

# Coolant Valve

## VNC Series

### Air Operated/External Pilot Solenoid



Cylinder actuation by pilot air

Wide selection of port size and variations

Threaded type (6A to 50A)  
Flange type (32F to 80F)



Low water hammer

For details, refer to page 626.

Large valve capacity

Av factor  $30 \times 10^{-6}$  to  $1600 \times 10^{-6}$   
(VNC1 to VNC7)  
Cv factor 49 to 100  
(VNC8 to VNC9)

VNA
VNB
SGC
SGH
VNC
VNH
VND
VCC
TQ

# Coolant Valve: Air Operated/External Pilot Solenoid VNC Series



[Option]  
Note) CE-compliant: For D or DZ only

## How to Order

**Seal material**  

A	NBR seals
B	FKM seals

**Thread type**  

Nil	Rc
F	G
N	NPT
T	NPTF

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

Nil	None
B (Note)	With bracket (VNC□-16)

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: VNC□-16#1  
↳ 2 to 4

**Air operated**    VNC **2** **0** **1** **A** - [ ] **15A** - [ ] (Except valve size 8, 9)

**External pilot solenoid**    VNC **2** **1** **1** **A** - [ ] **15A** - **1** **T** [ ] - [ ] - [ ]

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

Symbol	Orifice diameter (mm)	Symbol			Symbol	Port size Rc
		1 N.C. 0.5 MPa	2 N.O. 1 MPa	4 N.C. 1 MPa		
1	ø7	—	●	●	6A	1/8
		—	●	●	8A	1/4
		—	●	●	10A	3/8
2	ø15 (ø11)	●	●	●	10A	3/8
		●	●	●	15A	1/2
3	ø20 (ø14)	●	●	●	20A	3/4
4	ø25 (ø16)	●	●	●	25A	1
		●	●	●	32A	1 1/4
5	ø32 (ø22)	●	●	●	32F	1 1/4 B Flange
		●	●	●	40A	1 1/2
6	ø40 (ø28)	●	●	●	40F	1 1/2 B Flange
		●	●	●	50A	2
7	ø50 (ø33)	●	●	●	50F	2B Flange
8	ø65 (ø45)	●	—	●	65F	2 1/2 B Flange
9	ø80 (ø56)	●	—	●	80F	3B Flange

Values in parentheses are N.C. at 1 MPa.

**Rated voltage**

Nil	Air operated
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

\* Semi-standard  
For other rated voltages, please consult with SMC.

**CE-compliant**

Nil	—
Q	CE-compliant

Note) Electrical entry: D or DZ only

**Manual override**

<b>Nil: Non-locking push type</b>  <b>A: Non-locking* push type A* (projecting)</b>  <b>B: Slotted locking type B* (tool required)</b> 	Valve size 1
<b>Nil: Non-locking push type</b> 	Valve size 2 to 9

\* Semi-standard

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

Symbol	Electrical entry	Valve size 1	Valve size 2 to 9
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	●	●

**CE-compliant**

Symbol	Electrical entry	Valve size 1	Valve size 2 to 9
D	DIN terminal	●	●
DZ	DIN terminal with light/surge voltage suppressor	●	●

Note) The length of the grommet (G, GS) lead wire is 300 mm.

# Coolant Valve: Air Operated/External Pilot Solenoid **VNC Series**



## Model

Model	Port size		Orifice dia. ø (mm)	Flow rate characteristics		Weight (kg)	
	Threaded	<sup>Note)</sup> Flange		Kv	Conversion Cv	Air operated	External pilot solenoid
VNC1□□□-6A	1/8	—	7	1.1	1.2	0.2	0.3
VNC1□□□-8A	1/4	—		1.1	1.3		
VNC1□□□-10A	—	—		1.3	1.5		
VNC2□4□-10A	3/8	—	11	3.4	3.9	0.5	0.7
VNC2□□□-10A	—	—	15	4.3	5.0		
VNC2□4□-15A	1/2	—	11	3.9	4.5		
VNC2□□□-15A	—	—	15	5.0	5.8	0.8	1.0
VNC3□4□-20A	3/4	—	14	6.1	7.0		
VNC3□□□-20A	—	—	20	9.3	11		
VNC4□4□-25A	1	—	16	7.9	9.1	1.2	1.4
VNC4□□□-25A	—	—	25	13.2	15		
VNC5□4□-32A	1 1/4	—	22	14.3	17		
VNC5□□□-32A	—	—	32	20.0	23	2.2	2.4
VNC5□4□-32F	—	32	22	14.3	17		
VNC5□□□-32F	—	—	32	20.0	23		
VNC6□□□-40A	1 1/2	—	28	22.5	26	3.6	3.8
VNC6□4□-40A	—	—	40	29.3	34		
VNC6□4□-40F	—	40	28	25.7	30		
VNC6□□□-40F	—	40	40	34.3	40	6.8	7.0
VNC7□4□-50A	2	—	33	35.4	41		
VNC7□□□-50A	—	—	50	53.6	62		
VNC7□4□-50F	—	50	33	35.7	41	10.2	10.4
VNC7□□□-50F	—	—	50	57.1	66		
VNC814□-65F	—	65	45	42.4	49		
VNC811□-65F	—	—	65	60.6	70	—	15.7
VNC914□-80F	—	80	56	63.1	73		
VNC911□-80F	—	—	80	86.5	100		

Note) The companion flange is JIS B 2210 10K (standard) or its equivalent.

## Symbol

Operation	Valve type	
	N.C.	N.O.
Air operated	VNC□0□□	VNC□02□□
External pilot solenoid	VNC□1□□	VNC□12□□

## Specifications

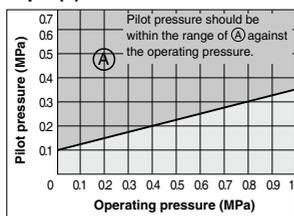
Fluid (Main piping)	Coolant <sup>Note 2)</sup>	
Fluid temperature	VNC□□□A	-5 to 60°C <sup>Note 1)</sup>
	VNC□1□B	-5 to 99°C <sup>Note 1)</sup>
Ambient temperature	-5 to 50°C (Air operated type: 60°C) <sup>Note 1)</sup>	
Proof pressure	1.5 MPa	
Applicable pressure range	VNC□□□□	0 to 0.5 MPa
	VNC□□□□	0 to 1 MPa
External pilot air	Pressure VNC□□□□	0.25 to 0.7 MPa
	VNC□□□□	0.1 + 0.25 x (Operating pressure) to 0.7 MPa Refer to "Graph (1)".
	Lubrication	Not required (Use turbine oil Class 1 ISO VG32, if lubricated.)
Temperature	-5 to 50°C (Air operated type: 60°C) <sup>Note 1)</sup>	
Mounting orientation	Unrestricted <sup>Note 3)</sup>	

Note 1) No freezing

Note 2) This product cannot be used in water.

Note 3) For external pilot solenoid, it is recommended that the pilot solenoid valve be oriented either vertically upward or horizontally.

## Graph (1) VNC□□□□ Pilot Pressure (N.O. type)



## Pilot Solenoid Valve Specifications

Model	VNC1	VNC2 to 9	
Pilot solenoid valve	SF4-□□□-23 SF4-□□□-23-Q	VG307-□□□-1 VO307-□□□-1-Q	
Electrical entry	Grommet Grommet terminal Conduit terminal DIN terminal	DIN terminal	
Coil rated voltage (V)	AC (50/60 Hz) DC	100 V, 200 V, Other voltage (Option) 24 V, Other voltage (Option)	
Allowable voltage fluctuation	-15% to +10% of rated voltage		
Temperature rise	35°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)	12.7 VA (50 Hz) 10.7 VA (60 Hz)
		Holding 3.4 VA (50 Hz) 2.3 VA (60 Hz)	7.6 VA (50 Hz) 5.4 VA (60 Hz)
Power consumption	DC	1.8 W (without light), 2 W (with light)	4 W (without light), 4.2 W (with light)
Manual override	Non-locking push type, Other (Option)		Non-locking push type

Note) Refer to page 624 for how to order pilot solenoid valves.

VNA

VNB

SGC

SGH

VNC

VNH

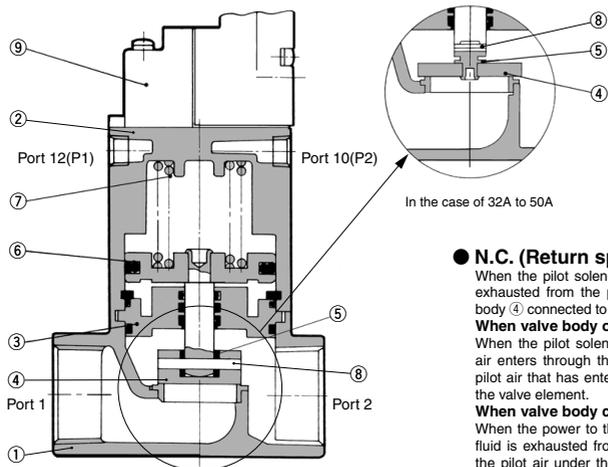
VND

VCC

TQ

## Construction

### N.C.



### ● N.C. (Return spring normally closed)

When the pilot solenoid valve ⑨ is not energized (or when air is exhausted from the port 12(P1) for air operated type), the valve body ④ connected to the piston ⑥ is closed by the return spring ⑦.

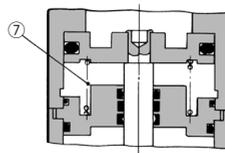
#### When valve body opens

When the pilot solenoid valve is energized (or when pressurized air enters through the port 12(P1) of the air operated type), 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 port 12(P1) of the air operated type), the pilot air under the piston is exhausted, and the return spring closes the valve element.

### N.O.



### ● N.O. (Return spring normally open)

In contrast with the N.C., when the pilot solenoid valve is not energized (or when air is exhausted from the port 10(P2) of the air operated type), the valve body is opened 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 type), the valve body closes.

## Component Parts

No.	Description	Material	Note
1	<b>Body assembly</b>	Cast iron	Plated
2	<b>Cover assembly</b>	Aluminum alloy	Platinum silver painted
3	<b>Plate assembly</b>	Iron	Seal material (NBR, FKM)
4	<b>Valve element</b>	Stainless steel	
5	<b>Valve cover</b>	NBR, FKM	32A to 50A are O-ring.
6	<b>Piston assembly</b>	Aluminum alloy	
7	<b>Return spring</b>	Piano wire	
8	<b>Spiral pin</b>	Stainless steel	
9	<b>Pilot solenoid valve</b>	—	

Note) 3, 5 components determine the valve composition.

## Replacement Parts

No.	Description	Part no.							
		VNC1□□□ -6A, 8A, 10A	VNC2□□□ -10A, 15A	VNC3□□□ -20A	VNC4□□□ -25A	VNC5□□□ -32A, 32F	VNC6□□□ -40A, 40F	VNC7□□□ -50A, 50F	
3	<b>Plate ass'y</b>	Seal material NBR FKM	VN2-A3CA VN2-A3CB	VN3-A3CA VN3-A3CB	VN4-A3CA VN4-A3CB	VN5-A3CA VN5-A3CB	VN6-A3CA VN6-A3CB	VN7-A3CA VN7-A3CB	
5	<b>Valve cover</b> (32A to 50A are O-ring)	Seal material NBR FKM	Refer to Note 1)		VN2-12CA VN2-12CB	VN4-12CA VN4-12CB	AS568-010	AS568-011	AS568-012
8	<b>Spiral pin</b> (32A to 50A are O-ring)		VN2-60-1	Refer to Note 2)	VN4-60-1	VN5-60-1	VN6-60-1	VN7-60-1	
9	<b>Pilot solenoid valve</b>	SF4-□□□-23	VO307-□□□:1 (Refer to page 624 for part no.)						

Note 1) Request factory repair.

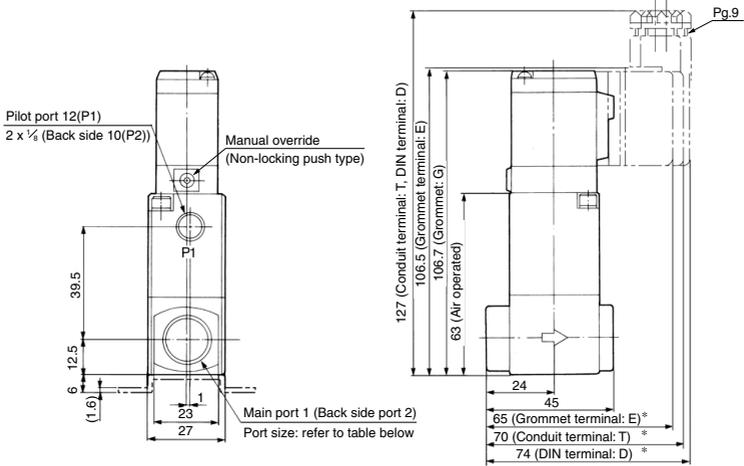
Note 2) For VNC3□□□ use VN3-60-1, and for VNC3□□□ use VN2-60-1.

## Replacement Parts: Applicable Flange

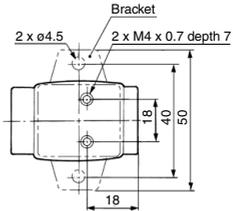
No.	Description	Part no.		
		VNC811□-65F	VNC911□-80F	
3	<b>Plate assembly</b>	Seal material NBR FKM	VN8-A3CA VN8-A3CB	VN9-A3CA VN9-A3CB
8	<b>Spiral pin</b>		VN7-60-1	
9	<b>Pilot solenoid valve</b>		VO307-□□□:1 (Refer to page 624 for part no.)	

# Coolant Valve: Air Operated/External Pilot Solenoid **VNC Series**

## Threaded Type/Port size: 6A, 8A, 10A



Model	Main port 1, 2
VNC1□□□-6A	1/8
VNC1□□□-8A	1/4
VNC1□□□-10A	3/8

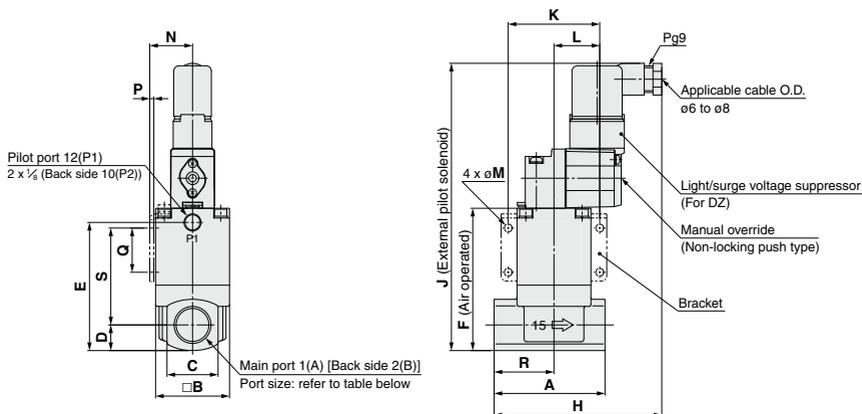


\* In the case of "EZ" or "TZ" or "DZ", the length is longer by 9 mm.

- VNA
- VNB
- SGC
- SGH
- VNC**
- VNH
- VND
- VCC
- TQ

# VNC Series

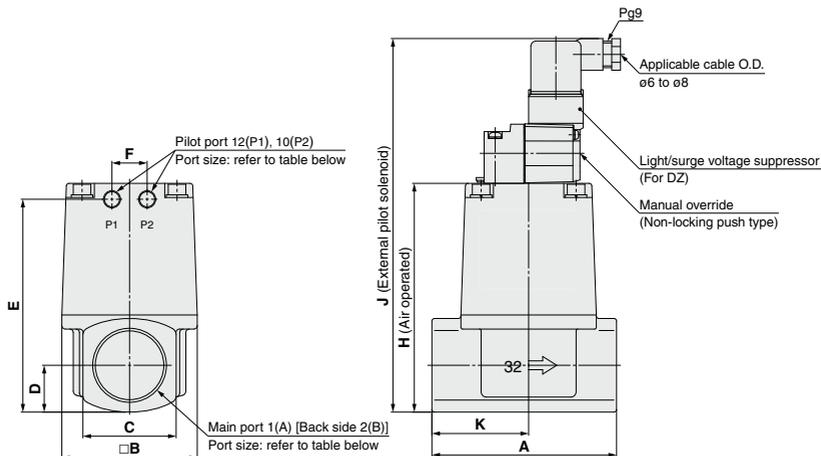
## Threaded Type/Port size: 10A, 15A, 20A, 25A



Model	Main port 1, 2	A	B	C	D	E	F	H	J (Note)	K	L	M	N	P	Q	R	S
VNC2□□□-10A	3/8	63	42	29	14.5	72.5	80.5	95.3	162.5 (164.5)	52	26	4.5	24.3	2.3	25	34	55
VNC2□□□-15A	1/2	63	42	29	14.5	72.5	80.5	95.3	162.5 (164.5)	52	26	4.5	24.3	2.3	25	34	55
VNC3□□□-20A	3/4	80	50	35	17.5	84	92	100.3	174 (176)	62	31	5.5	28.3	2.3	30	43	60.5
VNC4□□□-25A	1	90	60	44	22	100	108	101.3	190 (192)	72	36	6.5	33.3	2.3	35	49	71

Note 1 ( ): CE-compliant product (-Q)

## Threaded Type/Port size: 32A, 40A, 50A



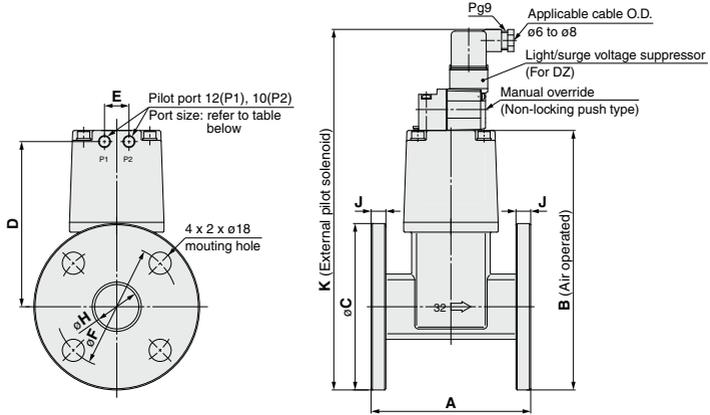
Model	Main port 1, 2	Pilot port 12(P1), 10(P2)	A (Note 1)	B	C	D	E	F	H	J (Note 2)	K (Note 1)
VNC5□□□-32A	1 1/4	1/8	105 (103)	77	53	26.5	120.5	20	129.5	211.5 (213.5)	55 (54)
VNC6□□□-40A	1 1/2	1/4	120 (118)	96	60	30	137	24	147	229 (231)	63 (62)
VNC7□□□-50A	2	1/4	140	113	74	37	160	24	170	252 (254)	74

Note 1 ( ): G thread

Note 2 ( ): CE-compliant product (-Q)

# Coolant Valve: Air Operated/External Pilot Solenoid **VNC Series**

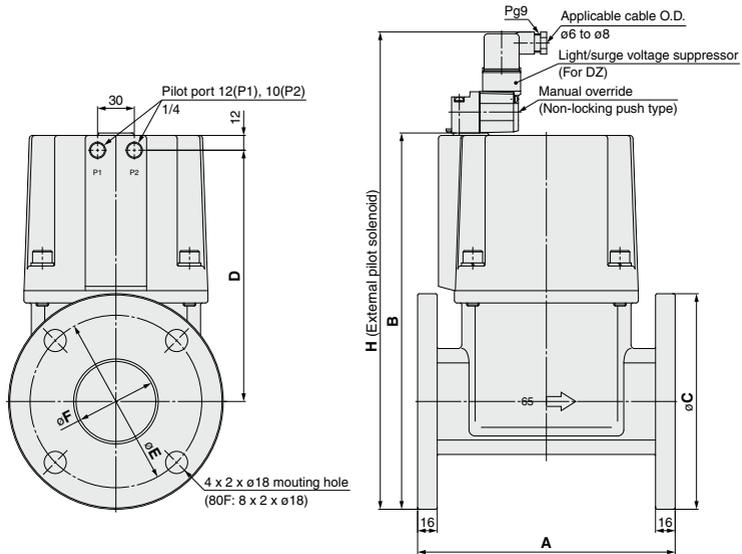
## Flange Type/Port size: 32F, 40F, 50F



Model	Applicable flange Port 1, 2	Pilot port 12(P1), 10(P2)	A	B	C	D	E	F	H	J	K (Note)
VNC5□□□-32F	32	1/8	130	210.5	135	134	20	100	36	12	292.5 (294.5)
VNC6□□□-40F	40	1/4	150	226	140	146	24	105	42	12	308 (310)
VNC7□□□-50F	50	1/4	180	250	155	162.5	24	120	54	14	332 (334)

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

## Flange Type/Port size: 65F, 80F



Model	Applicable flange Port 1, 2	A	B	C	D	E	F	H (Note)
VNC81□□-65F	65	210	305.5	175	204	140	65	387.5 (389.5)
VNC91□□-80F	80	240	341.5	185	235	150	80	423.5 (425.5)

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

- VNA
- VNB
- SGC
- SGH
- VNC
- VNH
- VND
- VCC
- TQ

## How to Order Pilot Solenoid Valves

### Valve size 1

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

#### 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

\* Semi-standard  
For other rated voltages,  
please consult with SMC.

#### CE-compliant

Nil	—
Q	CE-compliant

Note) Electrical  
entry: D or DZ  
only

#### 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

		CE-compliant
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	●

Note) The length of the grommet (G, GS) lead wire is 300 mm.

### Valve size 2 to 9

VO307 - **5** **D** **1** - **Q**

#### 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

\* Semi-standard  
For other rated voltages,  
please consult with SMC.

#### CE-compliant

Nil	—
Q	CE-compliant

#### Light/surge voltage suppressor

		CE-compliant
D	DIN terminal	●
DZ	DIN terminal with light/surge voltage suppressor	●

#### Accessory

Function plate for VO307 (D seal, with thread): DXT152-14-5A



# VNC Series

## Specific Product Precautions 1

Be sure to read this before handling the products.

Refer to back page 50 for Safety Instructions and pages 17 to 19 for 2 Port Solenoid Valve for Fluid Control Precautions.

### Design

#### Warning

##### 1. Extended periods of continuous energization

If a valve is continuously energized for long periods, heat generation of the coil may result in reduced performance and shorter service life. This may also have an adverse effect on the peripheral equipment in proximity. Should a valve be continuously energized for long periods, or its daily energized state exceeds its non energized state, please use valve with DC specifications. Additionally, when using with AC, energizing for long periods of time continuously, select the air-operated valve and use the continuous duty type of the VT307 for a pilot valve.

### Mounting

#### Warning

##### 1. Do not apply external force to the coil section.

When tightening is performed, apply a wrench or other tool to the outside of the piping connection parts.

##### 2. Do not warm the coil assembly with a heat insulator, etc.

Use tape, heaters, etc., for freeze prevention on the piping and body only. They can cause the coil to burn out.

##### 3. Avoid sources of vibration, or adjust the arm from the body to the minimum length so that resonance will not occur.

##### 4. When mounted in the vertical downward direction, foreign matter can remain in the plate assembly part if there are foreign matters in the coolant. For this reason, avoid mounting in the vertical downward direction as much as possible.

### Wiring

#### Caution

##### 1. Applied voltage

When electric power is connected to a solenoid valve, be careful to apply the proper voltage. Improper voltage may cause malfunction or coil damage.

##### 2. Confirm the connections.

After completing the wiring, confirm that the connections are correct.

### Piping

#### Caution

When high temperature fluids are used, use fittings and tubing with heat resistant features. (Self-align fittings, PTFE 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.

### External Pilot

#### Caution

##### Pilot port piping

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

Port	Air operated		Solenoid
	VNC□0 $\frac{1}{4}$ □	VNC□02□	VNC□1 $\frac{1}{4}$ □
12 (P1)	External pilot	Bleed port	External pilot
10 (P2)	Bleed port	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.

### Fluid quality

#### Caution

Please note that using fluids that contain foreign material (especially hard objects like glass chips), may cause damage to the valve, will reduce sealing performance, and may cause early failure.

VNA

VNB

SGC

SGH

VNC

VNH

VND

VCC

TQ



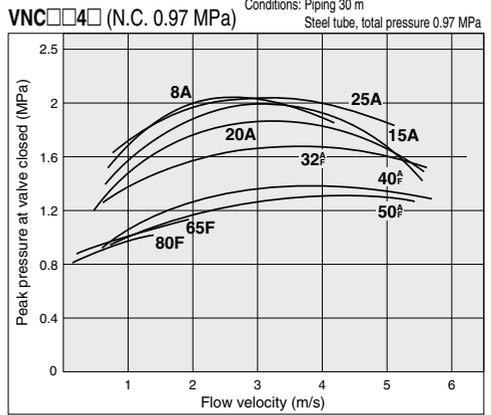
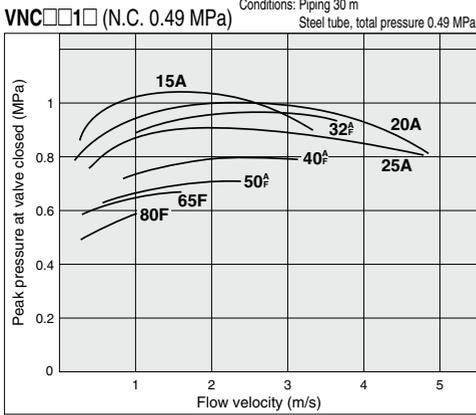
# VNC Series

## Specific Product Precautions 2

Be sure to read this before handling the products.

Refer to back page 50 for Safety Instructions and pages 17 to 19 for 2 Port Solenoid Valve for Fluid Control Precautions.

### Water Hammer Characteristics



### Calculating the Flow Velocity

$$v = 21.2 \times Q/d^2$$

**(Symbol)**

v: flow velocity (m/s)

Q: flow rate (L/min)

d: piping inner diameter (mm)