For General Purpose

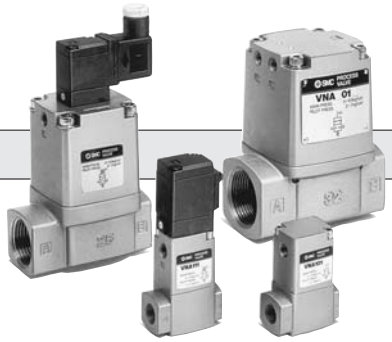
2/3 Port Valve

Process Valve/Series VN

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

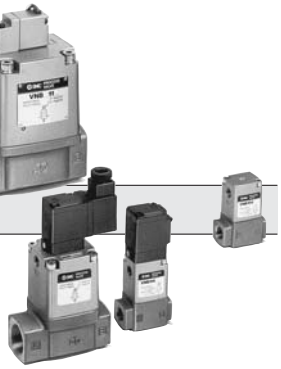
Series VNA

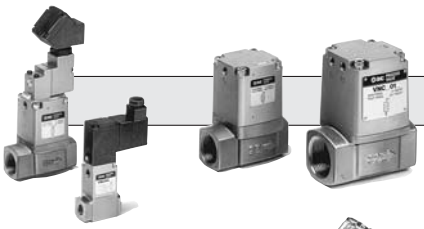
For controlling pneumatic systems or air-hydro circuits.
A balance poppet that enables air to flow forward or backward.



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

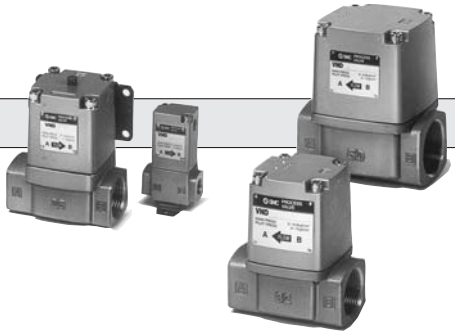
For controlling the cutting oils and coolants used in machine tools.
Metal seals are used for preventing foreign matter such as cutting chips from entering.
Maximum operating pressure: 0.5MPa, 1MPa

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

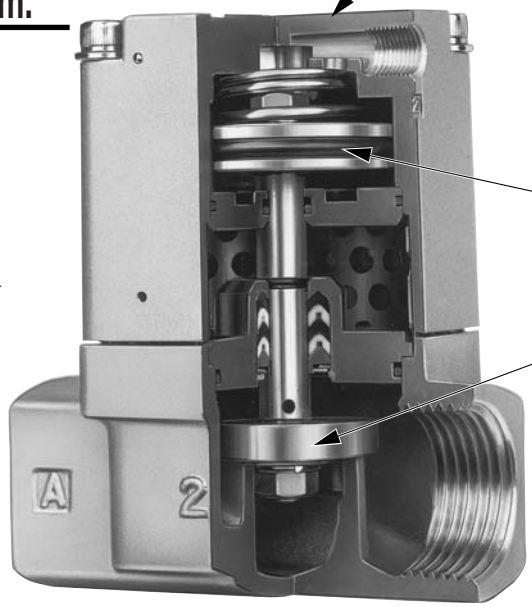
Series			Process valve Series **VNA**			Process valve Series **VNB**			Coolant valve Series **VNC**		Coolant valve for high pressure Series **VNH**	Steam valve Series **VND**	
Valve Style			N.C.	N.O.	C.O.	N.C.	N.O.	C.O.	N.C.	N.O.	N.C.	N.C.	N.O.
Applicable fluid	Water		—	—	—	●	●	●	—	—	—	—	—
	Air		●	●	●	●	●	●	—	—	—	—	—
	Oil		●	●	●	●	●	●	●	●	●	—	—
	Low vacuum (1 Torr)		—	—	—	●	●	●	—	—	—	—	—
	Coolant		—	—	—	—	—	—	●	●	●	—	—
	Steam		—	—	—	—	—	—	—	—	—	●	●
Port size	Rc(PT)	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 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

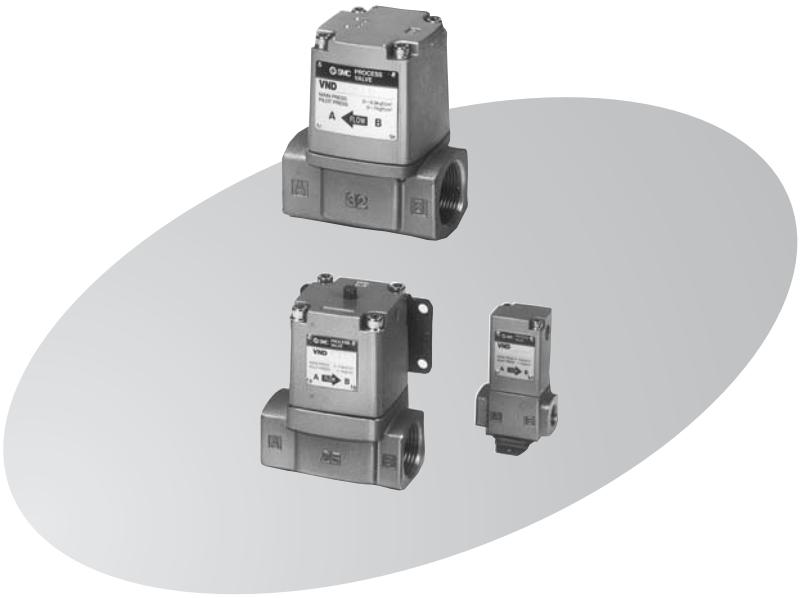


Cylinder actuation system by the external pilot air

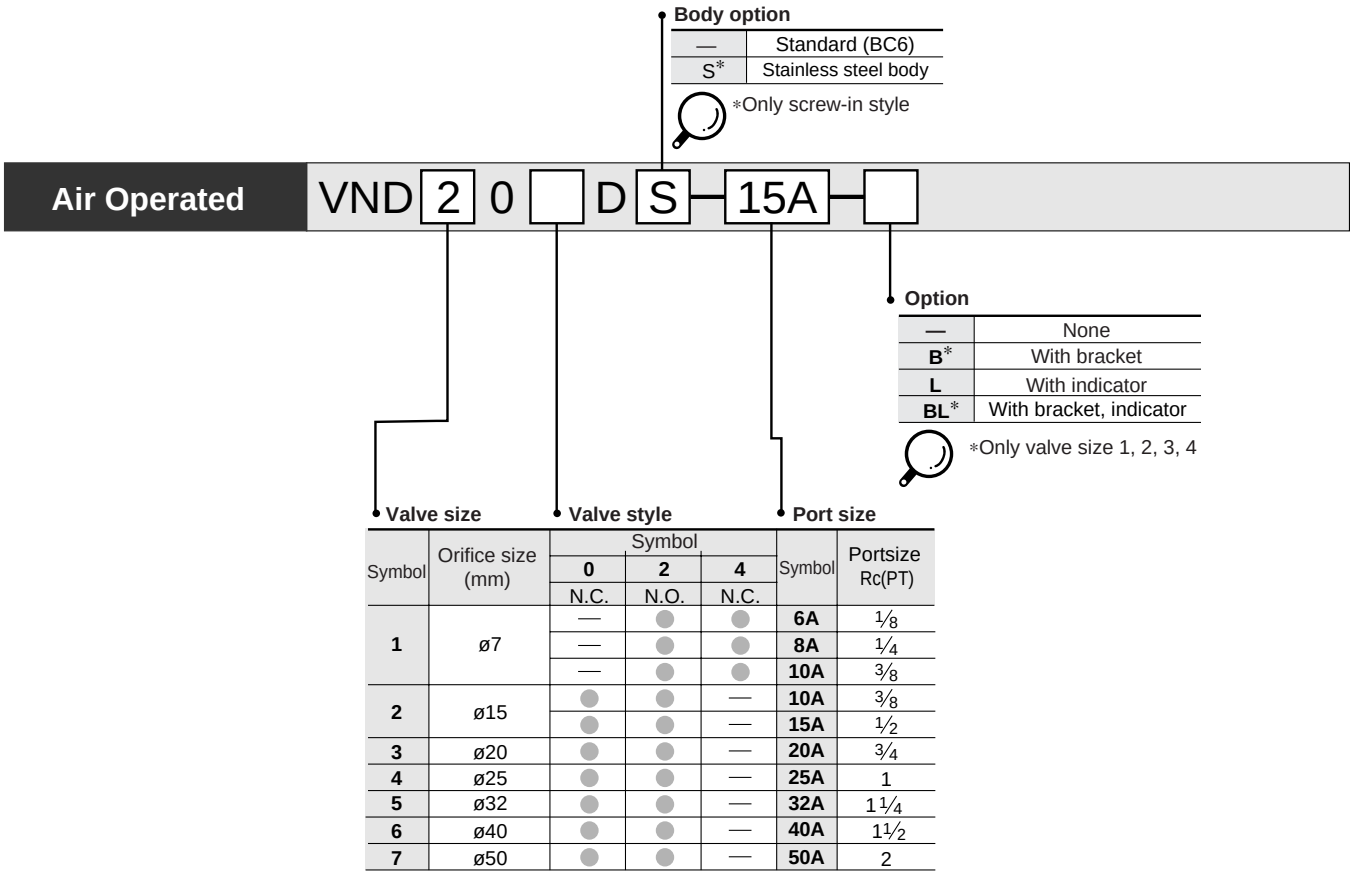
Large valve capacity
N*l*/min 687.05 to 42204.50

PTFE seal

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



How to Order



Symbol	Orifice size (mm)	Symbol 0 N.C.	Symbol 2 N.O.	Symbol 4 N.C.	Symbol	Portsize Rc(PT)
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
6	ø40	●	●	—	40A	1 1/2
7	ø50	●	●	—	50A	2

Model

Model	Port size Rc(PT)	Orifice size ø (mm)	Flow rate Nℓ/min	Flow rate Effe. area (mm²)	Weight (kg)
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

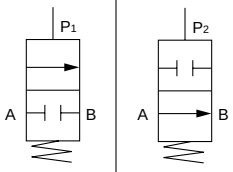
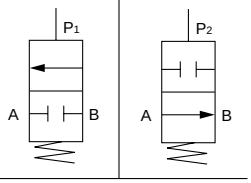
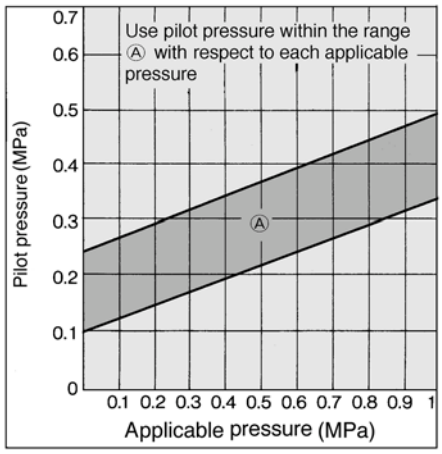
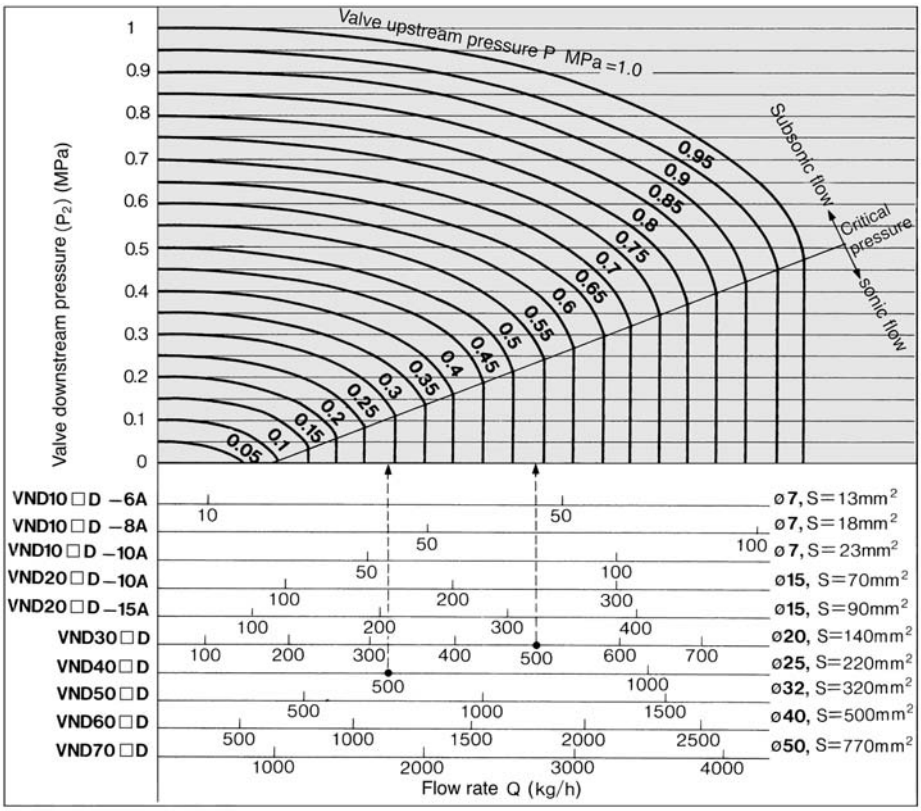
Valve / Valve size	N.C. Normally closed	N.O. Normally open
VND1		
VND 2 3 4 5 6 7		

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



Flow Characteristics

Saturated Steam



How to Read The Graph

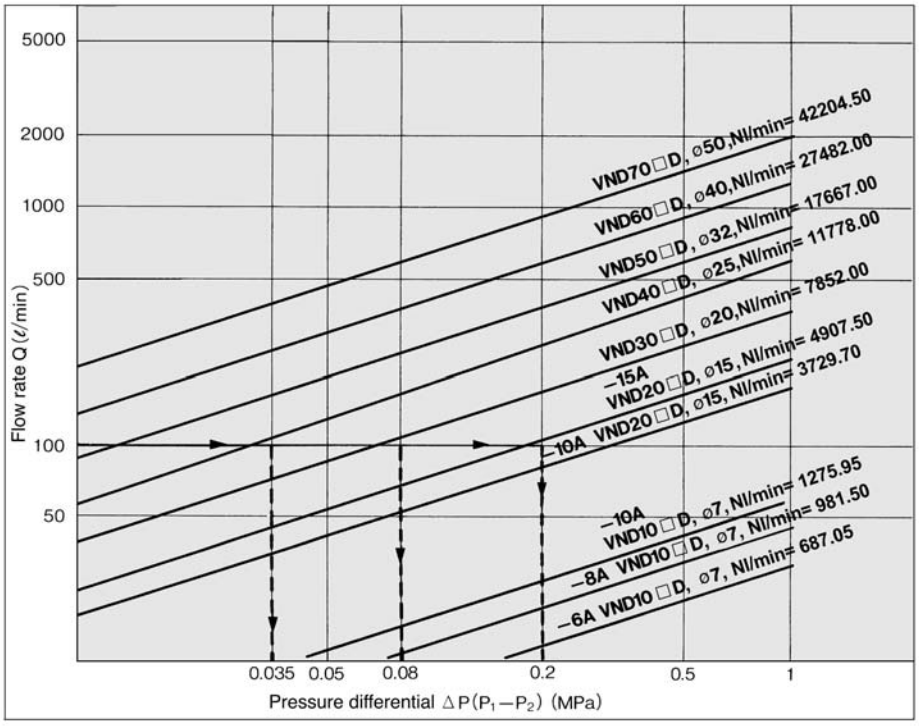
In the sonic flow region: For a flow of 500 Kg/h
VND30□D (Orifice ø20)·····$P_1 \cong 0.55$MPa
VND40□D (Orifice ø25)·····$P_1 \cong 0.3$MPa

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

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

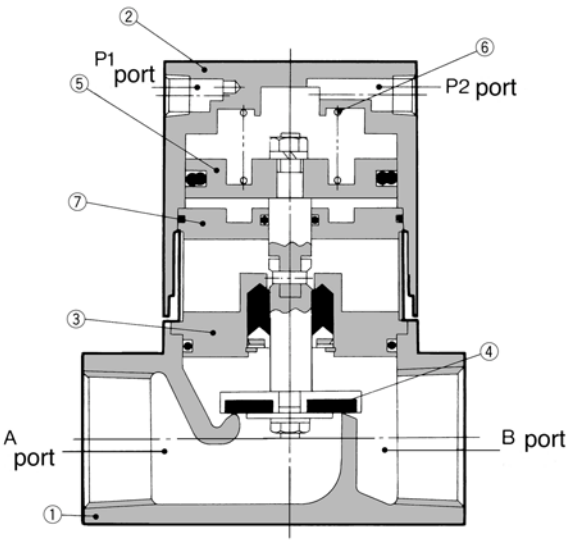
• Calculation by effective area

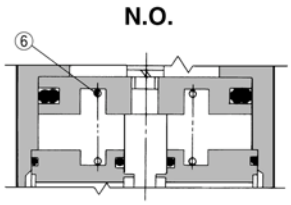
$$Q=0.8\cdot S\cdot\sqrt{\frac{10.2\Delta P}{G}} \cdots\cdots \ell/\text{min}$$

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

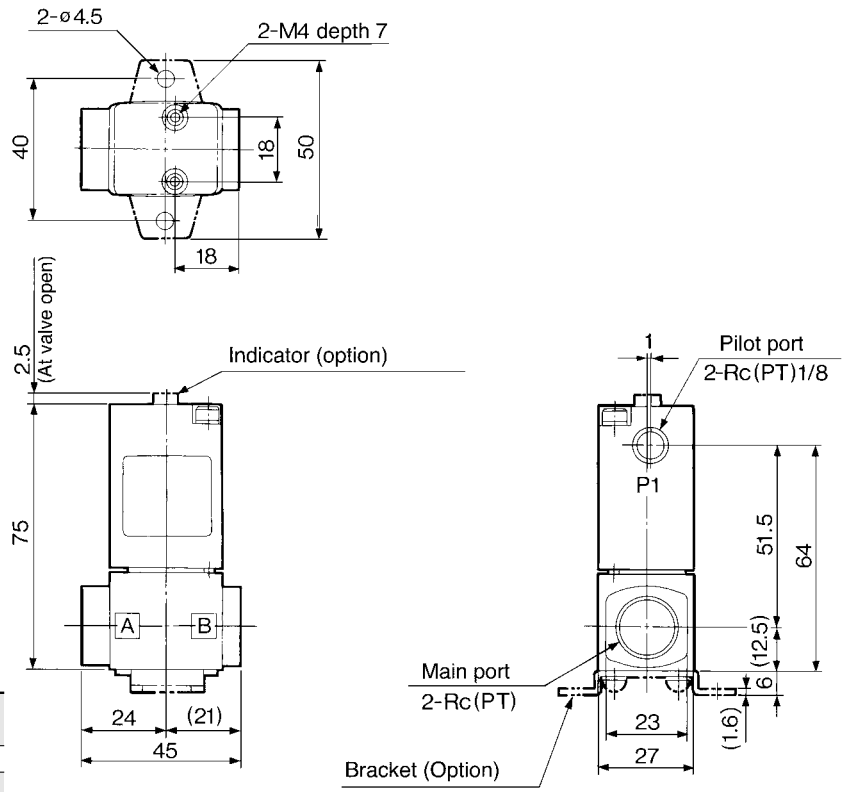
No.	Description	Material	Note
①	Body	Bronze*	Clear coated
②	Cover assembly	Aluminum alloy	Platinum silver painted
③	Plate assembly	Brass*	PTFE, EPR, FPM
④	Valve element	Valve material (PTFE)	Brass*
⑤	Piston assembly	Aluminum alloy	—
⑥	Return spring	Piano wire	—
⑦	Second plate ass'y	Aluminum alloy	—

∗ Body option S is made of stainless steel.

Operation Principles

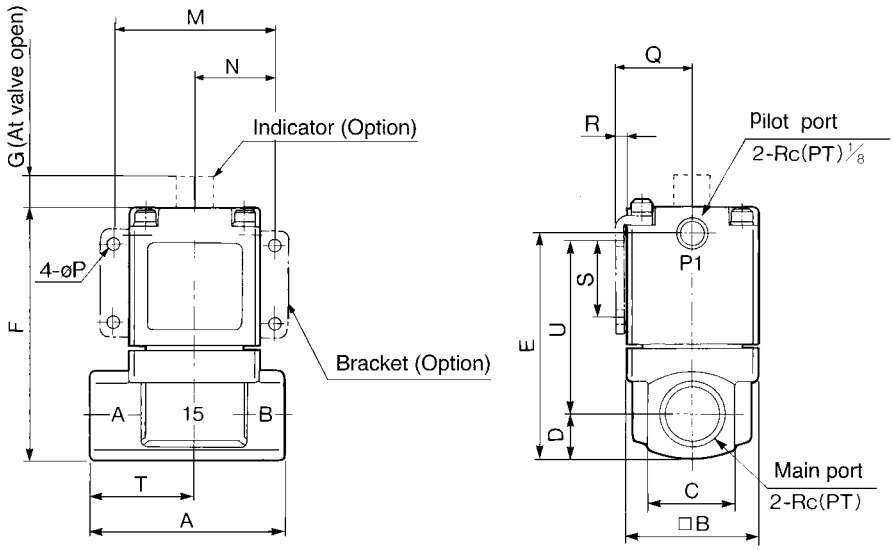
VND □ 0^{0}_{4}□ (N.C.):
When fluid is exhausted from the P1 port, the valve ④ connected with the piston ⑤ is closed by the return spring ⑥
• When valve opens
When pressurized air enters through the P1 port, the valve piston moves upward by the pilot air that enters below the piston and the valve element 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



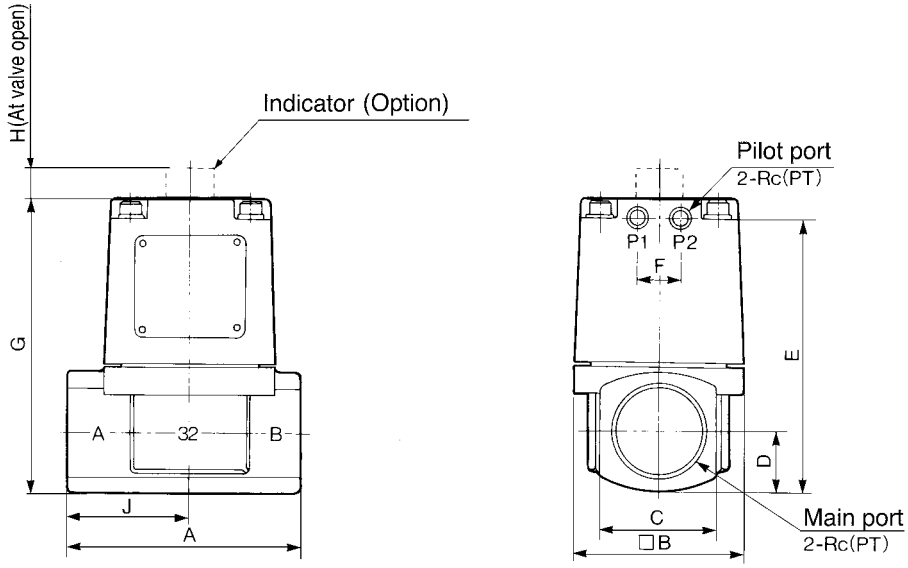
Model	Main port Rc(PT)
VND10□D-6A	1/8
VND10□D-8A	1/4
VND10□D-10A	3/8

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



Model	Main port Rc(PT)	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	40	20	101	109	6	72	36	6.5	33.3	2.3	35	49	74

Port size 32A, 40A, 50A



Model	Main port Rc(PT)	Pilot port Rc(PT)	A	B	C	D	E	F	G	H	J
VND50□D-32A	1¼	⅛	105	77	53	26.5	121.5	20	130.5	8	55
VND60□D-40A	1½	¼	120	96	60	30	138	24	148	10	63
VND70□D-50A	2	¼	140	113	74	37	161	24	171	12	74

⚠Precautions

Be sure to read before handling. Refer to p.0-33 for Safety Instructions p.0-37 to 0-40 for common 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, Teflon tube or copper pipe, etc.) Teflon is a registered trademark of DuPont.

Adiabatic Space

⚠ Caution

There is a space between body and cover