



Installation and Maintenance Manual
Series VX31/32/33 Direct Operated 3 Port
Solenoid Valve for Water, Oil, Steam, Air

1 Safety Instructions

- This manual contains essential information for the protection of users and others from possible injury and/or equipment damage.
- Read this manual before using the product, to ensure correct handling, and read the manuals of related apparatus before use.
- Keep this manual in a safe place for future reference.
- These instructions indicate the level of potential hazard by label of "DANGER", "WARNING" or "CAUTION", followed by important safety information which must be carefully followed.
- To ensure safety of personnel and equipment the safety instructions in this manual and the product catalogue must be observed, along with other relevant safety practices.

DANGER	In extreme conditions, there is a possibility of serious injury or loss of life.
WARNING	If instructions are not followed there is a possibility of serious injury or loss of life.
CAUTION	If instructions are not followed there is a possibility of injury or equipment damage.

WARNING

- **The compatibility of equipment is the responsibility of the person who designs the system or decides its specifications.**
Since the products specified here can be used in various operating conditions, their compatibility with a specific system must be based on specifications, post analysis and/or tests to meet specific requirements. The expected performance and safety assurance will be the responsibility of the person who has determined the compatibility of the system. This person should continuously review the suitability of all items specified, referring to the latest catalogue information and taking into consideration the possibility of equipment failure when configuring a system. Be particularly careful in determining the compatibility with the fluid to be used.
- **Only trained personnel should operate pneumatically operated machinery and equipment.**
- The fluid can be dangerous if handled incorrectly. Assembly, handling or maintenance of the system should be performed by trained and experienced personnel.
- **Do not service machinery/equipment or attempt to remove components until safety is confirmed.**
 - 1) Inspection and maintenance of machinery/equipment should only be performed once measures to prevent falling or runaway of driven component have been confirmed. Measures to prevent danger from the fluid should also be taken.
 - 2) When equipment is to be removed, confirm the safety processes as mentioned above. Release the fluid pressure and be certain there is no danger from fluid leakage or fluid remaining in the system. Switch off electrical supplies.
 - 3) Before machinery/equipment is re-started, ensure all safety measures are being implemented.
- **Do not use this product outside of the specifications. Contact SMC if it is to be used in any of the following conditions:**
 - 1) Conditions and environments beyond the given specifications, or if the product is to be used outdoors.
 - 2) With fluids whose application causes concern due to the type of fluid or additives, etc.
 - 3) Installations in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverage, recreation equipment, emergency stop circuits, press applications, or safety equipment.

1 Safety Instructions (continued)

- 4) An application which possibly having negative effects on people, property, or animals, requires special safety analysis.

CAUTION

- Ensure that the air supply system is filtered to 5 microns.

2 Specifications

2.1 General Specifications

VX31/32/33			
Valve specification	Valve construction		Direct operated poppet
	Withstand pressure		3.0 MPa
	Body material		Brass, Stainless steel
	Seal material		NBR, FKM, EPDM, PTFE, FFKM
	Enclosure		Dust tight, Low jet proof (equivalent to IP65) ⁽¹⁾
Coil specification	Environment		Location without corrosive or explosive gases.
	Rated voltage	AC (Class B coil, built-in wave rectifier type)	100 VAC, 200 VAC, 110 VAC, 220 VAC, 230 VAC, 240 VAC, 48 VAC
		AC (Class H coil)	
		DC	
	Allowable voltage fluctuation		±10% of rated voltage
	Allowable leakage voltage	AC (Class B coil, built-in wave rectifier type)	±5% or less of rated voltage
		AC (Class H coil)	±20% or less of rated voltage
		DC (Class B coil only)	±2% or less of rated voltage
		Coil insulation type	Class B, Class H

Note 1) Electrical entry, Grommet with surge voltage suppressor (GS) has a rating of IP40

Valve Operating Fluid and Ambient Temperature

Power Source	Operating fluid temperature (°C)				Ambient temperature (°C)
	Solenoid valve option (symbol)				
	Water		Oil		
	Nil, G,	E, P	A, H	D, N	
AC	1 to 60	1 to 99	-5 ⁽¹⁾ to 60	-5 ⁽¹⁾ to 120	-20 to 60
DC	1 to 40	-	-5 ⁽¹⁾ to 40	-	-20 to 40

Power Source	Operating fluid temperature (°C)			Ambient temperature (°C)
	Solenoid valve option (symbol)			
	Steam	Air		
	S, Q	Nil, G	V, M	
AC	183	-10 ⁽¹⁾ to 60	-10 ⁽¹⁾ to 40	-20 to 60
DC	-	-10 ⁽¹⁾ to 60	-10 ⁽¹⁾ to 40	-20 to 40

Note 1) Dew point temperature: -10°C or less

Manifold Operating Fluid and Ambient Temperature

Power Source	Operating fluid temperature (°C)				Ambient temperature (°C)
	Solenoid valve option (symbol)				
	Oil		Air		
	A	D	Nil	V	
AC	-5 ⁽¹⁾ to 60	-5 ⁽¹⁾ to 120	-10 ⁽¹⁾ to 60	-10 ⁽¹⁾ to 40	-20 to 60
DC	-5 ⁽¹⁾ to 40	-	-10 ⁽¹⁾ to 60	-10 ⁽¹⁾ to 40	-20 to 40

Note 1) Dew point temperature: -10°C or less

2 Specifications (continued)

2.2 Flow Characteristics

Valve VX3 Normally Closed (N.C.), Normally Open (N.O.), Common (COM.).

Port size	Orifice size (Ømm)	Model	Flow characteristics	
			Water, Oil, Steam	
			Av x 10 ⁻⁶ m ²	Cv converted
1/8 (6A)	1.5	VX311#-01	1.9	0.08
	2.2	VX312#-01	3.8	0.16
	3	VX313#-01	5.8	0.24
1/4 (8A)	1.5	VX311#-02	1.9	0.08
	2.2	VX312#-02	3.8	0.16
		VX322#-02	4.6	0.19
		VX332#-02	4.6	0.19
	3	VX313#-02	5.8	0.24
		VX323#-02	7.9	0.33
		VX333#-02	7.9	0.33
	4	VX324#-02	12.0	0.50
		VX334#-02	12.0	0.50
3/8 (10A)	2.2	VX322#-03	4.6	0.19
		VX332#-03	4.6	0.19
		VX323#-03	7.9	0.33
	3	VX333#-03	7.9	0.33
		VX324#-03	12.0	0.50
		VX334#-03	12.0	0.50

Table 1

- The values of Av and Cv are based on JIS B 2005:1995.

Valve VX3 Normally Closed (N.C.), Normally Open (N.O.), Common (COM.).

Port size	Orifice size (Ømm)	Model	Flow characteristics		
			Air		
			C[dm ³ / (s•bar)]	b	Cv
1/8 (6A)	1.5	VX311#-01	0.29	0.32	0.08
	2.2	VX312#-01	0.60	0.25	0.15
	3	VX313#-01	0.82	0.20	0.20
1/4 (8A)	1.5	VX311#-02	0.29	0.32	0.08
	2.2	VX312#-02	0.60	0.25	0.15
		VX322#-02	0.64	0.40	0.17
		VX332#-02	0.64	0.40	0.17
	3	VX313#-02	0.82	0.20	0.20
		VX323#-02	1.1	0.25	0.27
		VX333#-02	1.1	0.25	0.27
	4	VX324#-02	1.6	0.20	0.38
		VX334#-02	1.6	0.20	0.38
3/8 (10A)	2.2	VX322#-03	0.64	0.40	0.17
		VX332#-03	0.64	0.40	0.17
	3	VX323#-03	1.1	0.25	0.27
		VX333#-03	1.1	0.25	0.27
		VX324#-03	1.6	0.20	0.38

Table 2

- The values of C and b are based on JIS B 8390:2000.

2 Specifications (continued)

Valve VX3 Normally Closed (N.C.)

Port size	Orifice size (Ømm)	Model	Max. operating pressure differential (MPa)
			Air, Water & Oil
1/8 (6A)	1.5	VX3110-01	1.0
	2.2	VX3120-01	0.7
	3	VX3130-01	0.3
1/4 (8A)	1.5	VX3110-02	1.0
	2.2	VX3120-02	0.7
		VX3220-02	1.2
		VX3320-02	1.6
	3	VX3130-02	0.3
		VX3230-02	0.6
		VX3330-02	1.0
	4	VX3240-02	0.3
		VX3340-02	0.5
3/8 (10A)	2.2	VX3220-03	1.2
		VX3320-03	1.6
	3	VX3230-03	0.6
		VX3330-03	1.0
	4	VX3240-03	0.3
		VX3340-03	0.5

Table 3

Valve VX3 Normally Open (N.O.)

Port size	Orifice size (Ømm)	Model	Max. operating pressure differential (MPa)
			Air, Water & Oil
1/8 (6A)	1.5	VX3112-01	1.0
	2.2	VX3122-01	0.5
	3	VX3132-01	0.3
1/4 (8A)	1.5	VX3112-02	1.0
	2.2	VX3122-02	0.5
		VX3222-02	1.0
		VX3322-02	1.6
	3	VX3132-02	0.3
		VX3232-02	0.5
		VX3332-02	0.9
	4	VX3242-02	0.25
		VX3342-02	0.4
3/8 (10A)	2.2	VX3222-03	1.0
		VX3322-03	1.6
	3	VX3232-03	0.5
		VX3332-03	0.9
	4	VX3242-03	0.25

Table 4

2 Specifications (continued)

Valve VX3 Common (COM.)

Port size	Orifice size (Ømm)	Model	Max. operating pressure differential (MPa)
			Air, Water, Oil & Steam
1/8 (6A)	1.5	VX3114-01	0.7
	2.2	VX3124-01	0.4
	3	VX3134-01	0.2
1/4 (8A)	1.5	VX3114-02	0.7
	2.2	VX3124-02	0.4
		VX3224-02	0.7
		VX3324-02	1.0
	3	VX3134-02	0.2
		VX3234-02	0.3
		VX3334-02	0.6
	4	VX3244-02	0.2
		VX3344-02	0.3
		VX3224-03	0.7
3/8 (10A)	2.2	VX3324-03	1.0
		VX3234-03	0.3
	3	VX3334-03	0.6
		VX3244-03	0.2
	4	VX3344-03	0.3

Table 5

Valve VX3

Port size	Orifice size (Ømm)	Model	Max. System pressure (MPa)	Weight ⁽¹⁾ (g)
1/8 (6A)	1.5	VX311#-01	Air, Water, Oil : 2.0 Steam : 1.0	380
	2.2	VX312#-01		
	3	VX313#-01		
1/4 (8A)	1.5	VX311#-02		530
	2.2	VX312#-02		
		VX322#-02		730
		VX332#-02		380
	3	VX313#-02		530
		VX323#-02		730
		VX333#-02		530
	4	VX324#-02		730
		VX334#-02		730
3/8 (10A)	2.2	VX322#-03		530
		VX332#-03		730
	3	VX323#-03		530
		VX333#-03		730
	4	VX324#-03		530
		VX334#-03		730

Table 6

Note 1) Weight of grommet type. Add 10 g for conduit, 30 g for DIN terminal and 60 g for conduit terminal type.
Also add 60 g for VX31## , 80 g for VX32## and VX33## for bracket option.

2 Specifications (continued)

Manifold VX3

Orifice size (Ømm)	Model	Flow characteristics				
		Oil		Air		
		Av x 10 ⁻⁶ m ²	Cv converted	C[dm ³ / (s•bar)]	b	Cv
1.5	VX311#-00	1.9	0.08	0.29	0.32	0.08
2.2	VX312#-00	3.8	0.16	0.60	0.25	0.15
	VX322#-00	4.6	0.19	0.64	0.40	0.17
	VX332#-00					
3	VX313#-00	5.8	0.24	0.82	0.20	0.20
	VX323#-00	7.9	0.33	1.1	0.25	0.27
	VX333#-00					
4	VX324#-00	12	0.50	1.6	0.20	0.38
	VX334#-00					

Table 7

Manifold VX3

Orifice size (Ømm)	Model ⁽¹⁾	Max. operating pressure differential (MPa)			Max. system pressure (MPa)
		Oil, Air			
		N.C.	N.O.	COM.	
1.5	VX311#-00	1	1	0.7	2.0
2.2	VX312#-00	0.7	0.5	0.4	
	VX322#-00	1.2	1	0.7	
	VX332#-00	1.6	1.6	1	
3	VX313#-00	0.3	0.3	0.2	
	VX323#-00	0.6	0.5	0.3	
	VX333#-00	1	0.9	0.6	
4	VX324#-00	0.3	0.25	0.2	
	VX334#-00	0.5	0.4	0.3	

Table 8

Note 1) # = 1: N.C. , 3: N.O. , 5: COM.

2 Specifications (continued)

Port size	Orifice size (Ømm)		Model	Operating pressure (MPa)		Max. system pressure (MPa)
	Port 1 side	Port 3 side		Port 1 side	Port 3 side	
1/8 (6A)	3	1.5	VXV3130-01	Low vacuum	0 to 0.5	2.0
	1.5	3	VXV3132-01	0 to 0.5	Low vacuum	
1/4 (8A)	3	1.5	VXV3130-02	Low vacuum	0 to 0.5	
	1.5	3	VXV3132-02	0 to 0.5	Low vacuum	
	4	2.2	VXV3240-02	Low vacuum	0 to 0.5	
			VXV3340-02	0 to 0.9	0 to 0.9	
	2.2	4	VXV3242-02	0 to 0.5	Low vacuum	
			VXV3342-02	0 to 0.9	Low vacuum	
3/8 (10 A)	4	2.2	VXV3240-03	Low vacuum	0 to 0.5	
			VXV3340-03	0 to 0.9	0 to 0.9	
	2.2	4	VXV3242-03	0 to 0.5	Low vacuum	
			VXV3342-03	0 to 0.9	Low vacuum	

Table 11

Manifold VXV3 Normally Closed (N.C.), Normally Open (N.O.)

Orifice size (Ømm)		Model	Flow characteristics		
Port 1 side	Port 3 side		Passage 1 ⇄2		
			C[dm ³ / (s•bar)]	b	Cv
3	1.5	VXV3131-00	0.82	0.20	0.20
1.5	3	VXV3133-00	0.29	0.32	0.08
4	2.2	VXV3241-00	1.6	0.20	0.38
		VXV3341-00			
2.2	4	VXV3243-00	0.64	0.40	0.17
		VXV3343-00			

Table 12

Orifice size (Ømm)		Model	Flow characteristics		
Port 1 side	Port 3 side		Passage 2 ⇄3		
			C[dm ³ / (s•bar)]	b	Cv
3	1.5	VXV3131-00	0.29	0.32	0.08
1.5	3	VXV3133-00	0.82	0.20	0.20
4	2.2	VXV3241-00	0.64	0.40	0.17
		VXV3341-00			
2.2	4	VXV3243-00	1.6	0.20	0.38
		VXV3343-00			

Table 13

Orifice size (Ømm)		Model	Operating pressure (MPa)		Max. system pressure (MPa)
Port 1 side	Port 3 side		Port 1 side	Port 3 side	
3	1.5	VXV3131-00	Low vacuum	0 to 0.5	2.0
1.5	3	VXV3133-00	0 to 0.5	Low vacuum	
4	2.2	VXV3241-00	Low vacuum	0 to 0.5	
		VXV3341-00	0 to 0.9	0 to 0.9	
2.2	4	VXV3243-00	0 to 0.5	Low vacuum	
		VXV3343-00	0 to 0.9	Low vacuum	

Table 14

3 Installation

3.1 Installation



WARNING

- Do not install the product unless the safety instructions have been read and understood.

VX3 Valve Mounting Bracket (Optional)

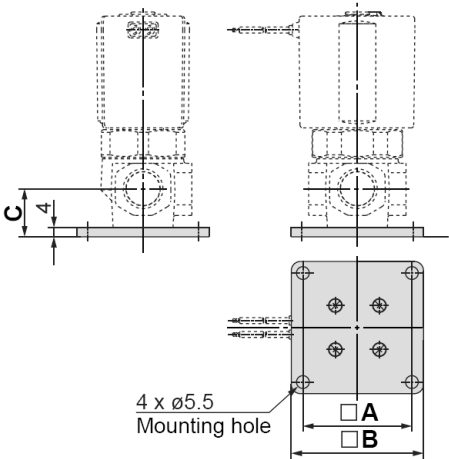


Figure 1

Model	Bracket Mounting (mm)		
	A	B	C
VX31##	40	50	17.5
VX32##	47	57	21
VX33##	47	57	21

Table 15

VX3 Manifold (for fluid Air or Oil)

- Aluminium

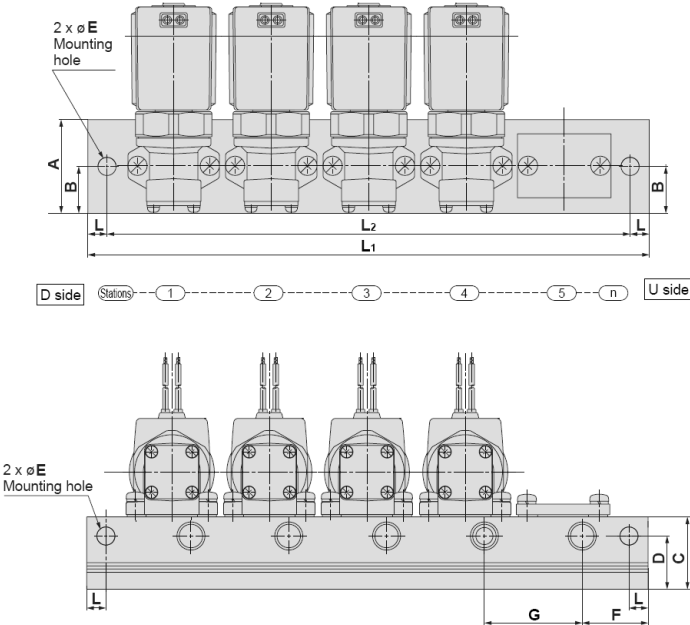


Figure 2

Model	Manifold Mounting (mm)							
	A	B	C	D	E	F	G	L
VX31##	40	20	33	24	6,5	26	36	6
VX32##	44	22	34	25	8,5	31	46	9
VX33##	44	22	34	25	8,5	31	46	9

Table 16

3 Installation (continued)

Model	Dimn (mm)	n Stations									
		2	3	4	5	6	7	8	9	10	
VX31##	L1	96	132	168	204	240	276	312	348	384	
	L2	84	120	156	192	228	264	300	336	372	
VX32##	L1	126	172	218	264	310	356	402	448	494	
VX33##	L2	108	154	200	246	292	338	384	430	476	

Table 17

- To assemble valve to manifold, ensure the valve is correctly positioned and gaskets are present.
- The solenoid valve is attached with 2 mounting screws.
- Tighten mounting screws to appropriate tightening torque shown in Table 18

Valve	Appropriate tightening torque (N•m)
Manifold	Aluminium manifold
VX31##	1.5 to 2.0
VX32##	1.5 to 2.0
VX33##	1.5 to 2.0

Table 18

3.2 Environment

WARNING

- Do not use in an environment where the product is directly exposed to corrosive gases, chemicals, salt water, water or steam.
- Do not use in an explosive atmosphere.
- The product should not be exposed to prolonged sunlight. Use a protective cover.
- Do not mount the product in a location where it is subject to excessive vibrations and/or impacts.
- Do not mount the product in a location exposed to radiant heat.
- Employ suitable protective measures in locations where there is contact with water droplets, oil or welding splatter, etc.
- Low temperature operation;

- The valve can be used in an ambient temperature of between -10 to -20°C. However, take measures to prevent the water from freezing or solidification of impurities.
- When using valves for water application in cold environments, take appropriate measures to prevent water freezing in the system, after the water supply from the pump is cut off, by draining the water, etc.
- When warming by heater, etc, be careful not to expose the coil assembly to the heater.
- For air, installation of a drier and heat retaining of the body is recommended to prevent a freezing condition in which the dew point temperature is higher than the ambient temperature,

3.3 Piping

CAUTION

- Before piping make sure to clean up chips, cutting oil, dust etc.
- When installing piping or fittings, ensure sealant material does not enter inside the port. When using seal tape, leave 1.5 to 2 threads exposed on the end of the pipe/fitting.
- Install piping so that it does not apply pulling, pressing, bending or other forces on the valve body.
- In applications such as vacuum and non-leak specifications, use caution against contamination of foreign objects and air tightness of fittings.
- Steam generated by a boiler contains a large amount of water vapour, ensure to operate with a drain trap installed.

3 Installation (continued)

Valve

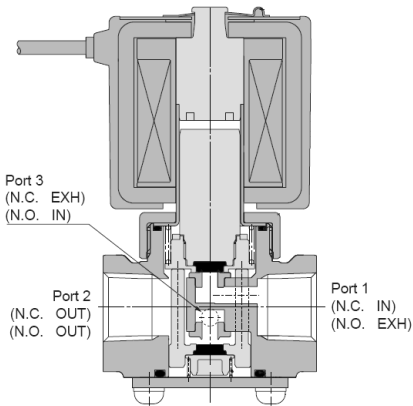


Figure 3

Model	Port Size
VX31##	Rc. G, NPT, NPTF 1/8, 1/4
VX32##	Rc. G, NPT, NPTF 1/4, 3/8
VX33##	Rc. G, NPT, NPTF 1/4, 3/8

Table 19

Manifold

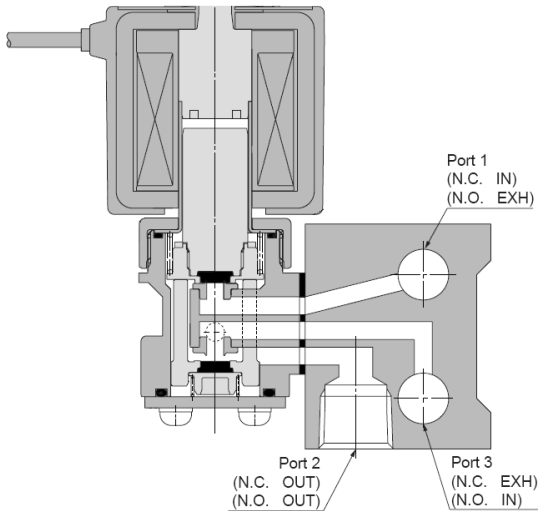


Figure 4

Model	Port		
	1	2	3
VX31##	Rc 1/4	Rc 1/8, 1/4	Rc 1/4
VX32##	Rc 1/4	Rc 1/8, 1/4	Rc 1/4
VX33##	Rc 1/4	Rc 1/8, 1/4	Rc 1/4

Table 20

- Tighten fittings to torque shown in Table 21

Thread	Appropriate tightening torque (N•m)
Rc 1/8	7 to 9
Rc 1/4	12 to 14
Rc 3/8	22 to 24

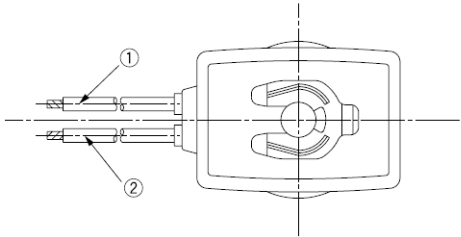
Table 21

3 Installation (continued)

3.4 Electrical Connection

CAUTION

Class H coil: AWG18 Insulator O.D. 2.2 mm
Class B coil: AWG20 Insulator O.D. 2.4 mm



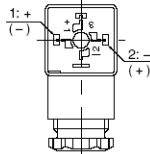
Rated voltage	Lead wire color	
	①	②
DC (Class B only)	Black	Red
100 VAC	Blue	Blue
200 VAC	Red	Red
Other AC	Gray	Gray

* There is no polarity. (For the low power consumption type, there is polarity.)

Figure 5

DIN connector (Class B only)

Since internal connections are as shown below for the DIN connector, make connections to the power supply accordingly.



Terminal no.	1	2
DIN terminal	+ (-)	- (+)

- * There is no polarity.
- Use compatible heavy duty cords with cable O.D. of ø6 to 12.
- Use the tightening torques below for each section.

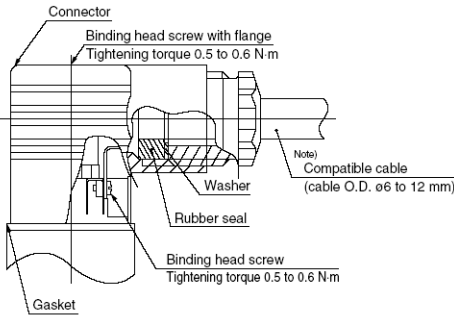


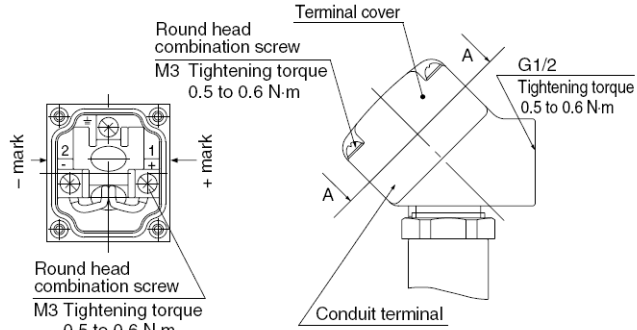
Figure 6

3 Installation (continued)

Conduit terminal

In the case of the conduit terminal, make connections according to the marks shown below.

- Use the tightening torques below for each section.
- Properly seal the terminal connection (G1/2) with the special wiring conduit, etc.



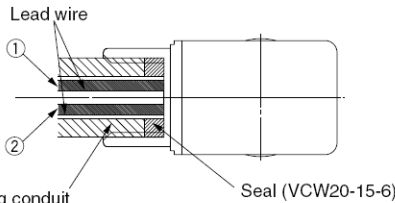
View A-A
(Internal connection diagram)

Figure 7

Conduit

When used as an IP65 equivalent, use seal (part no. VCW20-15-6) to install the wiring conduit. Also, use the tightening torque below for the conduit.

Class H coil: AWG18 Insulator O.D. 2.2 mm
Class B coil: AWG20 Insulator O.D. 2.4 mm



Bore size G1/2 Tightening torque 0.5 to 0.6 N•m

Rated voltage	Lead wire color	
	①	②
DC	Black	Red
100 VAC	Blue	Blue
200 VAC	Red	Red
Other AC	Gray	Gray

* There is no polarity for DC. (For the low power consumption type, there is polarity.)

Description	Part no.
Seal	VCW20-15-6

Note) Please order separately.

Figure 8

3 Installation (continued)

- For polarity indications:
 - No diode to protect polarity: if polarity connection is wrong, the diode in the valve or switching device at control equipment or power supply may be damaged.
 - With diode to protect polarity: if polarity connection is wrong, the valve does not switch.
- Avoid mis-wiring, as this can cause malfunction, damage and fire to the product.
- To prevent noise and surge in signal lines, keep all wiring separate from power lines and high voltage lines. Otherwise this can cause malfunction.
- When a surge from the solenoid affects the electrical circuitry, install a surge absorber, etc., in parallel with the solenoid. Or, adopt an option that comes with the surge voltage protection circuit.
- Use electrical circuits that do not generate chattering in their contacts.
- Use voltage that is within $\pm 10\%$ of the rated voltage. In cases with a DC power supply where responsiveness is important, stay within $\pm 5\%$ of the rated value. (The voltage drop is the value in the lead wire section connecting the coil).
- Generally use electrical wire with cross sectional area 0.5 to 1.25 mm².
- Do not bend or pull cables repeatedly.
- Connect the wires so that an external force greater than 10 N is not applied to the lead wire, otherwise the coil will burn.
- When the conduit type is used as an equivalent to an IP65 enclosure, install a wiring conduit, etc.
- When connecting C-R element parallel to switching element, leakage current flows through C-R element and the leakage voltage increases.

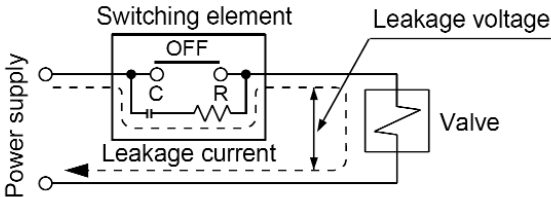


Figure 9

Ensure that the voltage leakage across the coil is as follows:
AC/Class B built-in full-wave rectifier coil: 5% or less of rated voltage.
AC/Class H coil: 20% or less of rated voltage.
DC coil: 2% or less of rated voltage.

3.5 Mounting

- If air leakage increases or equipment does not operate properly, stop operation. After mounting is completed, confirm that it has been done correctly by performing a suitable function test.
- Do not apply external force to the coil section.
When tightening fittings, apply a wrench or other tool to the outside of the piping connecting parts.
- Do not mount valve with coil downwards.
- If a valve is mounted with the coil positioned downwards, foreign objects in the fluid will adhere to the iron core leading to a malfunction.
- Do not warm the coil assembly with a heat insulator etc.
Use tape, heaters etc. to prevent freezing, on the piping and valve body only.
- Secure with brackets, except when using steel pipe and copper fittings.
- Avoid sources of vibration, or adjust the distance from the body to a minimum length so that resonance will not occur.
- Painting and coating;
Warnings or specifications printed or labelled on the product should not be erased, removed or covered up.

3.6 Lubrication

CAUTION

- This valve can be operated without lubrication.
- SMC products have been lubricated for life at manufacture, and do not require lubrication in service.
- If a lubricant is used in the system, use turbine oil Class 1(no additive), ISO VG32. But do not lubricate a valve with EPDM seal.
- Once lubricant is used in the system, lubrication must be continued because the original lubricant applied during manufacturing will be washed away.

4 Circuit Symbols

Valve type	Circuit Symbol
Normally Closed (N.C.)	
Normally Open (N.O.)	
Common (COM.)	
Normally Closed (N.C.) (VXV3: For vacuum pad)	
Normally Open (N.O.) (VXV3: For vacuum pad)	

Table 22

Manifold

Manifold type	Circuit Symbol
Normally Closed (N.C.)	
Normally Open (N.O.)	
Common (COM.)	
Normally Closed (N.C.) (VXV3: For vacuum pad)	
Normally Open (N.O.) (VXV3: For vacuum pad)	

Table 23

5 Internal Circuit & Wiring

Grommet, Conduit, Conduit terminal, DIN connector

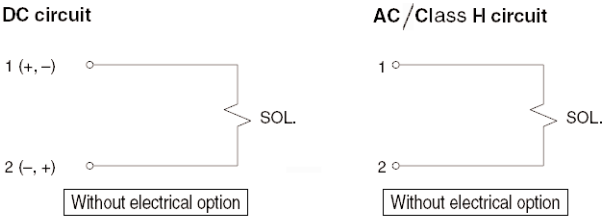


Figure 10

Conduit terminal, DIN connector

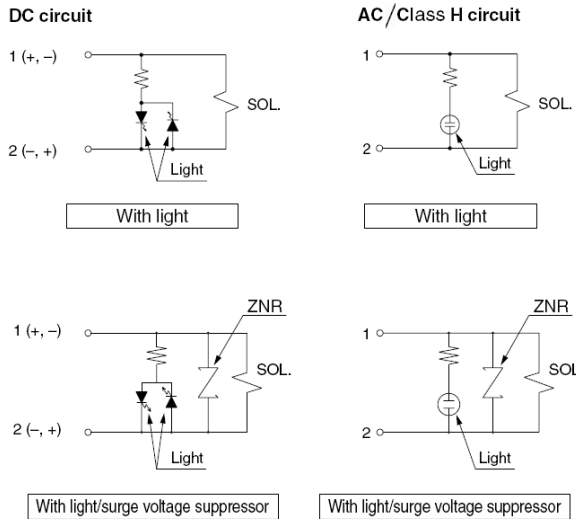


Figure 11

Grommet, Conduit terminal, DIN connector

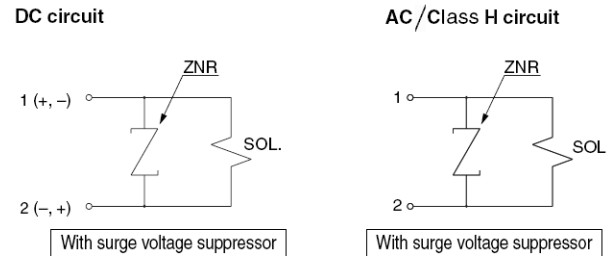


Figure 12

[AC/Class B Circuit]

* For AC/Class B, the standard product is equipped with surge voltage suppressor.

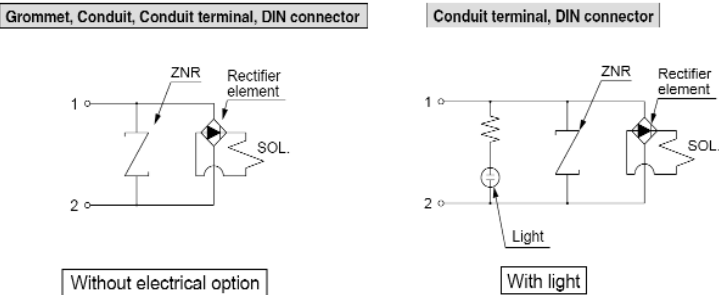


Figure 13

6 Maintenance

6.1 General Maintenance

CAUTION

- Not following proper maintenance procedures could cause the product to malfunction and lead to equipment damage.
- If handled improperly, compressed air can be dangerous. Maintenance of pneumatic systems should be performed by qualified personnel only.
- Drain: remove condensate from the filter bowl on regular basis.
- Before performing maintenance ensure the supply pressure is shut off and all residual air pressure is released from the system.
- After maintenance apply operating pressure and power to the equipment and check for proper operation and possible air leaks. If operation is abnormal, verify product set-up parameters.
- Do not make any modification to the product.
- Do not disassemble the product, unless required by installation or maintenance instructions.
- In case of long term storage after use with heated water, thoroughly remove all moisture to prevent rust and deterioration of rubber materials etc.
- Low frequency operation:
Switch valves at least once every 30 days to prevent malfunction. Also, in order to use it under optimum state, conduct a regular inspection once every 6 months.
- Filters and strainers:
 - Be careful regarding clogging of filters and strainers
 - Replace filter elements after one year of use, or earlier if the pressure drop reaches 0.1 MPa.
 - Clean strainers when the pressure drop reaches 0.1 MPa.

6.2 Valve Removal

WARNING

- The valve will reach high temperature when used with high temperature fluids. Confirm that the valve temperature has dropped sufficiently before performing work. If valve is touched inadvertently, there is danger of being burned.
- Shut off the fluid supply and release the fluid pressure in the system.
- Shut off the power supply and disconnect the leads.
- Remove the valve, ensuring any O-rings/gaskets are retained.

6.3 Solenoid Coil Replacement (see Figure 14)

WARNING

- The valve will reach high temperature when used with high temperature fluids. Confirm that the valve temperature has dropped sufficiently before performing work. If valve is touched inadvertently, there is danger of being burned.
- Shut off the fluid supply and release the fluid pressure in the system.
- Shut off the power supply and disconnect the leads.
- Carefully remove the clip using a flat bladed screwdriver, try not to damage name plate.
- Remove name plate.
- Slide off coil from tube assembly.
- Assembly is the reverse of removal, replace name plate if damaged.

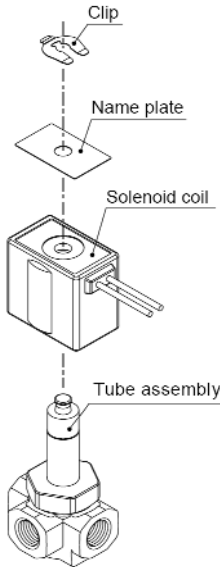


Figure 14

7 Limitations of Use

⚠ WARNING

- Do not exceed any of the specifications in section 2 of this document or the specific product catalogue.

7.1 Confirm the specifications

- Give careful consideration to the operating conditions such as the application, fluid and environment and use within the operating ranges specified in the catalogue.

7.2 Fluid

- Type of fluid;
Before using a fluid, confirm whether it is compatible with the materials for each model by referring to the fluids listed in the catalogue. Use a fluid with a dynamic viscosity of 50 mm²/s or less.
- Flammable oil, Gas;
Confirm the specification for leakage in the interior and/or exterior area.
- Corrosive gas;
Cannot be used since it will cause cracks by stress corrosion or result in other incidents.
- Use an oil-free specification when any oily particles must not enter the system.
- Applicable fluid in the catalogue list may not be suitable depending on the operating conditions. Give adequate consideration and then determine a suitable model, as the compatibility list is for general case.

7.3 Fluid quality

- The use of a fluid what contains foreign matter can cause problems such as malfunction and seal failure by promoting wear of the valve seat and armature, and by sticking to the sliding parts of the armature, etc.
- Install a suitable filter (strainer) immediately upstream from the valve. As a general rule, use 80 to 100 mesh.
- When the valve is used to supply water to boilers, substances such as calcium and magnesium, which generate hard scale and sludge, are present. Since this scale and sludge can cause the valve to malfunction, install water softening equipment and a filter (strainer) directly upstream from the valve to remove these substances.

7.4 Air quality

- Use clean air;
Do not use compressed air which includes chemicals, synthetic oils containing organic solvents, salt or corrosive gases, etc., as it can cause damage or malfunction of the valve.
- Install air filters;
Install air filters upstream, close to the valves. A filtration of 5 µm or less should be selected.
- Install an air drier or after cooler;
Compressed air that includes excessive drainage may cause malfunction of valves and other pneumatic equipment. To prevent this, install an air drier or after cooler, etc.
- If excessive carbon powder is generated, eliminate it by installing mist separators upstream of the valves. If excessive carbon powder is generated by the compressor, it may adhere to the inside of the valves and cause a malfunction.

7.5 Maintenance space

- The installation should allow sufficient space for maintenance activities.

7.6 Fluid pressure range

- Fluid pressure should be within the allowable pressure range.

7.7 Ambient environment

- Use within the allowable ambient temperature range. Confirm the compatibility between the products composition materials and the ambient atmosphere.
- Ensure that the fluid does not touch the external surface of the product.

7.8 Static electricity

- Take measures against static electricity, since some fluids can cause static electricity.

7.9 Cannot be used as an emergency shut-off valve etc.

- This product is not designed for safety applications such as an emergency shut-off valve. If the valves are used in this type of system, other reliable safety assurance measures should also be adopted.

7 Limitations of Use (continued)

7.10 Extended periods of continuous energization

- The solenoid coil will generate heat when continuously energized, so avoid installing in an enclosed space. Install in a well-ventilated area.
- Do not touch the coil while it is being energized or immediately after energization.
- Be especially careful when using three or more adjacent valves with manifolds and keeping them continuously energized for extended periods, as this may result in dramatic increases in temperature.

7.11 Pressure (including vacuum) holding

- Do not use for applications such as holding the pressure (including vacuum) inside a pressure vessel because of air leakage in the valve.

7.12 Impact precautions

- When impacts, such as water hammer (caused by rapid pressure fluctuations), etc. are detected, the solenoid valve may be damaged. Please carry out inspection of valve and take preventive measures.

8 Contact

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