

Process Valve

Series VNB

2 Port Valve For Flow Control

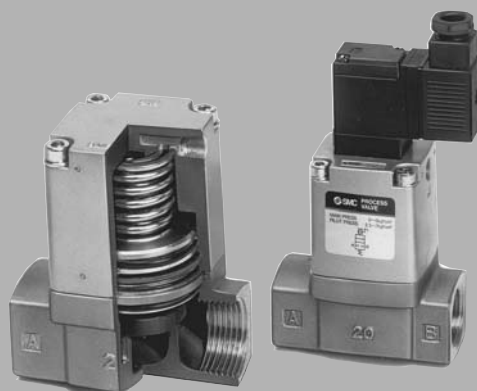
A wide variety of applicable fluids

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

Cylinder actuation by external pilot air

Wide variations

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



Air operated

External pilot solenoid



Selection Procedure

1 Applicable fluids

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

2 Flow characteristics (Air, Water)

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

3 Construction

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

4 Power voltage and electrical entry (External pilot solenoid)

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

Table (1) Applicable Fluids Check List

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

⚠ Caution

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

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

Note 3) Some brake oils are not allowed.

Table (2) Combinations between Valve Size and Port Size

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

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

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

VNA

VNB

SGC

VNC

VNH

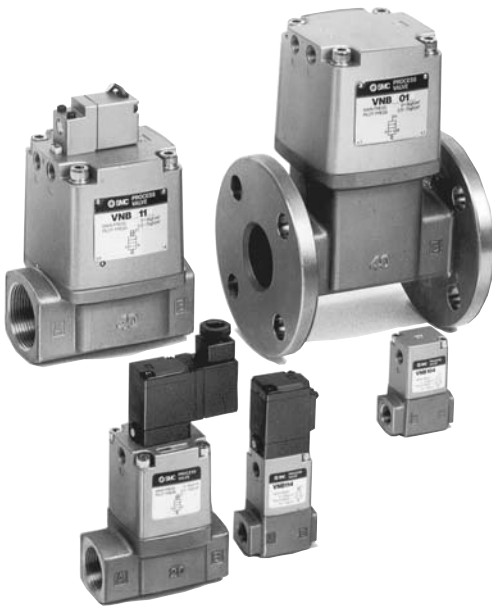
VND

VCC

CE

* Electrical entry: D or DZ only.

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



JIS Symbol

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

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

Option Specifications

Vacuum pilot valve VNB□□□□V

(Valve size 2 to 7)

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

Specifications (Vacuum pilot type)

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

JIS Symbol (Vacuum pilot type)

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

Model

Model	Port size Rc	Orifice dia. ø (mm)	Flow characteristics				Mass (kg)	
			Measured by air		Measured by water			
			C [dm³/(bar·sec)]	b	Cv	Av x 10 ⁻⁶ m²	Air operated	External pilot solenoid
VNB1□□□-6A	1/8	7	3.3	0.29	0.80	25	0.3	0.4
VNB1□□□-8A	1/4		4.6	0.17	1.0	29		
VNB1□□□-10A			4.7	0.18	1.1	31		
VNB2□4□-10A	3/8	11	9.6	0.40	2.6	71	0.6	0.7
VNB2□□□-10A		15	17	0.32	4.0	110		
VNB2□4□-15A	1/2	11	9.6	0.40	2.6	76		
VNB2□□□-15A		15	19	0.24	4.8	140		
VNB3□4□-20A	3/4	14	18	0.42	5.4	140	0.9	1.0
VNB3□□□-20A		20	35	0.13	7.4	270		

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

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

Specifications

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

Note 1) No freezing
 Note 2) Lubrication is not allowed in the case of seal material EPR.
 Note 3) Adjust the operating pressure range from 0.125 MPa to 0.275 MPa for low vacuum.
 Note 4) The pressure differential between Port 1 (A) and 2(B) must not exceed the maximum operating pressure.
 Note 5) For external pilot solenoid, it is recommended that the pilot solenoid valve be oriented either vertically upward or horizontally.

Pilot Solenoid Valve Specifications

Port size	6A to 25A	32A to 50A, 32F to 50F	32A to 50A, 32F to 50F, CE compliant
Pilot solenoid valve	SF4-□□□-23	VO301□-00□□□	VO307□-00□□□-Q
Electrical entry	Grommet, Grommet terminal, Conduit terminal, DIN terminal	Grommet, Conduit, DIN terminal, Other (Option)	DIN terminal
Coil rated voltage (V)	AC (50/60 Hz) DC	100 V, 200 V, other voltage (Semi-standard) 24 V, other voltage (Semi-standard)	
Allowable voltage fluctuation		-15% to +10% of rated voltage	
Temperature rise		35°C or less (when rated voltage is applied.)	70°C or less (when rated voltage is applied.) 50°C or less (when rated voltage is applied.)
Apparent power	AC	Inrush 5.6 VA (50 Hz), 5.0 VA (60 Hz) Holding 3.4 VA (50 Hz), 2.3 VA (60 Hz)	12 VA (50 Hz), 10.5 VA (60 Hz) 12.7 VA (50 Hz), 10.7 VA (60 Hz) 7.6 VA (50 Hz), 6 VA (60 Hz) 7.6 VA (50 Hz), 5.4 VA (60 Hz)
Power consumption	DC	1.8 W (without light), 2W (with light)	4.8 W (without light), 5 W (with light)
Manual override		Non-locking push type Other (Semi-standard)	Non-locking push type

Note 1) For "How to Order" pilot solenoid valves, refer to page 368.
 Note 2) Vacuum pilot type pilot solenoid valves will become VO301V-00□□□.
 Note 3) Vacuum pilot type CE compliant pilot solenoid valves will become VO307V-□□□-Q.

How to Order Pilot Solenoid Valves

Valve size 1/2/3/4

SF4-5D-23-Q
SF4-5D-23

Coil rated voltage

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

* Semi-standard

Manual override

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

* Semi-standard

Electrical entry/With indicator light/surge voltage suppressor

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

CE compliant
 * Electrical entry: D or DZ only

Valve size 5/6/7 and vacuum pilot type

VO307- -Q
VO301-00- -Q

Body option

Nil	Standard
V	Vacuum pilot

With surge voltage suppressor

Nil	None
S	Surge voltage suppressor (Except "DZ, DL")

Coil rated voltage

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

* Semi-standard

Electrical entry

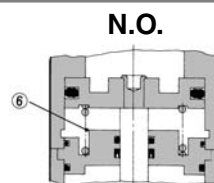
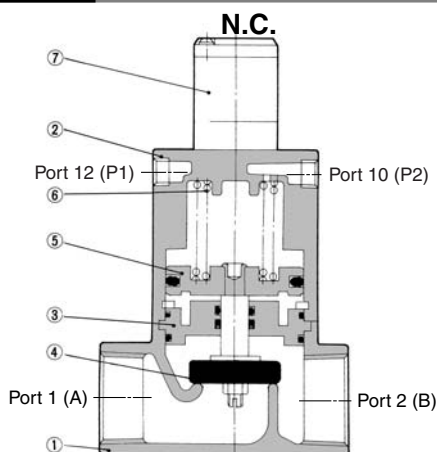
G	Grommet	—
C	Conduit	—
T (Note 1)	Conduit terminal	—
D	DIN terminal	●
DZ (Note 2)	DIN terminal with light/surge voltage suppressor*	●
DL (Note 3)	DIN terminal with indicator light	—

Note 1) When the electrical entry is T, the pilot solenoid valve parts are as follows:
VO301-00-T-X302
 Coil rated voltage — Light/Surge voltage suppressor

Note 2) VO307 only
 Note 3) Semi-standard

Accessory
 Function plate for VO301 (D sealing, with thread): DXT060-32-4A
 Function plate for VO307 (D sealing, with thread): DXT152-14-1A

Construction



* C.O. type does not have a return spring ⑥.

Working Principle (Vacuum pilot type is excluded)

VNB01□, □1□ (N.C.)

When the pilot solenoid valve ⑦ is not energized (or when air is exhausted from the port P1 of the air operated type), the valve element ④ linked to the piston ⑤ is closed by the return spring ⑥.

• When valve opens

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

• When valve closes:

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

VNB02□, □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 through the port P2 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 port P2 of the air operated style), the valve element closes.

VNB03□ (C.O.)

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

Component Parts

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

Note 1) Parts ③ and ④ are for selection of valve composition.

Note 2) The body option "S" is stainless steel, and "L" is aluminum.

Replacement Parts

No.	Description	Part no.
		VNB1□□□ -6A, 8A, 10A
		VNB2□□□ -10A, 15A
		VNB3□□□ -20A
		VNB4□□□ -25A
		VNB5□□□ -32A, 32F
		VNB5□ 4 -32A, 32F
		VNB6□□□ -40A, 40F
		VNB6□ 4 -40A, 40F
		VNB7□□□ -50A, 50F
		VNB7□ 4 -50A, 50F
Note 1) 3	Plate assembly	Seal material NBR FKM EPR Refer to Note 2)
Note 1) 4	Valve element (32F to 50F come in valve element assembly)	Seal material NBR FKM EPR
7	Pilot solenoid valve	SF4-□□□-23 (Refer to the table below.) VO301□-00□□□ (Refer to the table below.)



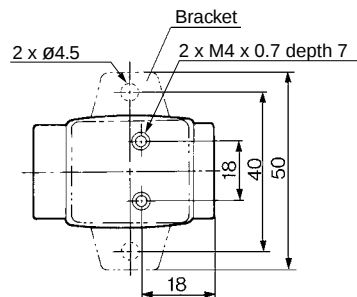
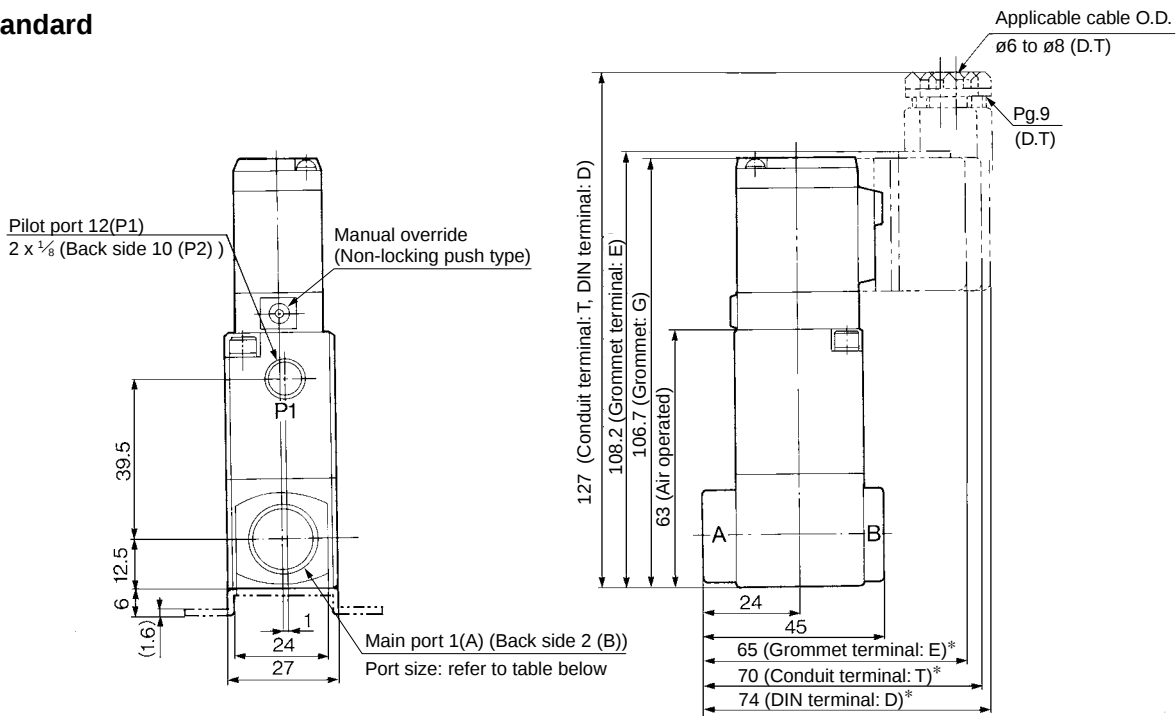
Note 1) In the case of body options "S" and "L", the materials of the part nos. ③ and ④ are as follows: (Example): **VN1-A3B□A**

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

Note 2) Please request a factory repair.

Port size: 6A, 8A, 10A

Standard



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



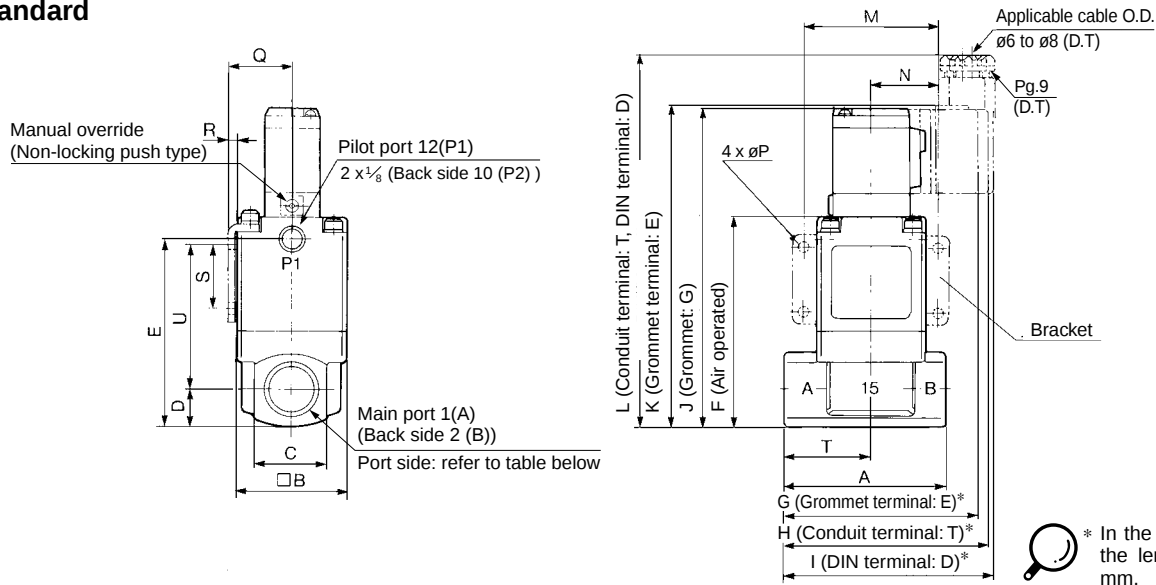
* In the case of "EZ" or "TZ", the length is longer by 10 mm.
For "DZ", the length is longer by 17 mm.

VNA
VNB
SGC
VNC
VNH
VND
VCC

Series VNB

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

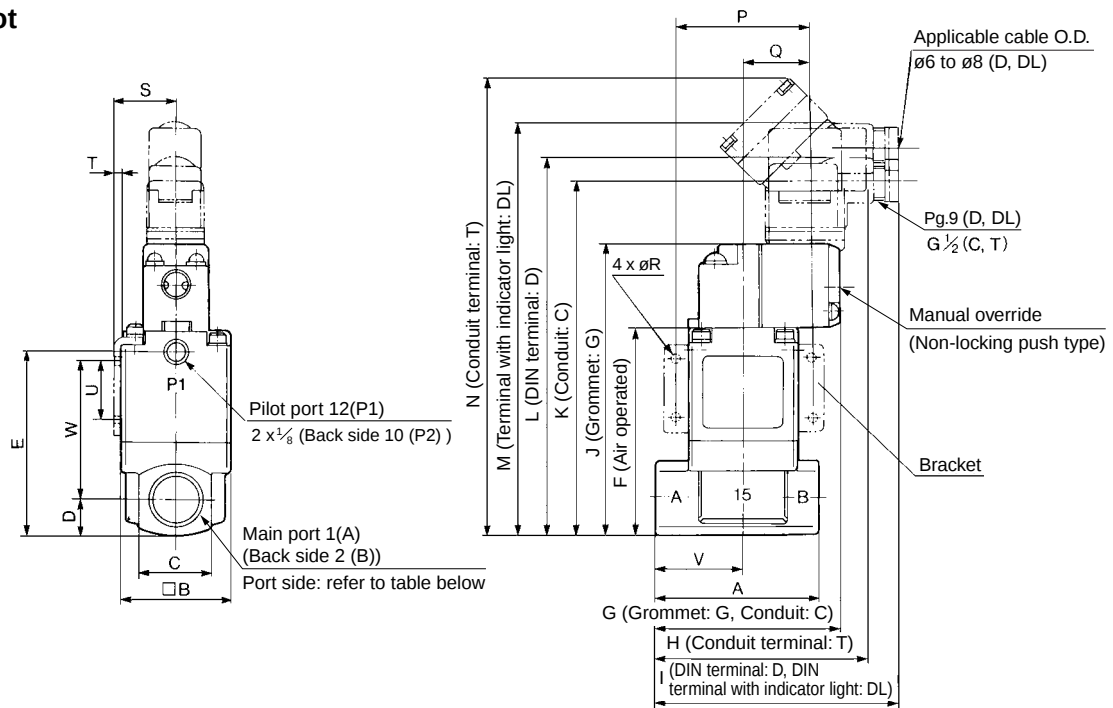
Standard



Model	Main port 1(A), 2(B)	A	B	C	D	E	F	G	H	I	J	K	L	M	N	P	Q	R	S	T	U
VNB2□□□-10A	3/8	63	42	28	14	72.5	80.5	75	80	84.5	124	125.5	144.5	52	26	4.5	24.3	2.3	25	34	55
VNB2□□□-15A	1/2																				
VNB3□□□-20A	3/4	80	50	35	17.5	84	92	84	89	93.5	135.5	137	156	62	31	5.5	28.3	2.3	30	43	60.5
VNB4□□□-25A	1	90	60	40	20	100	108	90	95	99.5	151.5	153	172	72	36	6.5	33.3	2.3	35	49	73

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

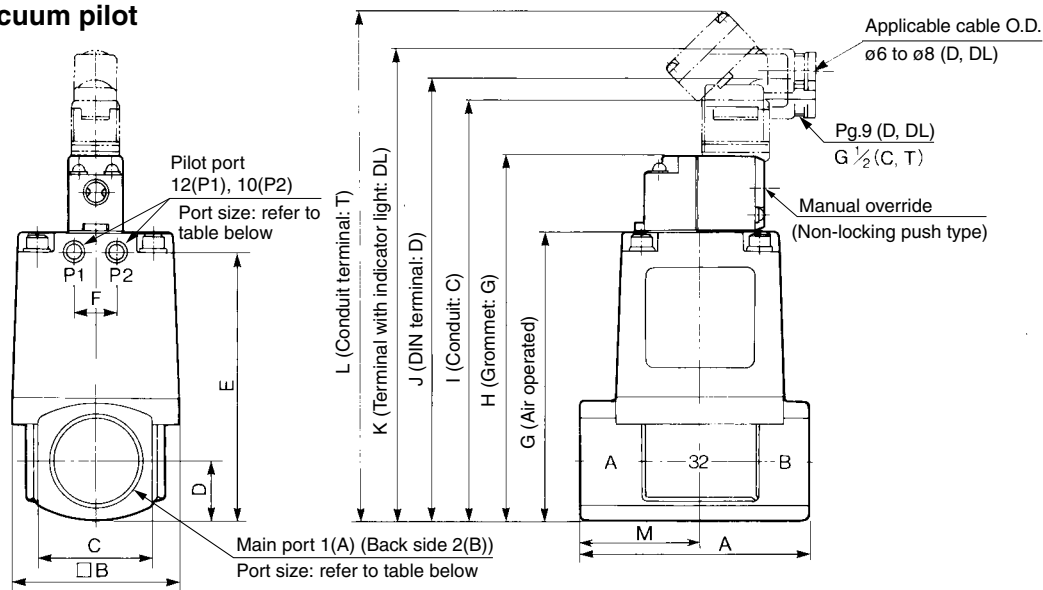
Vacuum pilot



Model	Main port 1(A), 2(B)	A	B	C	D	E	F	G	H	I	J	K	L	M	N	P	Q	R	S	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

Port size: 32A, 40A, 50A

Standard/Vacuum pilot

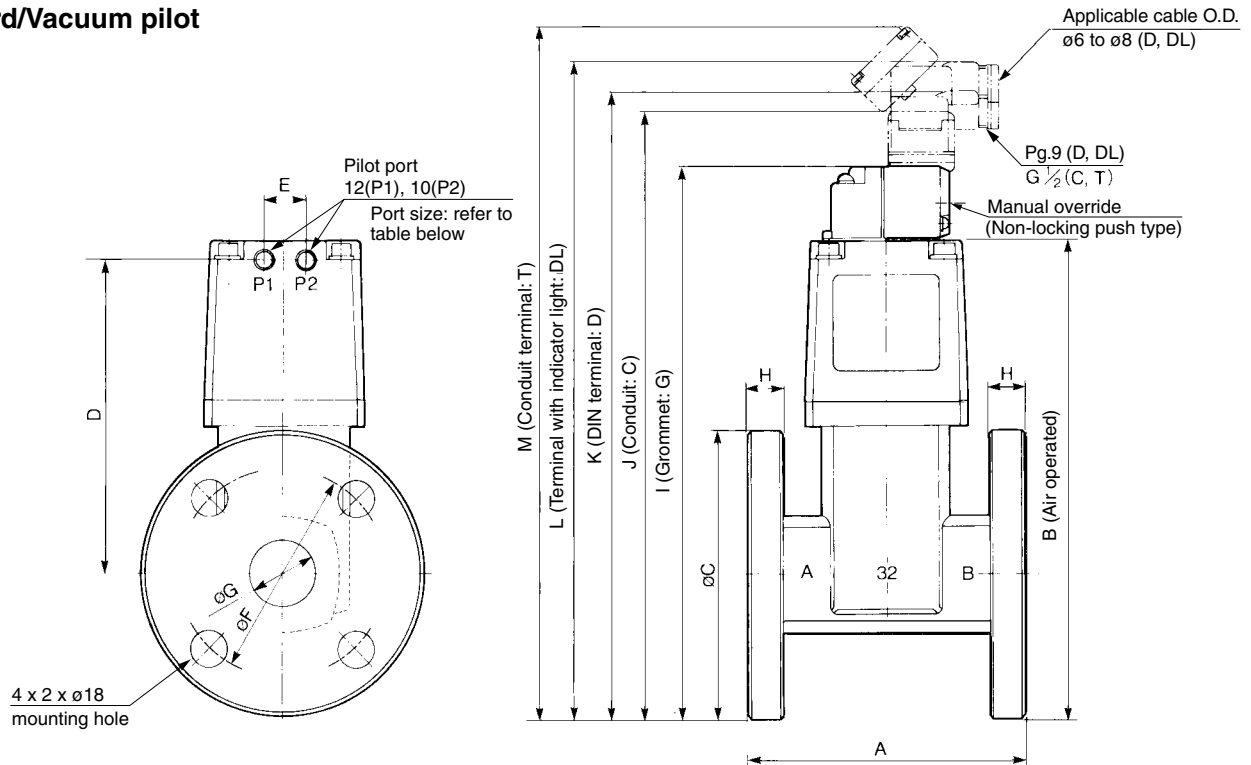


Model	Main port 1(A), 2(B)	Pilot port 12(P1), 10(P2)	A	B	C	D	E	F	G	H	I	J (Note)	K	L	M
VNB5□□□□-32A	1 1/4	1/8	105	77	53	26.5	120.5	20	129.5	163	175.5	218.5 (215.5)	223	229.5	55
VNB6□□□□-40A	1 1/2	1/4	120	96	60	30	137	24	147	180.5	193	236 (233)	240.5	247	63
VNB7□□□□-50A	2	1/4	140	113	74	37	160	24	170	203.5	216	259 (256)	263.5	270	74

Note) (): CE compliant product (-Q)

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

Standard/Vacuum pilot



Model	Applicable flange 1(A), 2(B)	Pilot port 12(P1), 10(P2)	A	B	C	D	E	F	G	H	I	J	K (Note)	L	M
VNB5□□□□-32F	32	1/8	130	210.5	135	134	20	100	36	12	244	256.5	299.5 (296.5)	304	310.5
VNB6□□□□-40F	40	1/4	150	226	140	146	24	105	42	12	259.5	272	315 (312)	319.5	326
VNB7□□□□-50F	50	1/4	180	250	155	162.5	24	120	54	14	283.5	296	339 (336)	343.5	350

Note) (): CE compliant product (-Q)

VNA

VNB

SGC

VNC

VNH

VND

VCC



External Pilot

Piping

Mounting Direction of Pilot Solenoid Valve

Vacuum Pilot