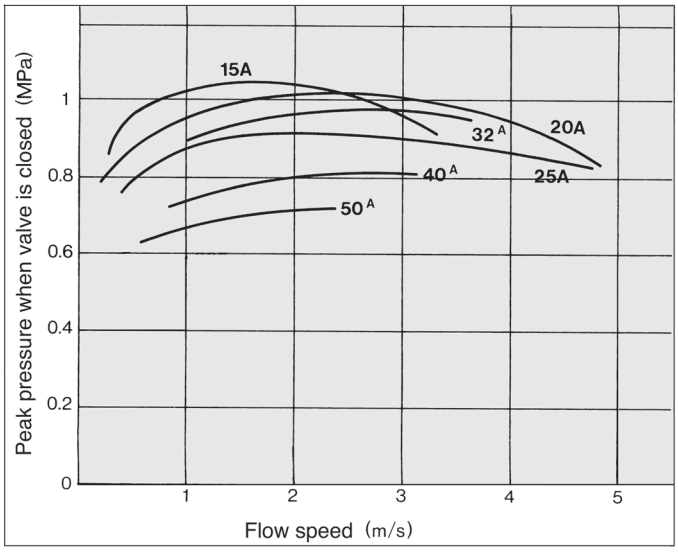
$$Q=0.8 \cdot S \cdot \sqrt{\frac{10.2\Delta P}{G}} \quad \ldots\ldots \ell/\text{min}$$

(Symbol)
Q: Flow rate (ℓ/min)
ΔP: Pressure differential(P1-P2)
P1: Primary pressure(MPa)
P1: Secondary pressure(MPa)
S: Effective area (mm^2)S ≅ 17667.00 Nℓ/min
Cv: Cv factor(/)
G: Specific gravity (/) Water =1

Water Hammer Characteristics

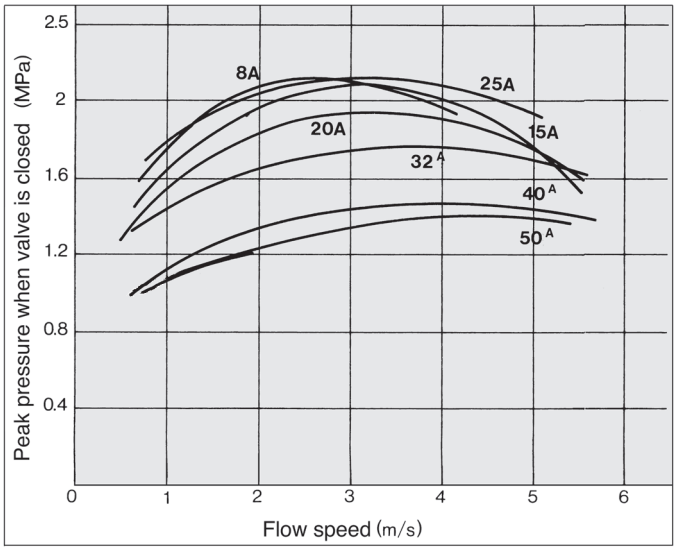
VNC□□1□(N.C. 0.49MPa)

Conditions: Piping length/30m
Steel tube, full pressure/0.49MPa



VNC□□4□(N.C. 0.97MPa)

Conditions: Piping length/30m
Steel tube, full pressure/0.97MPa

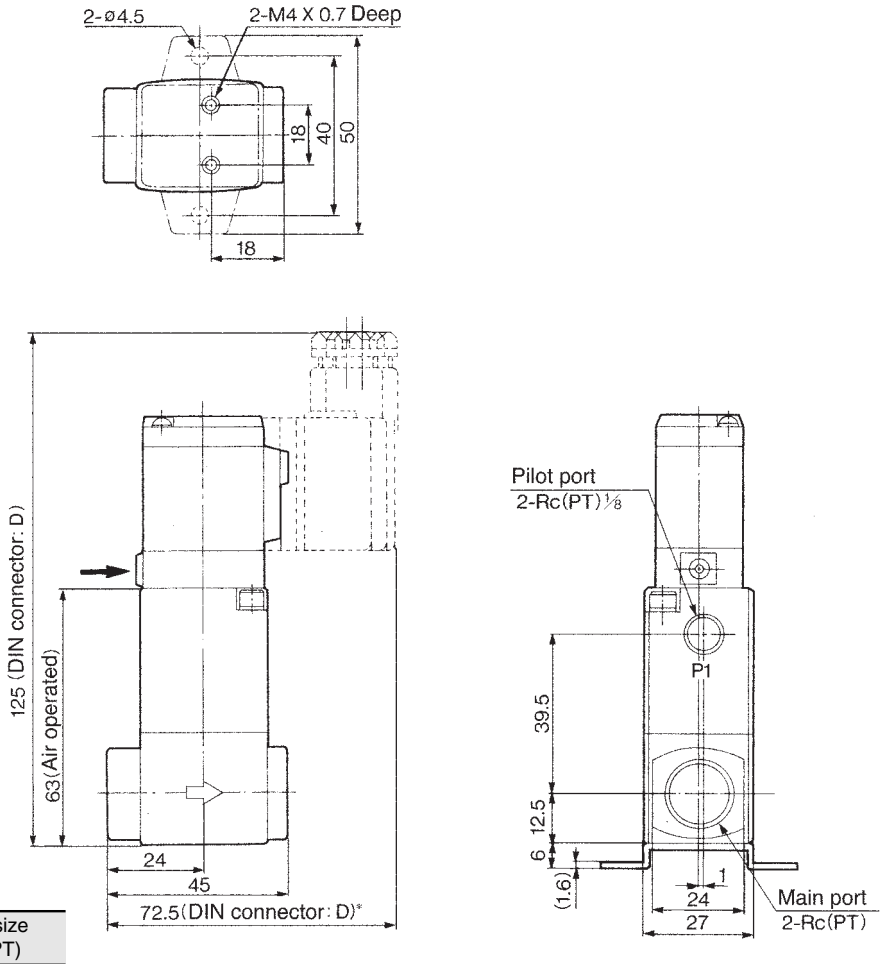


How to Calculate Flow Speed

$$v=212 \times Q/d^2$$

(Symbol)
v: Flow speed(m/s)
Q: Flow rate(ℓ/min)
d: Piping bore size(mm)

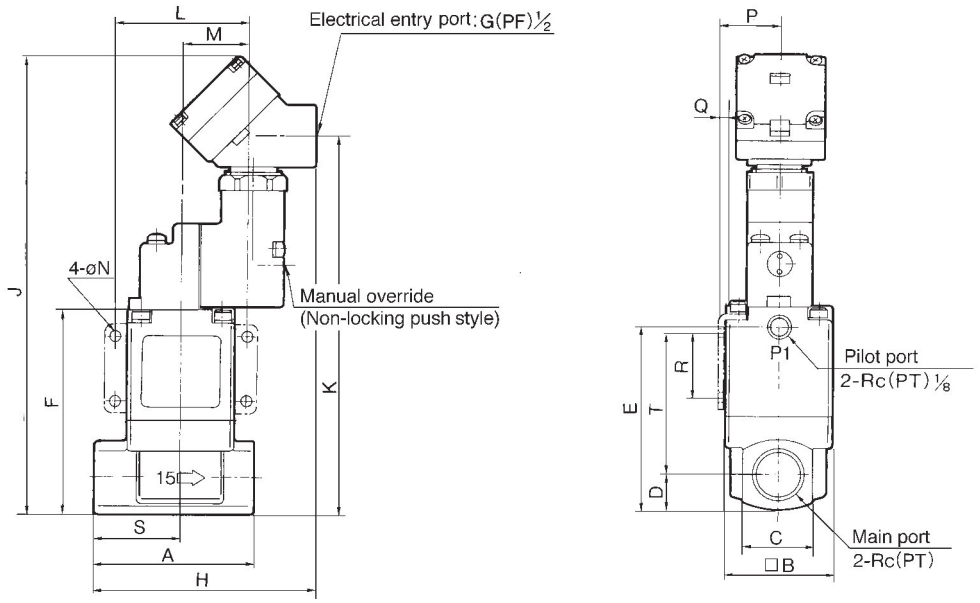
Thread connection Port size: 6A, 8A, 10A



Model	Port size Rc(PT)
VNC1□□□-6A	1/8
VNC1□□□-8A	1/4
VNC1□□□-10A	3/8

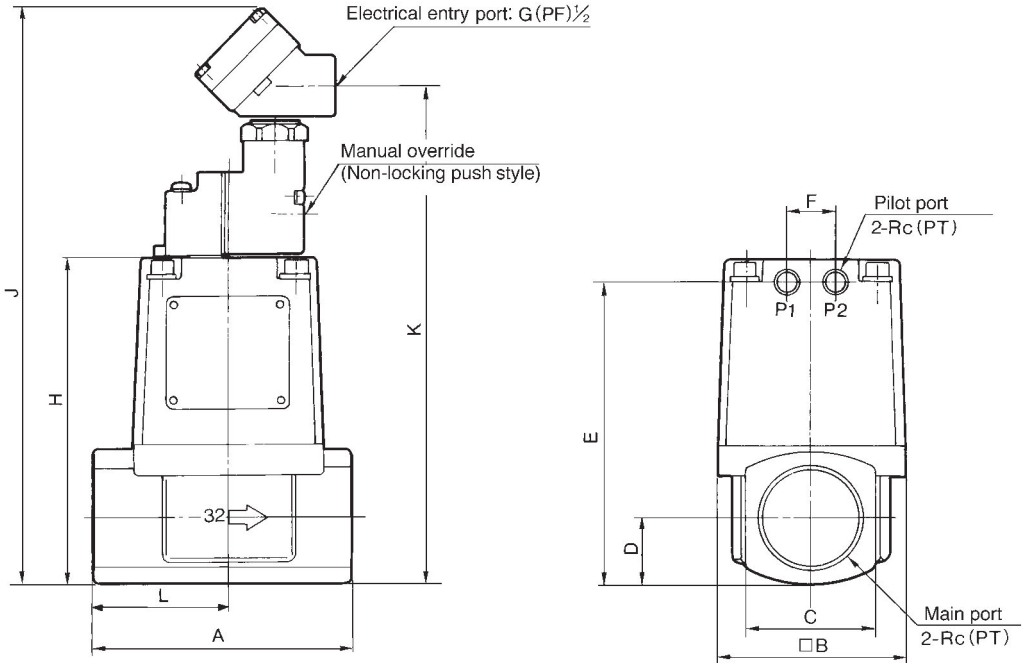
DZ: 9mm longer

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



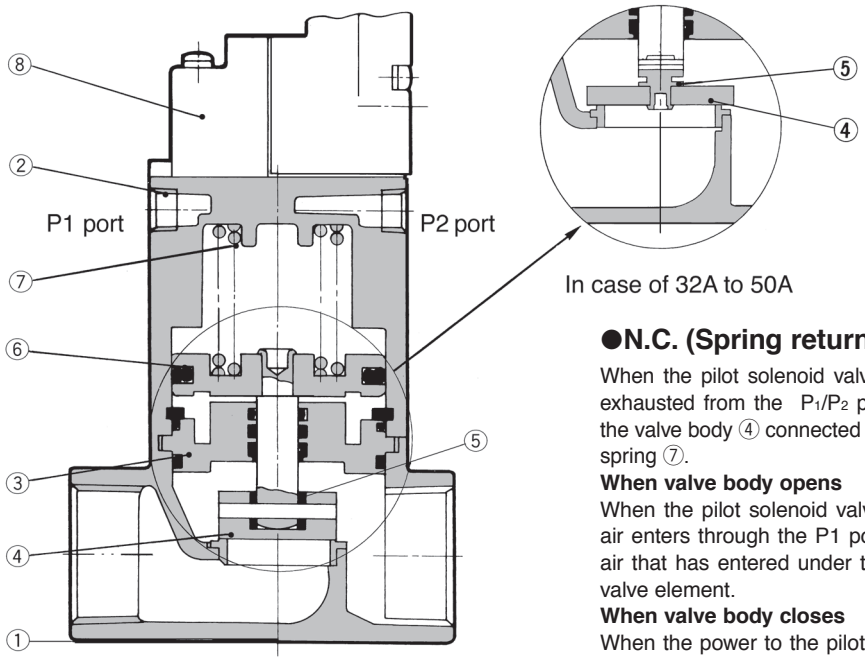
Model	MainPort Rc(PT)	A	B	C	D	E	F	H	J	K	L	M	N	P	Q	R	S	T
VNC2□□□-10A	3/8	63	42	28	14	72.5	80.5	87	180.5	148	52	26	4.5	24.3	2.3	25	34	55
VNC2□□□-15A	1/2	63	42	28	14	72.5	80.5	87	180.5	148	52	26	4.5	24.3	2.3	25	34	55
VNC3□□□-20A	3/4	80	50	35	17.5	84	92	92	192	159.5	62	31	5.5	28.3	2.3	30	43	60.5
VNC4□□□-25A	1	90	60	40	20	100	108	93	208	175.5	72	36	6.5	33.3	2.3	35	49	73

Thread connection Port size: 32A, 40A, 50A



Model	MainPort Rc(PT)	Pilot port Rc(PT)	A	B	C	D	E	F	H	J	K	L
VNC5□□□-32A	1 1/4	1/8	105	77	53	26.5	120.5	20	129.5	229.5	197	55
VNC6□□□-40A	1 1/2	1/4	120	96	60	30	137	24	147	247	214.5	63
VNC7□□□-50A	2	1/4	140	113	74	37	160	24	170	270	237.5	74

Construction



●N.C. (Spring return normally closed)

When the pilot solenoid valve ⑧ is not energized (or when air is exhausted from the P_1/P_2 port in case of the air operated style), the valve body ④ connected to the piston ⑥ is closed by the return spring ⑦.

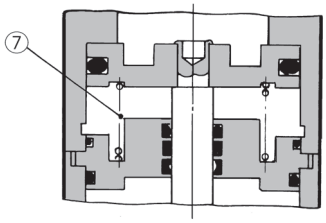
When valve body opens

When the pilot solenoid valve is energized (or when pressurized air enters through the P1 port of the air operated style), the pilot air that has entered under the piston moves upward to open the valve element.

When valve body closes

When the power to the pilot solenoid valve is turned off (or when fluid is exhausted from the P1 port of the air operated style), the pilot air under the piston is exhausted, and the return spring closes the valve element.

N.O.



●N.O. (Spring return normally open)

In contrast with the N.C., when the pilot solenoid valve is not energized (or when air is exhausted from the P2 port of the air operated style), the valve body is open by the return sping. When the pilot solenoid valve is energized (or when pressurized air enters thorough the P2 port of the air operated style), the valve body closes.

Component Parts

No.	Description	Material	Note
①	Body assembly	Bronze	Coated
②	Cover assembly	Aluminium alloy	Platinum silver painted
③	Plate assembly	Metal	Valve seal, NBR/FKM
④	Valve body	Stainless steel	
⑤	Valve cover	NBR/FKM	32A to 50A: O ring
⑥	Piston assembly	Aluminium alloy	
⑦	Return spring	Piano wire	
⑧	Pilot solenoid valve	—	

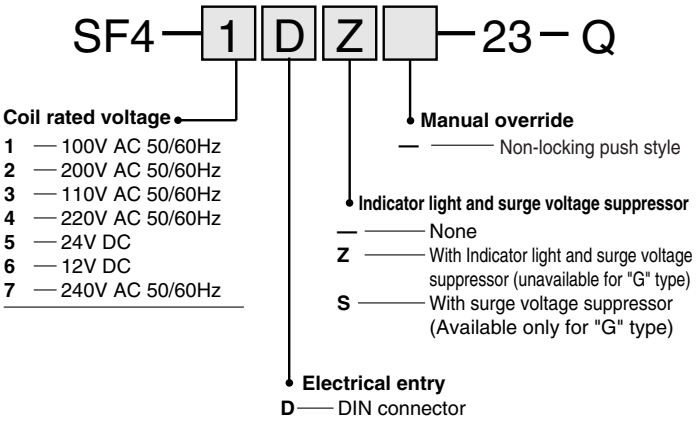
Note)If replacement parts for ③ or ⑤ are desired, rubber material should be designated per the table below.

Replacement Parts

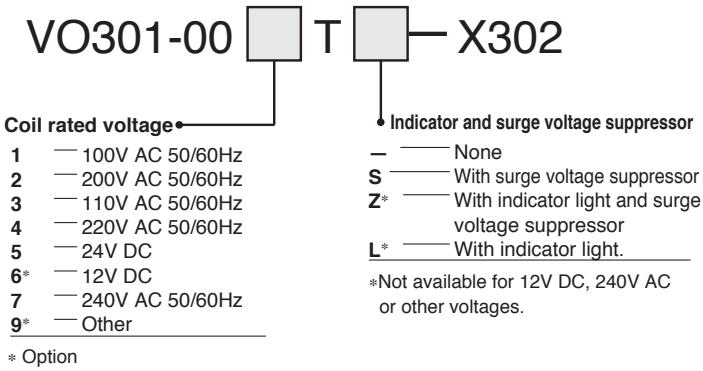
No.	Description			Part No.						
				VNC1□□□ -6A, 8A, 10A	**VNC2□□□ -10A, 15A**	**VNC3□□□ -20A**	**VNC4□□□ -25A**	**VNC5□□□ -32A**	**VNC6□□□ -40A**	**VNC7□□□ -50A**
③	Plate assembly	Valve seal	NBR	VN1-A3CA	VN2-A3CA	VN3-A3CA	VN4-A3CA	VN5-A3CA	VN6-A3CA	VN7-A3CA
			FKM	VN1-A3CB	VN2-A3CB	VN3-A3CB	VN4-A3CB	VN5-A3CB	VN6-A3CB	VN7-A3CB
⑤	Valve cover 32A to 50A: O ring	Valve seal	NBR	—	VN2-12CA		VN4-12CA	AS568-010	AS568-011	AS568-012
			FKM	—	VN2-12CB		VN4-12CB			
⑧	Pilot solenoid valve			SF4-□□□-23-Q	VO301-00□T□-X302 (Refer to How to Order on p.4.2-26)					

How to Order Pilot Solenoid Valve

Valve size 1



Valve size 2 to 7



* Option

⚠ Precautions

External Pilot

⚠ Caution

For piping to pilot port (P1, P2)

Piping should be according to the below.

Port	Air operated		Solenoid
	VNC□0 1/4 □	VNC□02□	VNC□1 1/2 4 □
P1	External pilot	Bleed port	External pilot
P2	Bleed port	External pilot	Pilot exhaust

Installing silencer to the exhaust port and bleed port is recommended for noise reduction and reducing dust.

Piping

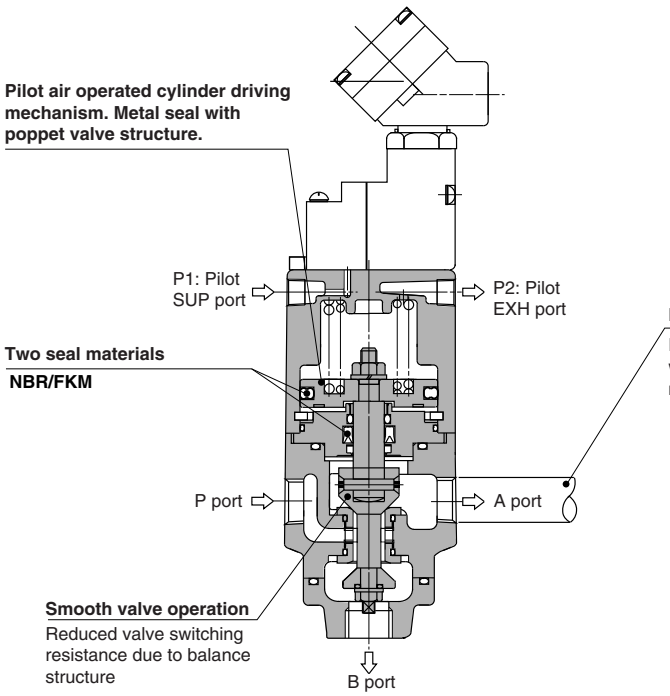
⚠ Caution

When high temperature fluid is used, use the fittings and tube with heat-resistant type. (Self-align fittings, copper tube, etc.)

3.5MPa, 7.0MPa
High Pressure Coolant Valve
Series VNH

Corresponding to high speed grinding and long drilling processes

Valve for high pressure coolant liquid (up to 3.5 MPa or 7.0 MPa) that is ideal for lubrication, dust blowing and cooling.



Series

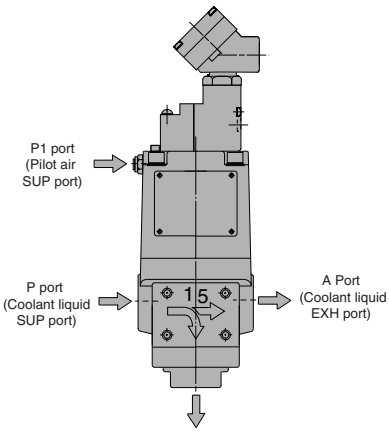
Operating fluid pressure	Port	Port size
3.5MPa	3 port	3/8(10A), 1/2(15A) 3/4(20A), 1(25A)
7.0MPa	2 port (Large flow)	3/8(10A), 1/2(15A) 3/4(20A), 1(25A)
	3 port	

Application examples

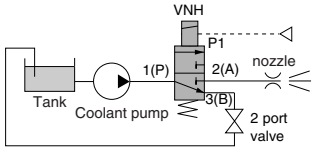
3 port valve (3.5MPa, 7.0MPa)

Piping

Primary side (supply side): P port
Secondary side (exhaust side):
A and B port
Supply pilot air higher than 0.25MPa to P1 port

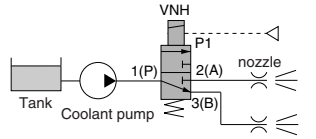


Ex1) 3 port valve: Reducing load to pump



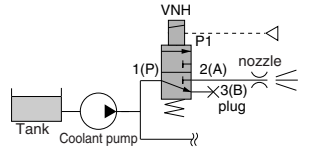
For reducing load to pump, coolant liquid is returned form B port to tank in each time.

Ex2) 3 port valve: Switching nozzle



Switching nozzles on supplying coolant liquid.

Ex3) 2 port valve: Nozzle ON/OFF

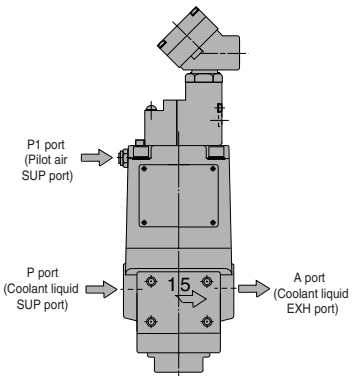


2 port valve application
(Not applicable for 7.0MPa model)

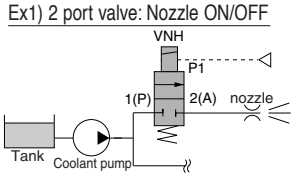
2 port valve (7.0MPa)

Piping

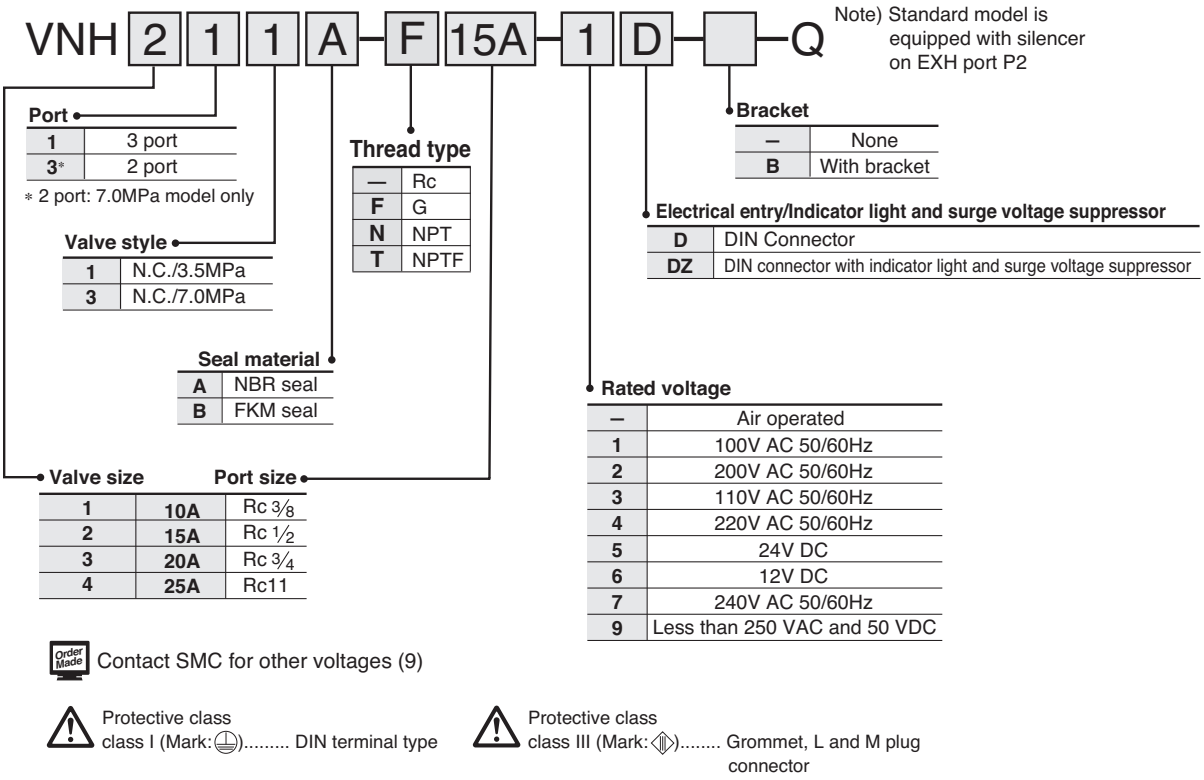
Primary side (supply side): P port
Secondary side (exhaust side):
A and B port
Supply pilot air higher than 0.25MPa to P1 port.



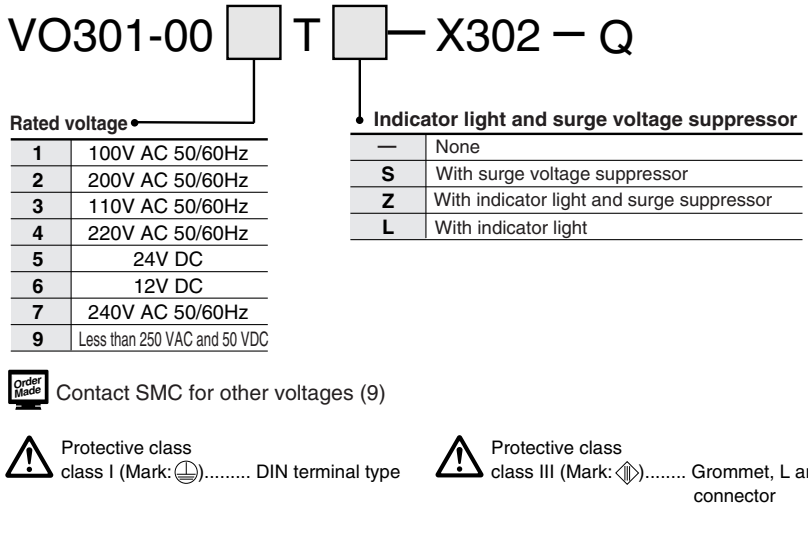
Ex1) 2 port valve: Nozzle ON/OFF



How to Order



How to Order Pilot Solenoid Valve



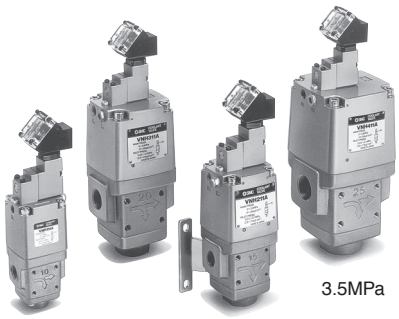
Option

Description		Part No.			
		VNH1□□	VNH2□□	VNH3□□	VNH4□□
Bracket (with bolt and washer)	B	VNH1-16	VNH2-16	VNH3-16	VNH4-16

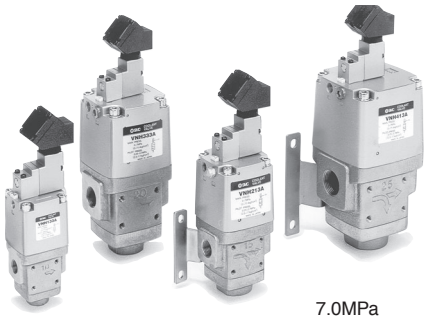
Specifications

Model		3 port valve								2 port valve			
		VNH111 A/B –10A	VNH211 A/B –15A	VNH311 A/B –20A	VNH411 A/B –25A	VNH113 A/B –10A	VNH213 A/B –15A	VNH313 A/B –20A	VNH413 A/B –25A	VNH133 A/B –10A	VNH233 A/B –15A	VNH333 A/B –20A	VNH433 A/B –25A
Operating fluid pressure		0 to 3.5MPa				0 to 7.0MPa							
Fluid		Fluid											
Operation		External pilot solenoid/Air operated											
Operating fluid temperature	VNH□□ 1/3 A	–5 to 60°C/–5 to 60°C											
	VNH□□ 1/3 B	–5 to 60°C/–5 to 99°C											
Pilot air	Pressure	0.25 to 0.7MPa											
	Temperature	–5 to 50°C											
	Lubrication	Not required (Use turbin oil class 1, ISO VG32 if lubricated)											
Proof pressure		5.5MPa				10.5MPa							
Ambient temperature		–5 to 50°C *											
Max. operating frequency		20 times/min											
Mounting orientation		Vertical upwards											
Port size		Rc 3/8	Rc 1/2	Rc 3/4	Rc1	Rc 3/8	Rc 1/2	Rc 3/4	Rc1	Rc 3/8	Rc 1/2	Rc 3/4	Rc1
Orifice size		ø7.1 **	ø8.7 **	ø10.6 **	ø14.3 **	ø3.9 **	ø5.2 **	ø6.2 **	ø7.3 **	ø8 **	ø9.5 **	ø13.5 **	ø15.8 **
Flow rate	Effective area	22mm²	41mm²	58mm²	112mm²	7.2mm²	13mm²	18mm²	25mm²	30mm²	43mm²	86mm²	120mm²
	Nl/min	1177.80	2257.45	3140.80	6085.30	392.60	687.05	981.50	1374.10	1668.55	2355.60	4711.20	6477.90
Pilot port size		Rc 1/8		Rc 1/4		Rc 1/8		Rc 1/4		Rc 1/8		Rc 1/4	
Weight		2kg	3.1kg	5.6kg	8.2kg	2kg	3.1kg	5.6kg	8.2kg	2kg	3.1kg	5.6kg	8.2kg
Face-to-face dimension		60mm	80mm	100mm	115mm	60mm	80mm	100mm	115mm	60mm	80mm	100mm	115mm

*No freezing allowed **Equivalent size



3.5MPa

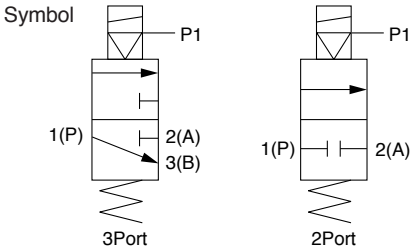


7.0MPa

Pilot Operated Solenoid Valve Specifications

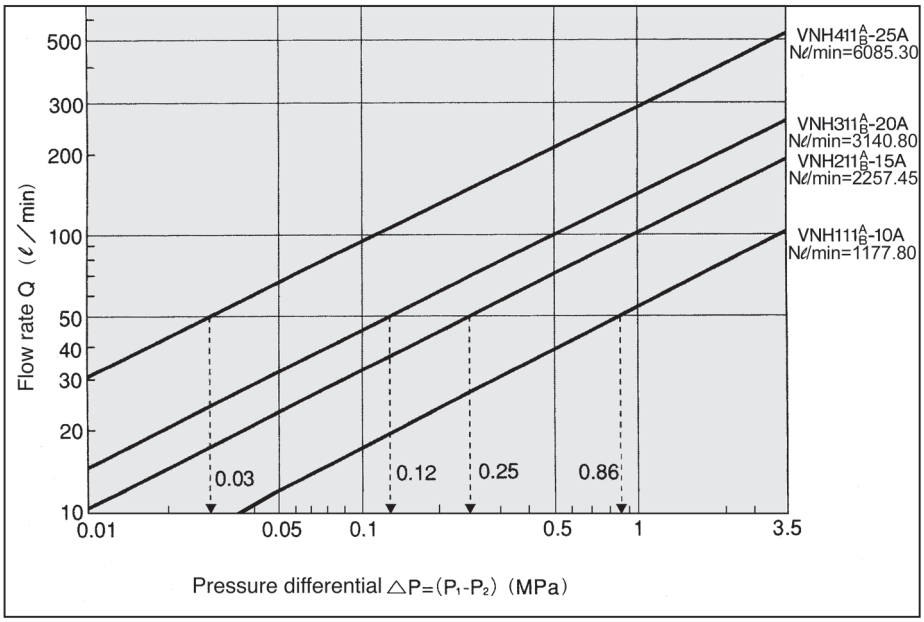
Pilot operated solenoid valve			VO301-00□T□-X302 -Q
Electrical entry			DIN Connector
Coil rated voltage	AC(50/60/Hz)		100V, 200V, other voltages (Option)
	DC		24V, other voltages (Option)
Applicable voltage range			–15% to +10% of the rated voltage
Coil insulation			Class B or equivalent (130°C)
Temperature rise			70°C or less (Application of rated voltage)
Apparent power	AC	Inrush	12VA(50Hz), 10.5VA(60Hz)
		Holding	7.5VA(50Hz), 6VA(60Hz)
Power consumption	DC		4.8W
Manual override			Non-locking push style

Symbol



Flow Characteristics

3.5MPa



<How to Read The Graph>

Pressure differential of coolant liquid whose flow rate is 50ℓ/min

VNH411$^{A}_{B}$(Nℓ/min=6085.30): △P ≅ 0.03MPa
VNH311$^{A}_{B}$(Nℓ/min=3140.80): △P ≅ 0.12MPa
VNH211$^{A}_{B}$(Nℓ/min=2257.45): △P ≅ 0.25MPa
VNH111$^{A}_{B}$(Nℓ/min=1177.80): △P ≅ 0.86MPa

<How to Calculate Flow>

• Calculation by Cv factor

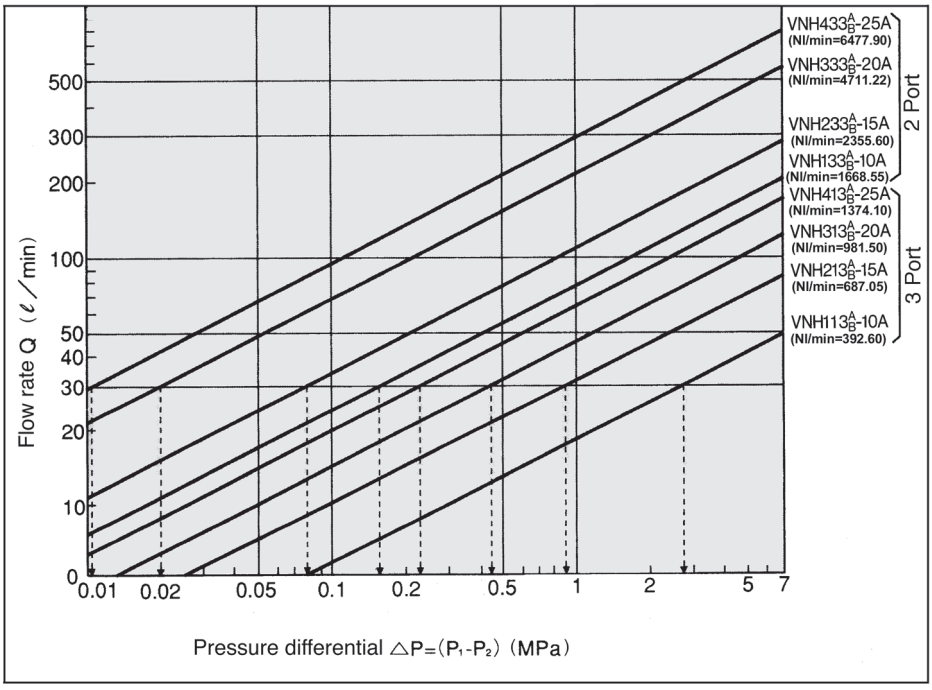
$$Q=14.2 \cdot Cv \cdot \sqrt{\frac{10.2\Delta P}{G}} \quad \ldots\ldots\ell/\text{min}$$

• Calculation by effective area

$$Q=0.8 \cdot S \cdot \sqrt{\frac{10.2 \cdot \Delta P}{G}} \quad \ldots\ldots\ell/\text{min}$$

(Symbol)
Q : Flow rate(ℓ/min)
△P : Pressure differential P_1-P_2(MPa)
P_1 : Primary pressure(MPa)
P_2 : Secondary pressure(MPa)
S : Effective area(mm^2) S≅17667.00 Nℓ/min
Cv : Cv factor
G : Specific gravity Water=1

7.0MPa



<How to Read The Graph>

Pressure differential of coolant liquid whose flow rate is 30ℓ/min:

VNH433$^{A}_{B}$(Nℓ/min=6477.90): △P ≅ 0.01MPa
VNH333$^{A}_{B}$(Nℓ/min=4514.90): △P ≅ 0.12MPa
VNH233$^{A}_{B}$(Nℓ/min=2355.60): △P ≅ 0.08MPa
VNH133$^{A}_{B}$(Nℓ/min=1668.55): △P ≅ 0.16MPa
VNH413$^{A}_{B}$(Nℓ/min=1374.10): △P ≅ 0.23MPa
VNH313$^{A}_{B}$(Nℓ/min=981.50): △P ≅ 0.45MPa
VNH213$^{A}_{B}$(Nℓ/min=687.05): △P ≅ 0.9MPa
VNH113$^{A}_{B}$(Nℓ/min=392.60): △P ≅ 0.8MPa

<How to Calculate Flow>

• Calculation by Cv factor

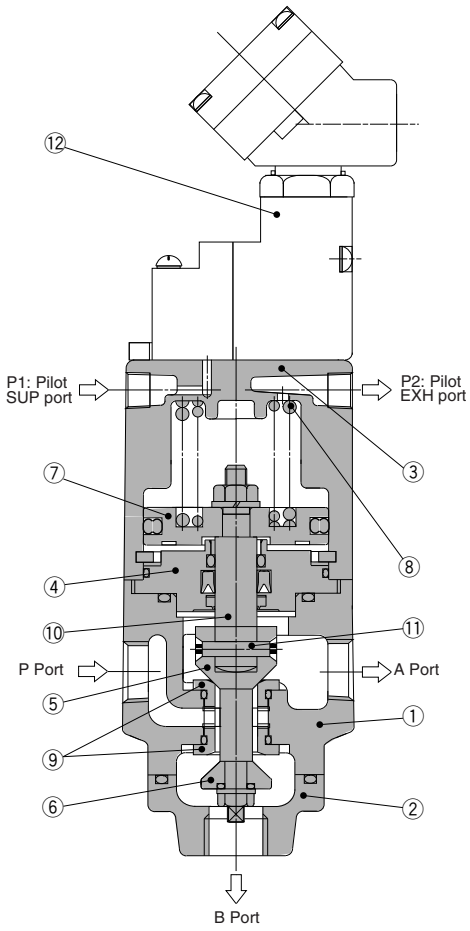
$$Q=14.2 \cdot Cv \cdot \sqrt{\frac{10.2\Delta P}{G}} \quad \ldots\ldots\ell/\text{min}$$

• Calculation by effective area

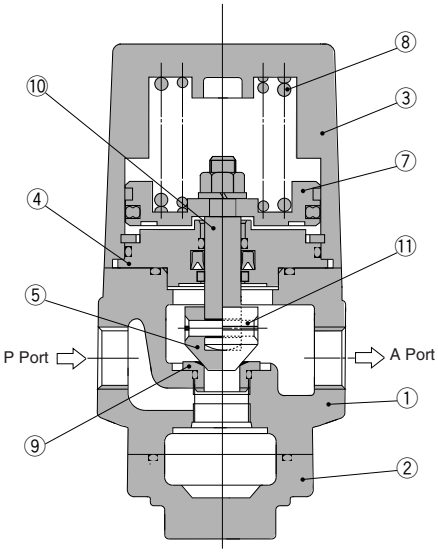
$$Q=0.8 \cdot S \cdot \sqrt{\frac{10.2 \cdot \Delta P}{G}} \quad \ldots\ldots\ell/\text{min}$$

(Symbol)
Q : Flow rate(ℓ/min)
△P : Pressure differential P_1-P_2(MPa)
P_1 : Primary pressure(MPa)
P_2 : Secondary pressure(MPa)
S : Effective area(mm^2) S ≅ 17667.00 Nℓ/min
Cv : Cv factor
G : Specific gravity Water=1

Construction



<3 port valve>



<2 port valve>

Operation principles

When the pilot operated solenoid valve ⑫ is not energised, the valve element A ⑤ connected to the piston ⑦ is closed by the return spring ⑧. Then valve element B ⑥ connected to the valve element A ⑤ is open. When the pilot operated solenoid valve ⑫ is energized, the pilot air supplied to the bottom of the piston ⑦ moves upward to open the valve element A ⑤ and closes the valve element B ⑥. Because rod ⑩ is connected to valve element A ⑤ by parallel pin ⑪. Valve element becomes free to incline and it certainly reaches valve seat.

Component Parts

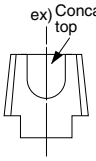
No.	Description	Material	Note
①	Body	Cast iron	Coated
②	Undercover	Cast iron	Coated
③	Cover	Aluminium alloy	
④	Plate	Iron	
⑤	Valve element A	Stainless Steel	
⑥	Valve element B	Stainless Steel	
⑦	Piston	Aluminium alloy	
⑧	Return spring	Piano wire	
⑨	Valve seat	Stainless Steel	
⑩	Rod	Stainless steel	
⑪	Parallel pin	Stainless Steel	
⑫	Pilot solenoid valve	Refer to How to Order on p.4.2-28	

⚠ Precautions

How to Use 2 Port Valve (VNH□11)

⚠ Caution

①When plug is screwed to B port, use concave top plug. If using plug whose top is flat, valve element in the body may be pushed up and the valve cannot be closed.



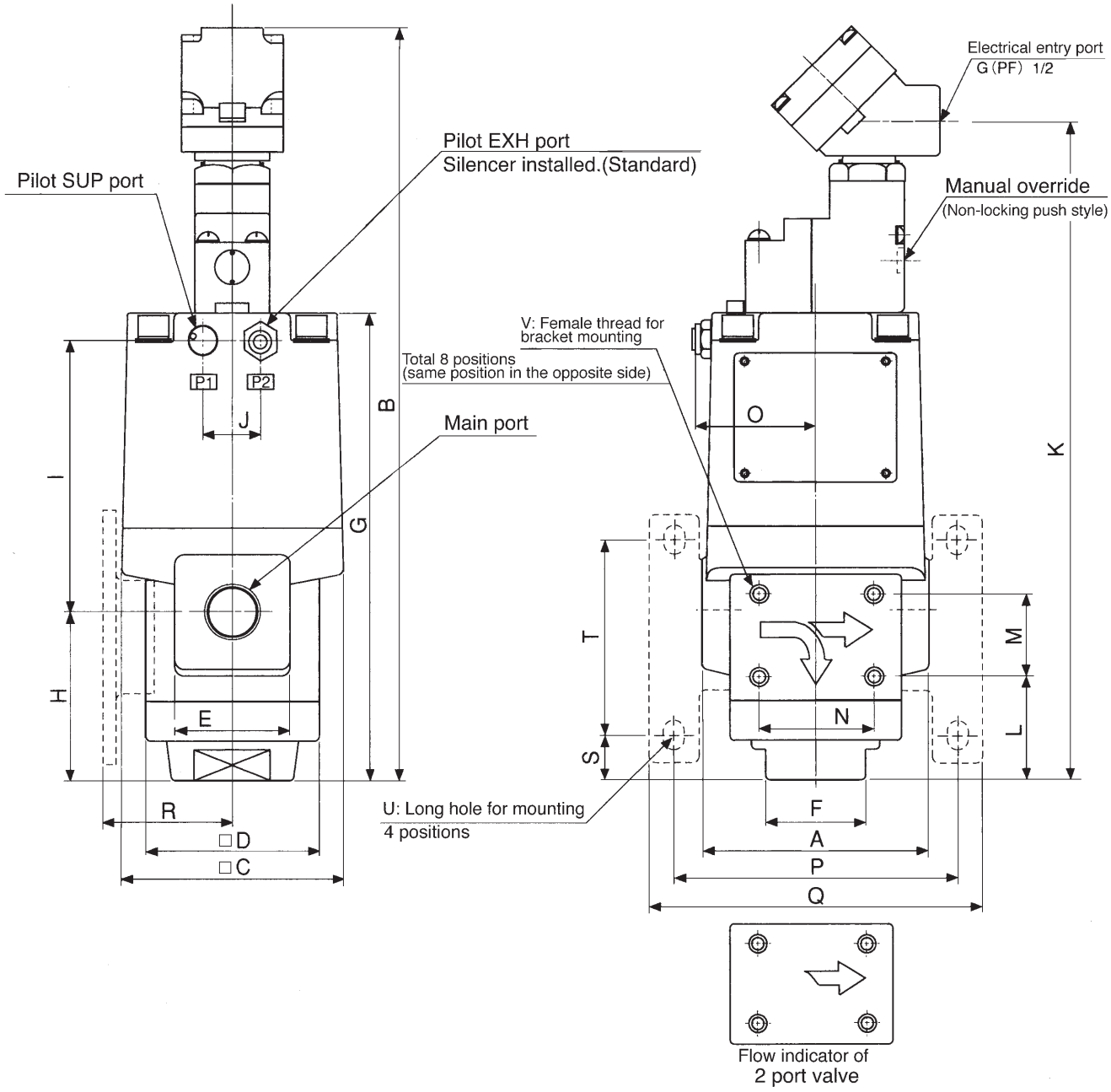
②VNH□13 is not available to use as 2 port valve by plugging B port. Use 2 port valve VNH□33.

Piping

⚠ Caution

When high temperature fluids are is used, use the fittings and tube with heat-resistant. (Self-align fittings, copper tube, etc.)

Dimensions



Dimensions

(mm)

Model	Main port		Pilot port	A	B	C	D	E	F	G	H	I
	2 port	3 port										
VNH1□□□$^{A}_{B}$-10A	2-Rc(PT) 3/8	3-Rc(PT) 3/8	Rc(PT) 1/8	60	235.5	60	46	34	24	135	50	77
VNH2□□□$^{A}_{B}$-15A	2-Rc 1/2	3-Rc 1/2	Rc1/8	80	265	77	60	40	36	164.5	60	95.5
VNH3□□□$^{A}_{B}$-20A	2-Rc 3/4	3-Rc 3/4	Rc1/4	100	300	96	76	50	41	200	79	111
VNH4□□□$^{A}_{B}$-25A	2-Rc1	3-Rc1	Rc1/4	115	319.5	113	85	60	50	219	90	119

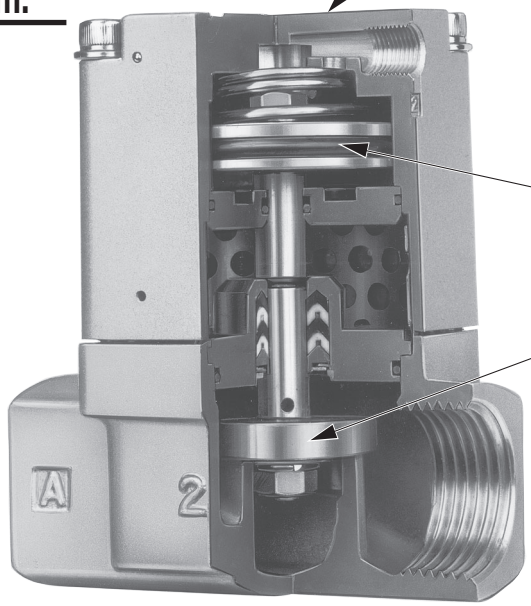
Model	J	K	L	M	N	O	P	Q	R	S	T	U	V
VNH1□□□$^{A}_{B}$-10A	—	202.5	29	25	30	37	75	88	34	10.5	62	6 X 8	M5 X 0.8 Depth 5.5
VNH2□□□$^{A}_{B}$-15A	20	232	36	30	40	43	100	118	44.5	16	70	7 X 0	M6 X 1 Depth 6
VNH3□□□$^{A}_{B}$-20A	24	267	48	35	50	50.5	126	148	60.5	19.5	92	9 X 2	M8 X 1.25 Depth 6
VNH4□□□$^{A}_{B}$-25A	24	286.5	51	38	56	58.5	141	163	66.5	15.5	109	9 X 2	M8 X 1.25 Depth 6

2 Port Valve for Steam
Steam Valve
Series VND

2 Port Valve for Steam MAX.180°C

With indicator (option)
Possible to mount the operation confirmation indicator on all valves.

By the adoption of a PTFE seal, the valve is suited for steam.
Body material: Bronze (BC 6),
Stainless steel

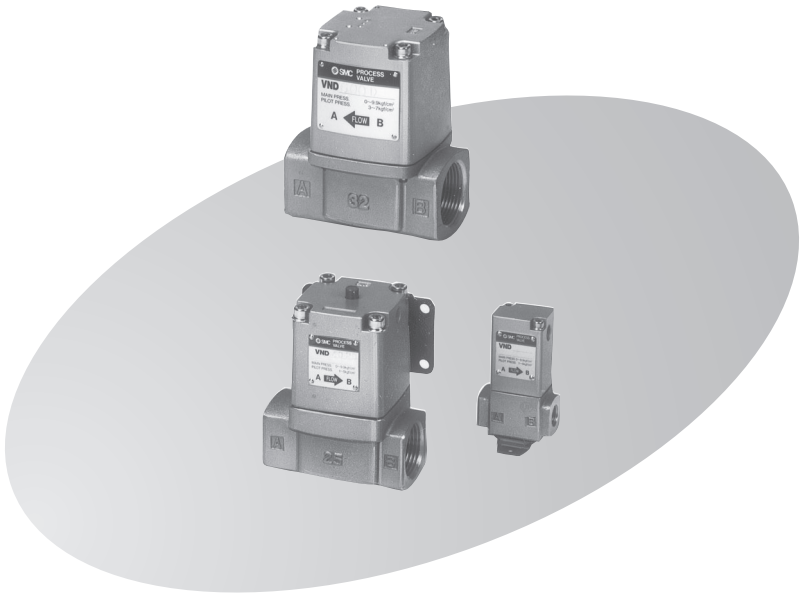


Cylinder actuation system by the external pilot air

Large valve capacity
N*l*/min 687.05 to 42204.50

PTFE seal

Many variations
2 types — N.C., N.O.
Screw-in (6A to 50A)
Flange (32F to 50F)



How to Order

Air operated **EVND 2 0 ☐ D S – F 15A – ☐**

Body option

—	Standard (Copper alloy)
S*	Stainless steel body

* Threaded type only

Thread type

—	Rc
F	G
N	NPT
T	NPTF

Option

—	None
B*	With bracket
L	With indicator
BL*	With bracket and indicator

* Only valve size 1, 2, 3, 4

Valve size / **Valve type** / **Port size**

Symbol	Orifice dia. (mm)	Valve type Symbol 0 N.C.	2 N.O.	4 N.C.	Symbol	Port size
1	ø7	—	●	●	6A	1/8
		—	●	●	8A	1/4
		—	●	●	10A	3/8
2	ø15	●	●	—	10A	3/8
		●	●	—	15A	1/2
3	ø20	●	●	—	20A	3/4
4	ø25	●	●	—	25A	1
5	ø32	●	●	—	32A	1 1/4
		●	●	—	32F	1 1/4 B Flange
6	ø40	●	●	—	40A	1 1/2
		●	●	—	40F	1 1/2 B Flange
7	ø50	●	●	—	50A	2
		●	●	—	50F	2B Flange

Model

Model	Port size	Orifice size ø (mm)	Flow rate		Weight (kg)
			Nℓ/min	Effe. area (mm²)	
VND10□D-6A	1/8	7	687.05	13	0.3
VND10□D-8A	1/4		981.50	18	
VND10□D-10A	3/8		1275.95	23	
VND20□D-10A	3/8	15	3729.70	70	0.6
VND20□D-15A	1/2		4907.50	90	
VND30□D-20A	3/4	20	7852.00	140	0.9
VND40□D-25A	1	25	11778.00	220	1.4
VND50□D-32A	1 1/4	32	17667.00	320	2.3
VND60□D-40A	1 1/2	40	27482.00	500	3.6
VND70□D-50A	2	50	43304.50	770	5.7

Valve Specifications

Fluid			Steam
Fluid temperature			–5 to180°C*
Ambient temperature			–5 to 60°C*
Proof pressure			1.5MPa
Operating pressure range			0 to 0.97MPa
External pilot air	Pressure	N.C.	0.3 to 0.7MPa
		N.O.	0.1 to 0.5MPa Reffer to table ① for application
	Lubrication		Not required (Use turbine oil No. 1(ISO VG32), if lubricated.)
	Temparature		–5 to 60°C*

* No freezing

Symbol

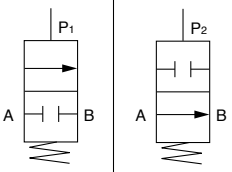
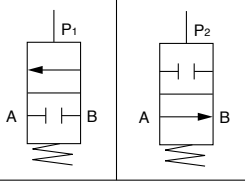
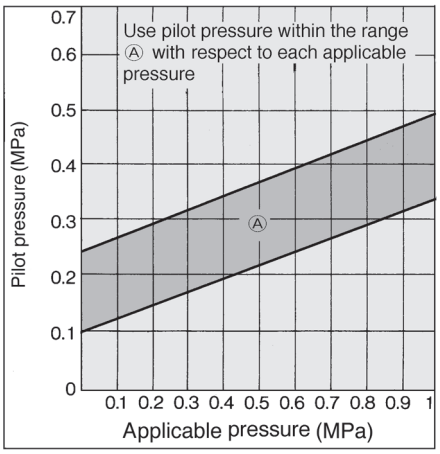
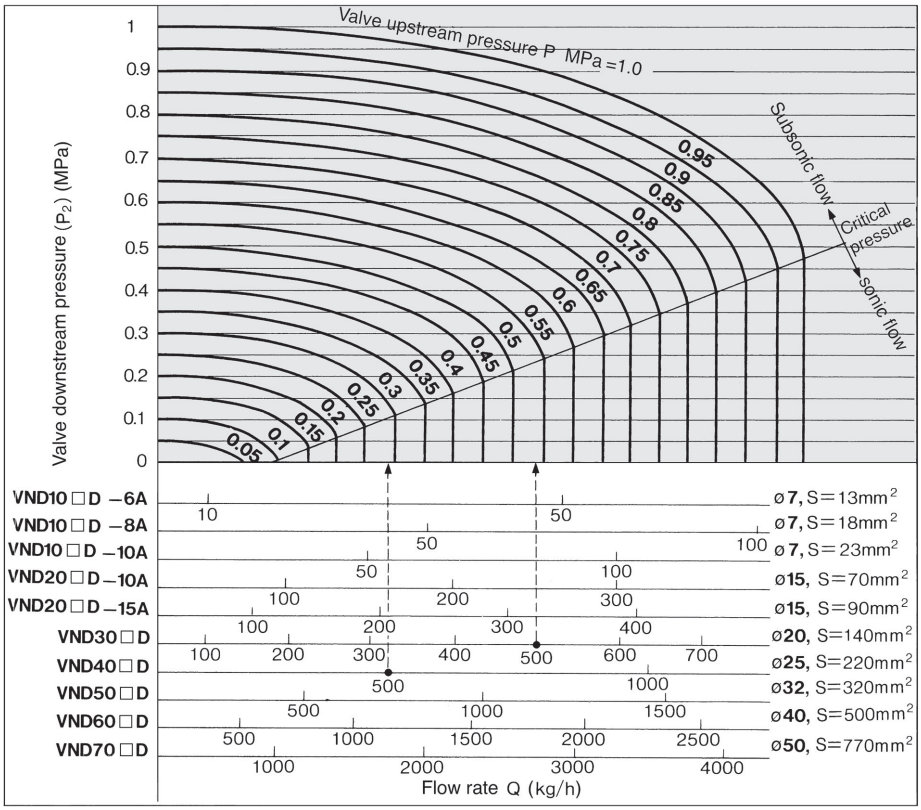
Valve / Valve size	N.C. Normally closed	N.O. Normally open
VND1		
VND 2□ 3□ 4□ 5□ 6□ 7		

Table ① Operating pressure - Pilot pressure (N.O.)



Flow Characteristics

Saturated Steam



How to Read The Graph

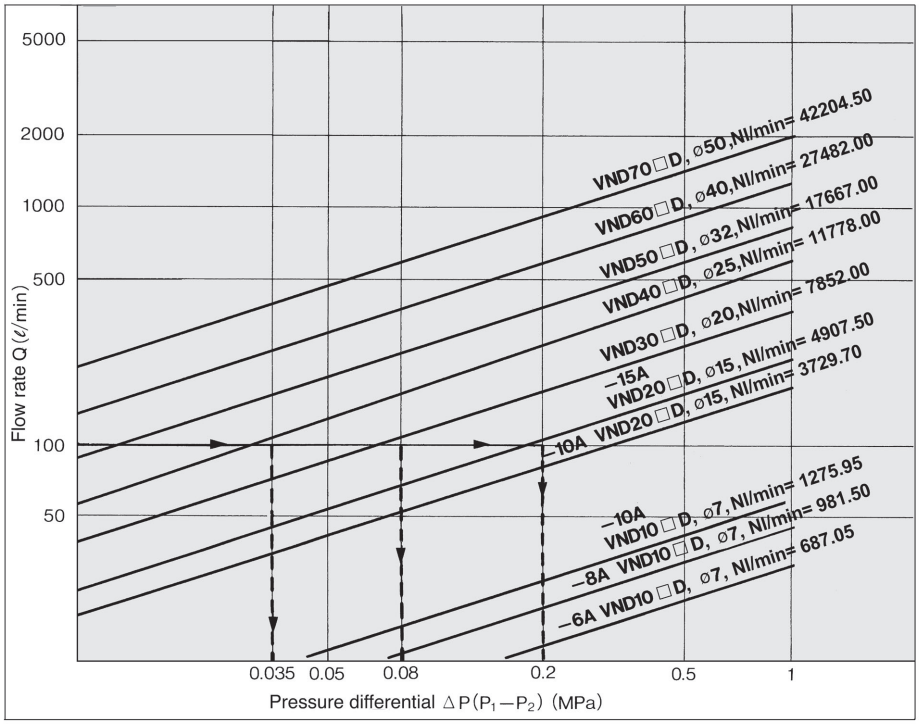
In the sonic flow region: For a flow of 500 Kg/h
VND30□D (Orifice ø20)·····$P^1 \cong 0.55$MPa
VND40□D (Orifice ø25)·····$P^1 \cong 0.3$MPa

How to Calculate Flow

① Equation in the domain of subsonic flow
•Calculation by Cv factor
$Q=198 \cdot Cv \cdot \sqrt{\triangle P(P_2+1.033)}$ ·····kg/h
•Calculation by effective area
$Q=11 \cdot S \cdot \sqrt{\triangle P(P_2+1.033)}$·····kg/h
② Equation in the domain of sonic flow
•Calculation by Cv factor
$Q=98.9 \cdot Cv \cdot (p_1+1.033)$·····kg/h
•Calculation by effective area
$Q=5.51 \cdot S \cdot (P_1+1.033)$·····kg/h

Flow Characteristics

Water/VND 2 to 7 should be N.O. to suppress water hammer.



How to Read The Graph

In case of a water flow of 100 ℓ/min.
VND40□D (Orifice ø25)
·····△P ≅ 0.035MPa
VND30□D (Orifice ø20)
·····△P ≅ 0.08MPa
VND20□D (Orifice ø15)
·····△P ≅ 0.2MPa

How to Calculate Flow/Water

<Water and other liquids>
• Calculation by Cv factor

$$Q=14.2 \cdot Cv \cdot \sqrt{\frac{10.2\Delta P}{G}} \cdots\cdots \ell/\text{min}$$

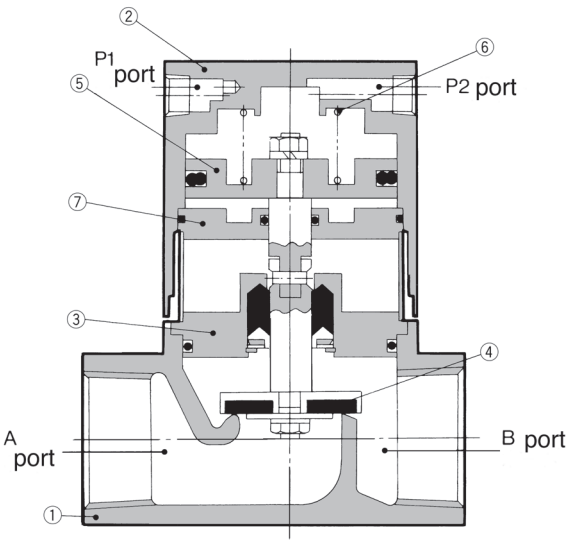
• Calculation by effective area

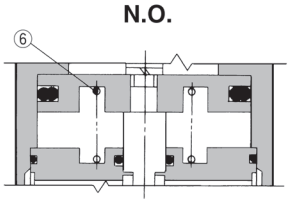
$$Q=0.8 \cdot S \cdot \sqrt{\frac{10.2\Delta P}{G}} \cdots\cdots \ell/\text{min}$$

Note) Calculation error of fluid with viscosity of 50 cst or less will be very small.

Symbol
Q : Flow rate (Air and other liquids ℓ/min)
ΔP: Pressure differential(P_1–P_2)
P_1 : Upstream pressure (MPa)
P_2 : Downstream pressure(MPa)
S : Effective area(mm^2) S ≅ 17667.00Nℓ/min
Cv: Cv factor (/)
G : Specific gravity (/) Air/Water =1

Construction





Component Parts

No.	Description	Material	Note
①	Body	Bronze*	Clear coated
②	Cover assembly	Aluminum alloy	Platinum silver painted
③	Plate assembly	Brass*	PTFE, EPR, FKM
④	Valve element	Valve material (PTFE)	Brass*
⑤	Piston assembly	Aluminum alloy	—
⑥	Return spring	Piano wire	—
⑦	Second plate ass'y	Aluminum alloy	—

* Body option S is made of stainless steel.

Operation Principles

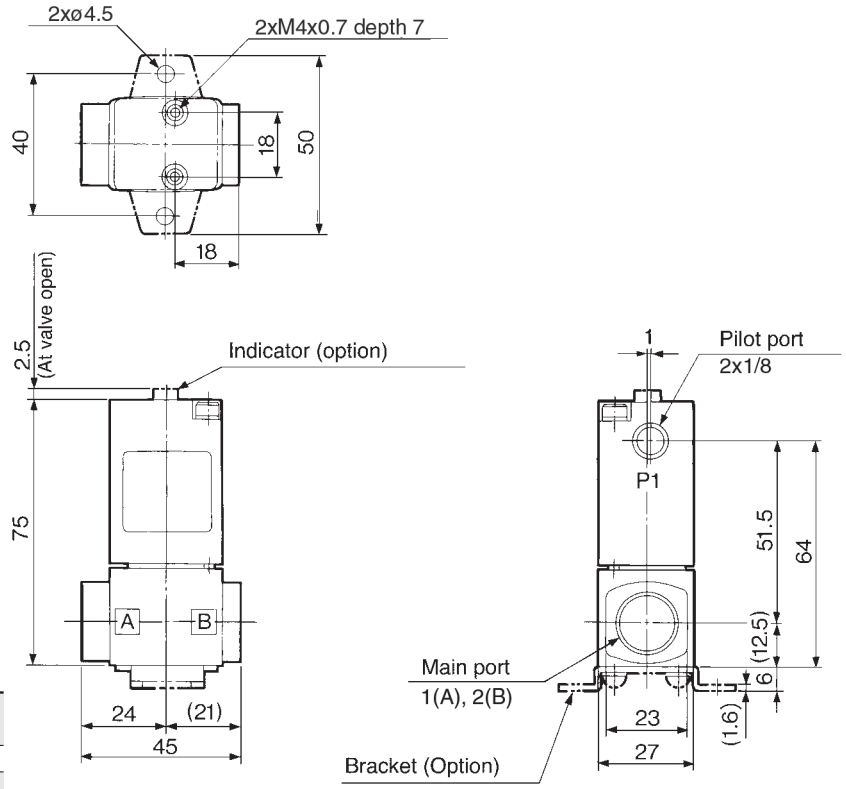
VND □ 0^{0}_{4}□ (N.C.):
When fluid is exhausted from the P1 port, the valve ④ connected with the piston ⑤ is closed by the return spring ⑥

• When valve opens
When pressurized air enters through the P1 port, the valve piston moves upward by the pilot air that enters below the piston and the valve element opens.

• When valve closes:
When fluid is exhausted from the P1 port, the pilot air below the piston is exhausted and the valve element is closed by the return spring.

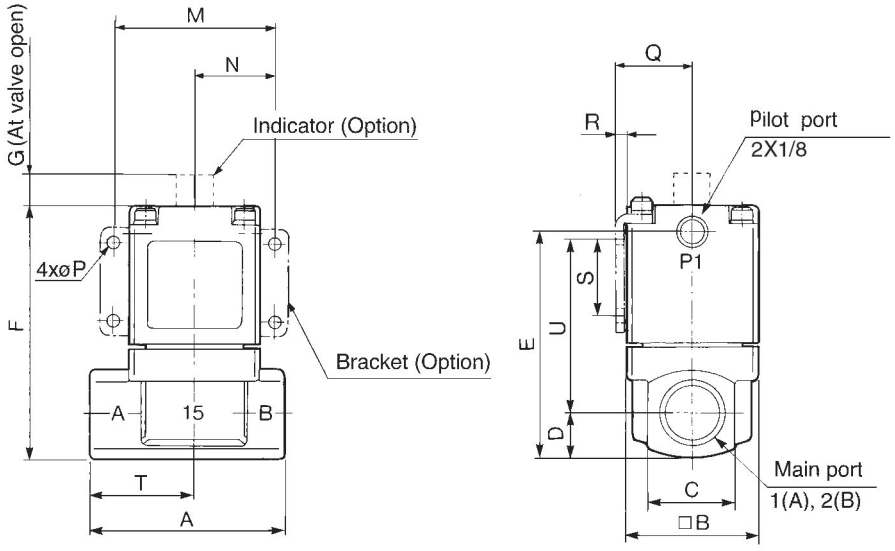
VND□02□(N.O.)
In contrast with the N.C., when air is exhausted from the P2 port, the return spring opens the valve element. Pressurized air that enters through the P2 port closes the valve element.

Port size 6A, 8A, 10A



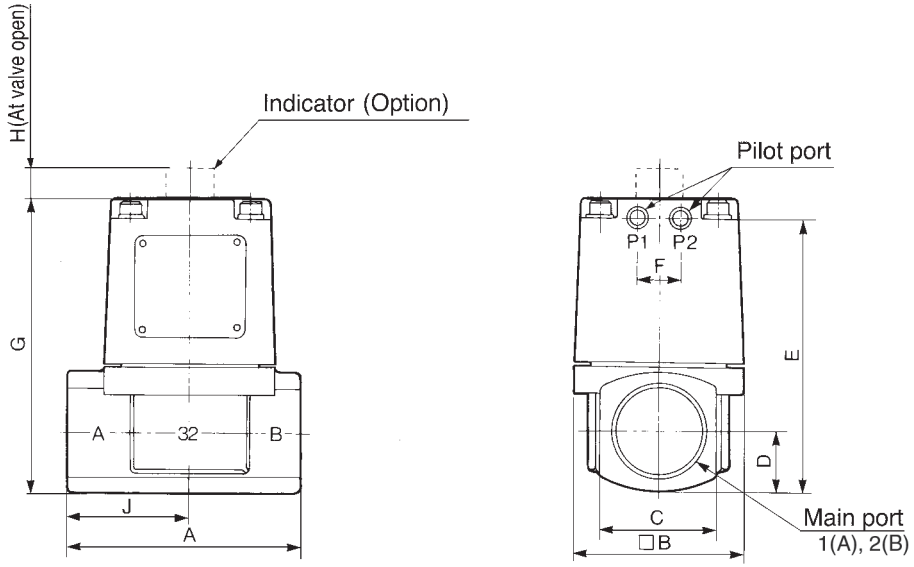
Model	Main port
VND10□D-6A	1/8
VND10□D-8A	1/4
VND10□D-10A	3/8

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



Model	Main port	A	B	C	D	E	F	G	M	N	P	Q	R	S	T	U
VND20□D-10A	3/8	63	42	28	14	73.5	81.5	4	52	26	4.5	24.3	2.3	25	34	56
VND20□D-15A	1/2															
VND30□D-20A	3/4	80	50	35	17.5	85	93	5	62	31	5.5	28.3	2.3	30	43	61.5
VND40□D-25A	1	90	60	44	22	101	109	6	72	36	6.5	33.3	2.3	35	49	74

Port size 32A, 40A, 50A



Model	Main port	Pilot port	A	B	C	D	E	F	G	H	J
VND50□D-32A	1 1/4	1/8	105	77	53	26.5	121.5	20	130.5	8	55
VND60□D-40A	1 1/2	1/4	120	96	60	30	138	24	148	10	63
VND70□D-50A	2	1/4	140	113	74	37	161	24	171	12	74

⚠ Precautions

External Pilot

⚠ Caution

Piping of pilot port (P1, P2)

P1 and p2 piping should be as follows according to the model.

Port	VND□O□D	VND□O2D
P1	External pilot	Exhaust
P2	Exhaust	External pilot

It is recomended to mount a silencer in the bleed port to prevent entry of dust into the valve.

Piping

⚠ Caution

To use the piping with a high temperature fluid, use heat resistant fittings and tubes. (Self-align fittings, copper pipe, etc.)

Adiabatic Space

⚠ Caution

There is a space between body and cover (∗: approximate 1mm) for adiabatic effect.