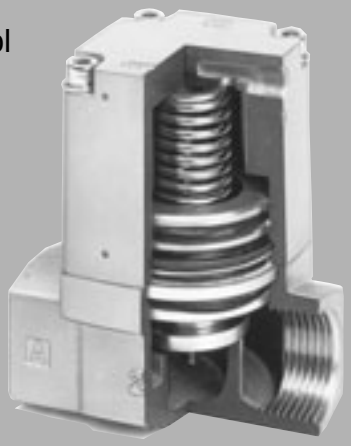
Process Valve

Series VNA

2 Port Valve For Compressed Air and Air-hydro Circuit Control

Exclusively for air pressure system and air-hydro circuit control

Universal 2 Port Valve



Cylinder actuation by external pilot air

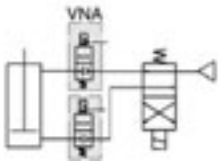
The balance poppet permits normal and reverse flow.

Operation from 0 MPa is possible.

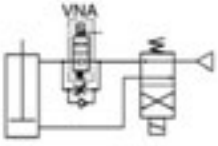
Wide variations
N.C., N.O., C.O., types are available. Threaded type from 6A to 50A is standardized.

Compressed Air Air pressure circuit: Application examples

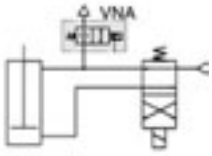
Actuator stop valve
Intermediate stop, inching



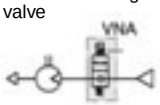
Actuator skip valve
Terminal deceleration, intermediate deceleration, accelerative start



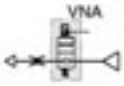
Actuator exhaust valve
High speed operation, high speed exhaust



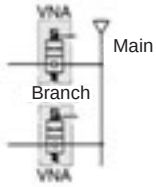
Air motor driving valve



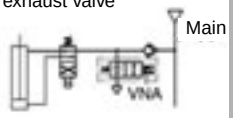
Air blow valve



Line stop valve

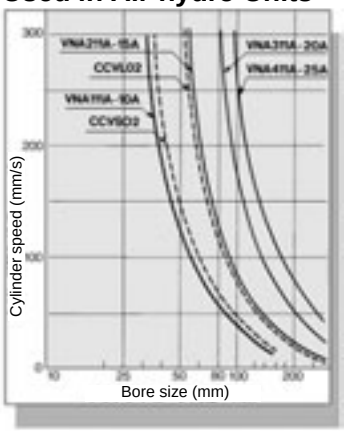


Residual line pressure exhaust valve



Air-hydro Air pressure circuit: Application examples

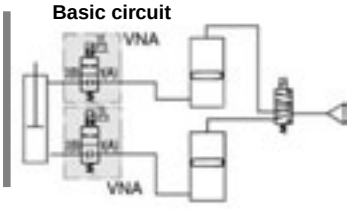
Operation Capacity When Used in Air-hydro Units



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 multiple cylinders and suspend their operation. Thus they can be used in the same way as the conventional air-hydro units.

Air-hydro circuit: Application example

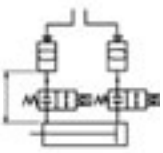
Basic circuit



Conditions

Supply pressure	0.49 MPa	
Hydraulic fluid	ISO VG32	
Load	No load	
Piping length	1 m	
Piping diameter	VNA111A, CCVSO2	3/8B (9 mm)
	VNA211A, CCVLO2	1/2B (13 mm)
	VNA311A	3/4B (19 mm)
	VNA411A	1B (25 mm)

Piping length

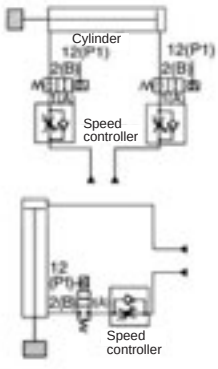


Refer to Air-hydro Unit pages in "Best Pneumatics No. 2" for further information on air-hydro.

⚠Caution

When speed controller is mounted

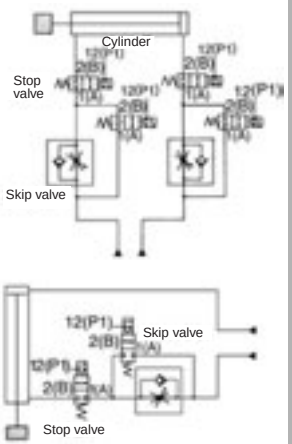
Connect a speed controller (Series AS etc.) to A port of VNA□11 (in order to protect the speed control valve from surges when cylinder operation is suspended, thus improving stopping accuracy).



⚠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.



Process Valve: 2 Port Valve
For Compressed Air and Air-hydro Circuit Control
Series VNA

How to Order

Seal material

A	NBR seals
B	FKM seals
C	EPR seals

Refer to "Table (1)" for availability.

Thread type

Nil	Rc
F	G
N	NPT
T	NPTF

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

Nil	None
B Note)	With bracket

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

Air operated

VNA 2 0 1 A – □ 15A – □

External pilot solenoid

VNA 2 1 1 A – □ 15A – 1 T □ – □

Valve size

Symbol	Orifice dia. (mm)
1	ø10
2	ø15
3	ø20
4	ø25
5	ø32
6	ø40
7	ø50

Valve type

Symbol 1 (N.C.)	Symbol 2 (N.O.)	Symbol 3 Note) (C.O.)
●	●	●

Port size

Symbol	Port size Rc
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

Note) Air operated only

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

* Option

Manual override

Nil: Non-locking push type **A**: Non-locking push type A* (projecting) **B**: Slotted locking type B* (tool required)	Valve size 1 to 4
Nil: Non-locking push type	Valve size 5 to 7

* Option

Electrical entry/ With light/surge voltage suppressor

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

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

Table (1) Applicable Fluids

Model	VNA□□□A (Valve material: NBR seal)	VNA□□□B (Valve material: FKM seal)	VNA□□□C (Valve material: EPR seal)
Fluid	Air (Standard, Dry) Carbon dioxide (CO_2) (0.7 MPa Max.) Nitrogen gas (N_2) Turbine oil, Hydraulic fluid (Kinematic viscosity 40 to 100 mm²/s)	Argon Helium Turbine oil, Hydraulic fluid (99°C or less)	Carbon dioxide (CO_2) (0.7 MPa max.)

⚠ Caution

Note) This product cannot be used for water application.

Model

Model	Port size Rc	Orifice diameter ø (mm)	Flow characteristics				Mass (kg)	
			Measured by air		Measured by water Note)			
			C [dm³/ (bar·sec)]	b	Cv	Av x 10^{-6} m^2	Air operated	External pilot solenoid
VNA1□□□-6A	1/8	10	3.5	0.35	0.88	25	0.1	0.2
VNA1□□□-8A	1/4		5.9	0.24	1.5	41		
VNA1□□□-10A	3/8		7.9	0.16	1.9	51		
VNA2□□□-10A		15	16	0.35	3.8	110	0.3	0.4
VNA2□□□-15A	1/2		23	0.25	4.8	130		
VNA3□□□-20A	3/4	20	34	0.16	7.5	210	0.5	0.6

Note) This product cannot be used for water application.

Model	Port size Rc	Orifice diameter ø (mm)	Flow characteristics		Mass (kg)	
			Cv	Effective area $(mm)^2$	Air operated	External pilot solenoid
VNA4□□□-25A	1	25	12	220	0.8	0.9
VNA5□□□-32A	1 1/4	32	18	320	1.3	1.4
VNA6□□□-40A	1 1/2	40	28	500	2.1	2.2
VNA7□□□-50A	2	50	43	770	3.1	3.2

External pilot solenoid

Air operated

Specifications

Fluid (Main piping)		Refer to “Table (1)” on page 358.
Fluid temperature	**VNA□□□ A**	–5 to 60°C Note 1)
	VNA□□□ B □□□ **C**	–5 to 99°C Note 1) (Air operated type only)
Ambient temperature		–5 to 50°C Note 1) (Air operated type: 60°C)
Proof pressure		1.5 MPa
Operating pressure range		0 to 1 MPa
External pilot air	**Pressure range**	0.2 to 0.7 MPa
	Lubrication	Not required (Use turbine oil Class 1 ISO VG32, if lubricated. Note 2))
	Temperature	–5 to 50°C Note 1) (Air operated type: 60°C)
Mounting orientation		Unrestricted Note 3)

Note 1) No freezing
Note 2) Lubrication is not allowed for use with EPR seal material.
Note 3) For external pilot solenoid, it is recommended that the pilot solenoid valve be oriented either vertically upward or horizontally.
Note 4) Non-lubricant specifications are not available for this product.

Pilot Solenoid Valve Specifications

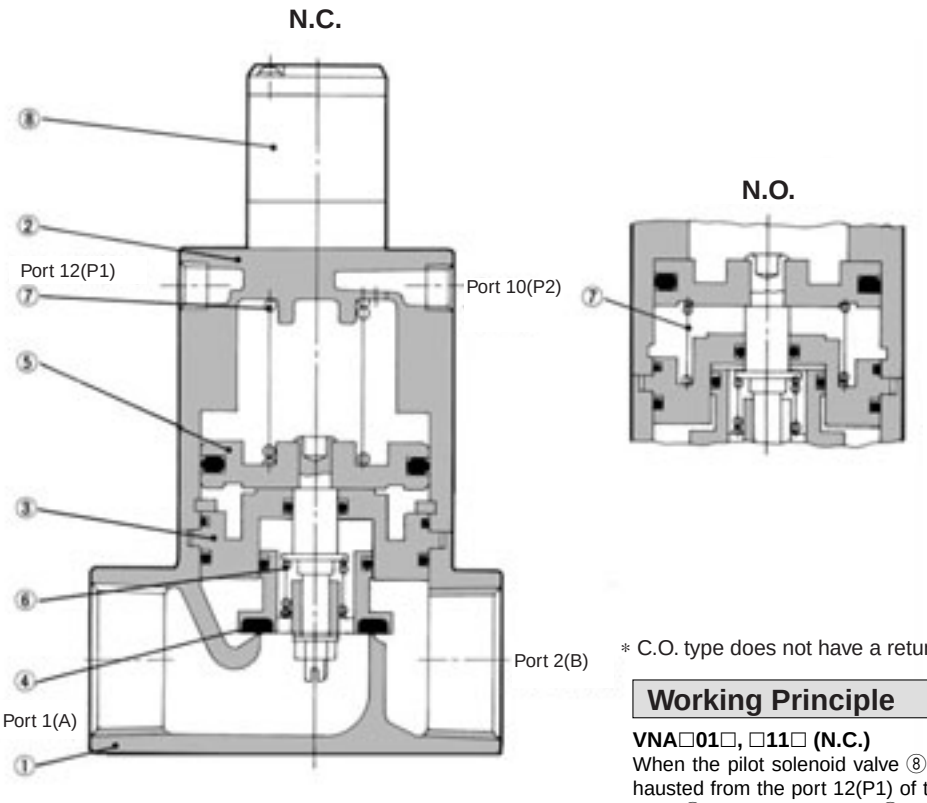
Port size			6A to 25A	32A to 50A
Pilot solenoid valve			**SF4-□□□-23**	**VO301-00□□□**
Electrical entry			Grommet, Grommet terminal Conduit terminal DIN terminal	Grommet, Conduit DIN terminal Other (Option)
Coil rated voltage (V)	**AC (50/60 Hz)**		100 V, 200 V, Other voltage (Option)	
	DC		24 V, Other voltage (Option)	
Allowable voltage fluctuation			–15% to +10% of rated voltage	
Coil insulation type			Class B or equivalent (130°C)	
Temperature rise			35°C or less (When rated voltage is applied.)	70°C or less (When rated voltage is applied.)
Apparent power	**AC**	**Inrush**	5.6 VA (50 Hz), 5.0 VA (60 Hz)	12 VA (50 Hz), 10.5 VA (60 Hz)
		Holding	3.4 VA (50 Hz), 2.3 VA (60 Hz)	7.5 VA (50 Hz), 6 VA (60 Hz)
Power consumption	**DC**		1.8 W (without light), 2 W (with light)	4.8 W (without light), 5 W (with light)
Manual override			Non-locking push type Other (Option)	Non-locking push type

Note) For “How to Order” pilot solenoid valves, refer to page 363.

JIS Symbol

Style \ Valve type	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**	

Construction



∗ C.O. type does not have a return spring ⑦.

Working Principle

VNA□01□, □11□ (N.C.)
When the pilot solenoid valve ⑧ is not energized (or when air is exhausted from the port 12(P1) 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 pressurized air enters through the port 12(P1) 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 port 12(P1) 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.C.)
In contrast with the N.C., when the power to the pilot solenoid valve is turned off (or when air is exhausted from the port 10(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 10(P2) 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 arbitrary position when air is exhausted through the ports 12(P1) and 10(P2). When pressurized air enters the port 12(P1) (exhaust from the port 10(P2)), the valve element opens, and it closes when pressurized air enters the port 10(P2) (exhaust from the port 12(P1)).

Component Parts

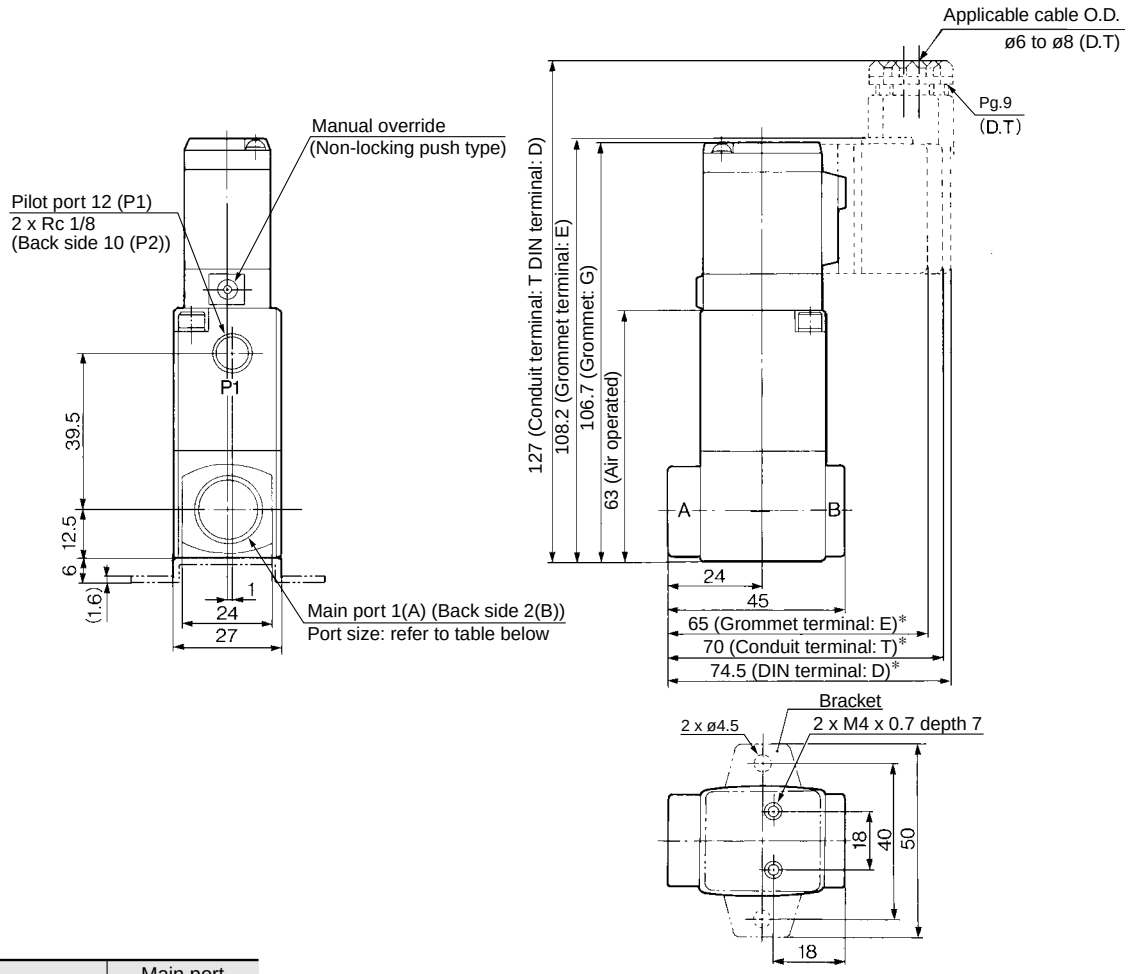
No.	Description	Material	Note
1	**Body**	Aluminum alloy	Platinum silver painted
2	**Cover assembly**	Aluminum alloy	Platinum silver painted
3 Note)	**Plate assembly**	Aluminum alloy	Valve material (NBR, FKM, EPR)
4 Note)	**Valve element**	Aluminum alloy	Valve material (NBR, FKM, EPR)
5	**Piston assembly**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

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

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**	**Seal 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 assembly for 25A-50A)	**Seal 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 page 363 for details.)				VO301-00□□□ (Refer to page 363 for details.)		

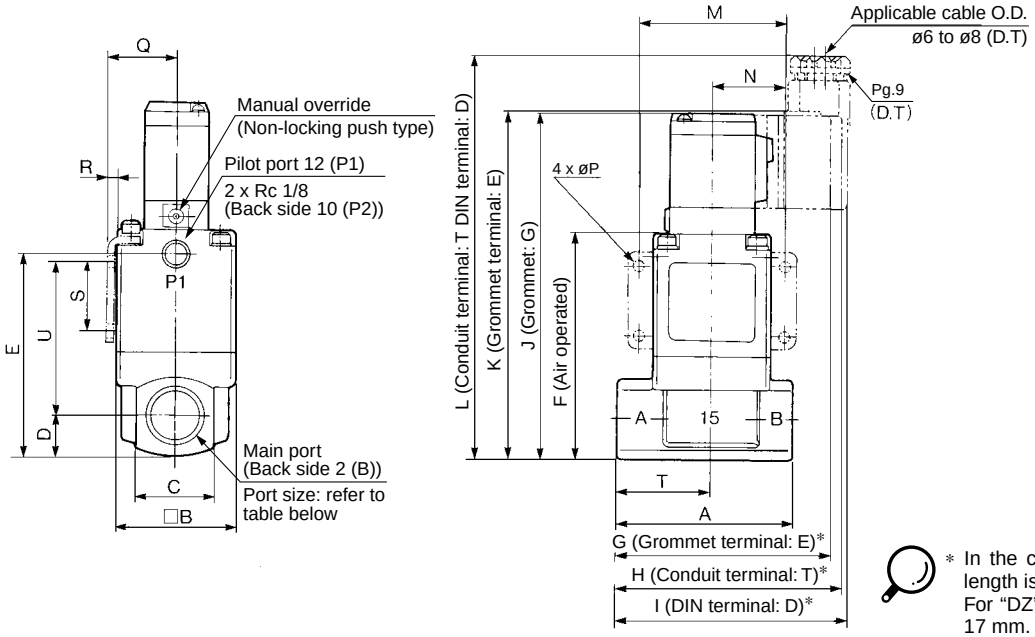
Port size: 6A, 8A, 10A



Model	Main port 1(A), 2(B)
VNA1□□□-6A	1/8
VNA1□□□-8A	1/4
VNA1□□□-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.

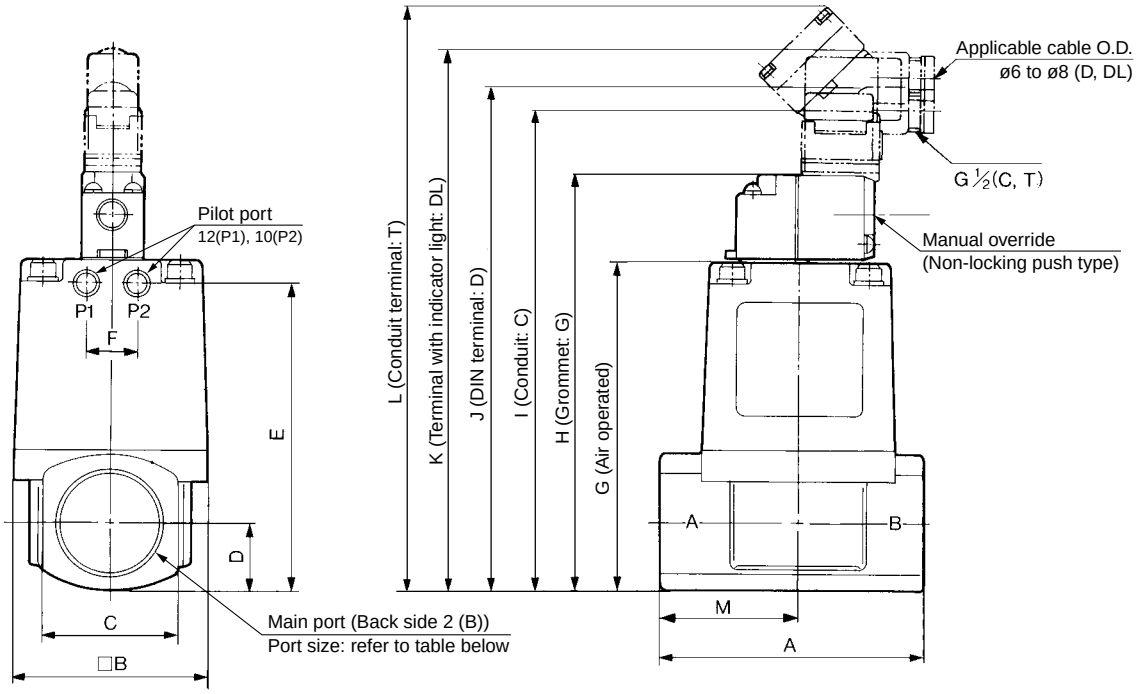
Port size: 10A, 15A, 20A, 25A



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

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
VNA2□□□-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
VNA2□□□-15A	1/2																				
VNA3□□□-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
VNA4□□□-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: 32A, 40A, 50A



Model	Main port 1(A), 2(B)	Pilot port 12(P1), 10(P2)	A	B	C	D	E	F	G	H	I	J	K	L	M
VNA5□□□-32A	1 1/4	1/8	105	77	53	26.5	120.5	20	129.5	163	175.5	219	223	229.5	55
VNA6□□□-40A	1 1/2	1/4	120	96	60	30	137	24	147	180.5	193	236	240.5	247	63
VNA7□□□-50A	2	1/4	140	113	74	37	160	24	170	203.5	216	259	263.5	270	74

How to Order Pilot Solenoid Valves

Valve size 1/2/3/4

SF4 − 1 DZ □ − 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 light/surge voltage suppressor

G	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

Valve size 5/6/7

VO301−00 □ □ □

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

With surge voltage suppressor

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

Electrical entry

G	Grommet
C	Conduit
T Note 1)	Conduit terminal
D	DIN terminal
DL Note 2)	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
- Light/Surge voltage Suppressor
- Coil rated voltage

Note 2) Semi-standard

Accessory
Function plate (D seal, with screw): DXT060-32-4A

Series VNA
Specific Product Precautions

Be sure to read before handling. Refer to front matters 42 and 43 for Safety Instructions, and pages 17 to 19 for 2 Port Solenoid Valves for Fluid Control Precautions.

External Pilot

⚠Caution

1. Pilot port piping

12(P1) and 10(P2) piping should be as follows according to the model

Port	VNA□01□	VNA□02□	VNA□03□	VNA□1½□
12 (P1)	External pilot	Bleed port	External pilot	External pilot
10 (P2)	Bleed port	External pilot	External pilot	Pilot exhaust

Installing a silencer to the exhaust port and the bleed port is recommended for noise reduction and for dust entry prevention.

Piping

⚠Caution

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

Mounting Direction of Pilot Solenoid Valve

⚠Warning

With external pilot solenoids, the pilot solenoid valves are not splash proof specifications, and so care must be taken not to get fluid on oneself such as when performing maintenance.

⚠Caution

Direction of mounting

When replacing a valve, if an external pilot solenoid valve is mounted in the wrong direction, it may malfunction or leak air.

Use with Air-hydro Unit

⚠Caution

1. Piping

Surge pressure is generated between the cylinder and the VNA during intermediate stoppage.
To directly thread in the cylinder, use durable fittings (Stainless steel square nipples etc,) instead of ductile iron fittings (JIS B 2301) or steel pipe fittings (JIS B 2302).
When VNA is installed away from the cylinder, use a high-pressure rubber hose (JIS B 6349) instead of steel pipe, when possible.

⚠Caution

1. Air bleeding

Series VNA valves have no air bleeding port. Bleed air comes from the middle piping. Bleeding by a vacuum 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 for best performance of the Series VNA. (Piping: JIS K 6349 high pressure hose)

Combination between Series-VNA and Speed control valve (Series AS)

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