



## Installation and Maintenance Manual VCA Direct Operated 2 Port Solenoid Valve for Air



Read this manual before using this product

- The information within this document is to be used by pneumatically trained personnel only.
- For future reference, please keep manual in a safe place.
- This manual should be read in conjunction with the current catalogue.

## 1 SAFETY

### 1.1 General recommendation

These safety instructions are intended to prevent a hazardous situation and/or equipment damage. These instructions indicate the level of potential hazard by label of "Caution", "Warning" or "Danger". To ensure safety, be sure to observe ISO4414 (<sup>1</sup>), JIS B 8370 (<sup>2</sup>) and other safety practices.

Note 1:ISO 4414:Pneumatic fluid power - General rules relating to systems.

Note 2:JIS B 8370:Pneumatic system axiom.

**CAUTION:** Operator error could result in injury or equipment damage.

**WARNING:** Operator error could result in serious injury or loss of life.

**DANGER:** In extreme conditions, there is a possible result of serious injury or loss of life.

### WARNING:

- The compatibility of pneumatic equipment is the responsibility of the person who designs the pneumatic system or decides its specifications.
  - Since the products specified here are used in various operating conditions, their compatibility for the specific pneumatic system must be based on specifications or after analysis and/or tests to meet your specific requirements.
- Only trained personnel should operate pneumatically operated machinery and equipment.
  - Compressed air can be dangerous if an operator is unfamiliar with it Assembly, handling or repair of pneumatic systems should be performed by trained and experienced operators.
- Do not service machinery/equipment or attempt to remove components until safety is confirmed.
  - Inspection and maintenance of machinery/equipment should only be performed after confirmation of safe locked-out control positions.
  - When equipment is to be removed, confirm the safety process as mentioned above. Switch off air and electrical supplies and exhaust all residual compressed air in the system.
  - Before machinery/equipment is re-started, ensure all safety measures to prevent sudden movement of cylinders etc. (Bleed air into the system gradually to create backpressure, i.e. incorporate a soft-start valve).
- Contact SMC if the product is to be used in any of the following conditions:
  - Conditions and environments beyond the given specifications, or if product is used outdoors.
  - Installations on equipment in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverage, recreation equipment, emergency stop circuits, press applications, or safety equipment.
  - An application, which has the possibility of having negative effects on people, property, or animals, requiring special safety analysis.

### CAUTION:

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

### 1.2 Conformity to standard

This product is certified to and complies with the following standards:

EMC Directive 89/336/EEC	EN 61000-6-2, EN 55011
Low Voltage Directive 93/68/EEC	DIN VDE 0580

## 2 INTENDED CONDITIONS OF USE

### 2.1 Specifications

#### Standard Specifications

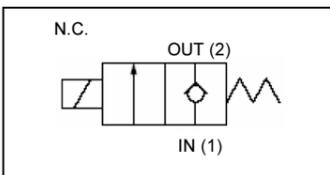
Valve specifications	Valve construction	Direct operated poppet		
	Fluid	Air/Inert gas		
	Withstand pressure MPa	2.0		
	Body material	Al		
	Seal material	HNBR		
	Ambient temperature °C	-20 to 60		
	Fluid temperature °C	-10 to 60 (with no freezing)		
	Enclosure	Dust proof, Splash proof (equivalent to IP65)		
	Environment	Location without corrosive or explosive gases		
	Valve leakage cm <sup>3</sup> /min (ANR)	0.2 or less		
Coil specifications	Mounting orientation	Unrestricted		
	Vibration/Impact m/s <sup>2</sup> (Note 2)	30/150 or less		
	Rated voltage	24VDC, 12VDC, 100VAC, 110VAC, 200VAC, 220VAC (50/60Hz)		
	Allowable voltage fluctuation	±10% of rated voltage		
	Coil insulation type	Class B		
	Power	DC	VCA2: 6.5W, VCA3: 8W, VCA4: 11.5W	
	Apparent power	AC (Note 1)	50Hz	VCA2: 7.5VA, VCA3: 10VA, VCA4: 13VA
			60Hz	

(Note 1) Since AC coil specifications include a rectifying device, there is no difference in apparent power for starting and holding.

(Note 2) Vibration resistance: Conditions when tested with one sweep of 10 to 300Hz in the axial direction and at a right angle to the armature, in both energized and de-energized states.

Impact resistance: Conditions when tested with a drop tester in the axial direction and at a right angle to the armature, one time each in energized and de-energized states.

### 2.2 Circuit Symbols



## 3 INSTALLATION

### WARNING:

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

### 3.1 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 strong vibrations and/or shock. Check the product specifications for above ratings.
- Do not mount the product in a location where it is exposed to radiant heat.

### 3.2 Piping

#### CAUTION:

- Before piping make sure to clean up chips, cutting oil, dust etc.
- When installing piping or fitting into a port, ensure that sealant material does not enter the port inside. When using seal tape, leave 1.5 to 2 threads exposed on the end of pipe/fitting.

Thread	Appropriate tightening torque (Nm)
Rc 1/8	7 to 9
Rc 1/4	12 to 14
Rc 3/8	22 to 24
Rc 1/2	28 to 30
Rc 3/4	28 to 30

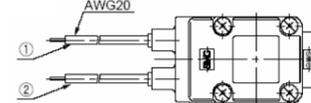
### 3.3 Electrical connection

#### CAUTION:

- When DC power is connected to a solenoid valve equipped with light and/or surge voltage suppressor, check for polarity indications.
- 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.
- Use electrical wire with a conductor cross sectional area of 0.5 to 1.25mm<sup>2</sup> for wiring. Furthermore, do not allow excessive force to be applied to the wires.
- Use electrical circuits which do not generate chattering in their contacts.
- Use voltage which is within ±10% of the rated voltage. In cases where importance is placed on responsiveness, stay within ±5% of the rated value. The voltage drop is the value in the lead wire section connecting the coil.

### Grommet

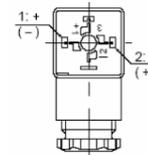


Rated voltage	Lead wire color	
	①	②
DC	Black	Red
100VAC	Blue	Blue
200VAC	Red	Red
Other AC	Gray	Gray

\* There is no polarity for DC.

### Din Connector

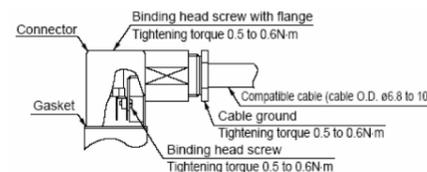
Since internal connections are as shown below for the DIN connector, make connections to the power supply accordingly.



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

\* There is no polarity.

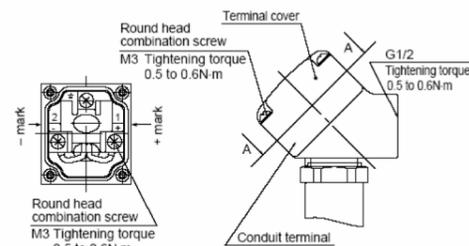
- Use compatible heavy duty cords with cable O.D. of ø6.8 to 10.
- Use the tightening torques below for each section.



### 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.

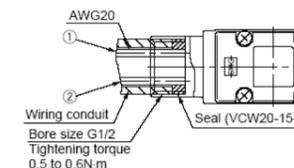


View A-A  
(Internal connection diagram)

\* There is polarity only when equipped with light.

### Conduit

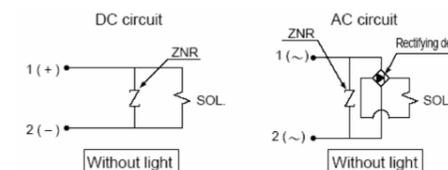
When used as an IP65 equivalent, use seal (part no. VCW20-15-6) to install the wiring conduit. Also, use the tightening torque below for the conduit.



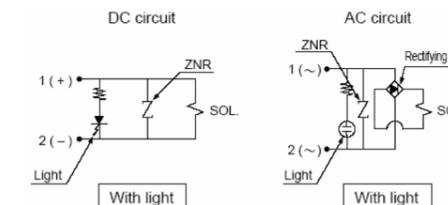
Rated voltage	Lead wire color	
	①	②
DC	Black	Red
100VAC	Blue	Blue
200VAC	Red	Red
Other AC	Gray	Gray

## Electrical Circuits

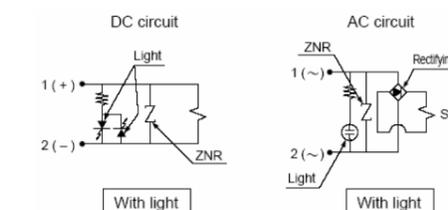
### Grommet, Conduit, Conduit terminal, DIN connector



### Conduit terminal



### DIN connector



## 3.4 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 is performed, apply a wrench or other tool to the outside of the piping connection parts.
- Do not warm the coil assembly with a heat insulator, etc. Use tape and heaters, etc., for freeze prevention on the piping and body only. They can cause burn out of the coil.
- 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.
- Secure with the use of brackets or bottom mount threads, where appropriate.
- Avoid sources of vibration, or redesign mounting so that resonance will not occur.
- Painting and coating. Warnings or specifications printed or pasted on the product should not be erased, removed or covered up.

### 3.5 Lubrication



#### CAUTION:

- SMC products have been lubricated for life at manufacturer, and do not require lubrication in service.
- If a lubricant is used in the system, use turbine oil Class 1 (no additive), ISO VG32. Once lubricant is used in the system, lubrication must be continued because the original lubricant applied during manufacturing will be washed away.

## 4 SETTINGS AND PROGRAMMING

### Manual Override Operation

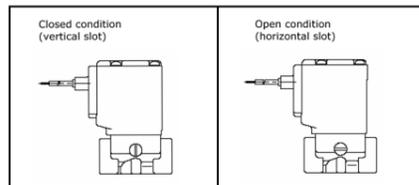
Manual operation for slotted locking type (tool required)

Opening the Valve:

With a flat head screwdriver, turn 90° to the right to open the valve. The valve remains in the open condition even when the screwdriver is removed.

Closing the valve:

Turn 90° to the left from the open condition to close the valve. Perform electrical operation with the valve closed.



## 5 MAINTENANCE



#### WARNING:

- Not following proper procedures could cause the product to malfunction and could lead to damage to the equipment or machine.
- If handled improperly, compressed air can be dangerous. Assembly, handling and repair of pneumatic system should be performed by qualified personnel only.
- Drain: remove condensate from the filter bowl on a regular basis.
- Shut-down before maintenance: before attempting any kind of maintenance make sure the supply pressure is shut off and all residual air pressure is released from the system to be worked on.
- Start-up after maintenance: apply operating pressure and power to the equipment and check for proper operation and possible air leaks. If operation is abnormal, please 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.

#### Removing the product

- Shut off the fluid supply and release the fluid pressure in the system.
- Shut off the power supply.
- Remove the product.

#### Low frequency operation

- Switch valves at least once every 30 days to prevent malfunction.



#### CAUTION:

#### Filters and strainers

- Be careful regarding clogging of filters and strainers.
- Replace filter elements after one year of use, or earlier if the amount of pressure drop reaches 0.1MPa.
- Clean strainers when the amount of pressure drop reaches 0.1MPa.
- Flush drainage from air filters periodically.

#### Manual override operation

- When the manual override is operated, connected equipment will be actuated. Confirm safety before operating.

#### Manifold Components

Consult specific product catalogue for manifold component parts.

#### Assembly and Disassembly

Before disassembling, shut down the power supply and air pressure supply, and release the residual pressure.

Disassembly procedure

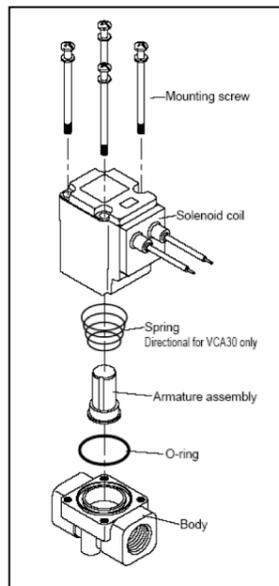
- Remove the mounting screws on the top.
- Remove the solenoid coil, spring, and armature assembly.
- If foreign matter is adhering to the parts, perform an appropriate procedure, such as blowing with air or cleaning with a neutral detergent.

Assembly procedures

- Re-assemble by following the disassembly procedure in the reverse order.
- When changing the electrical entry direction, mount it in the direction that solenoid coils will be mounted.

(Note 1) For series VCA30, the end of the spring with the smaller O.D. is fitted over the armature assembly. Be sure to make this distinction when assembling.

(Note 2) Tighten the four mounting screws in the diagonally crossing order, and use the proper tightening torque below.



#### Tightening Torque Nm

VCA20	0.4 to 0.5
VCA30	0.6 to 0.8
VCA40	0.6 to 0.8

## 6 LIMITATIONS OF USE

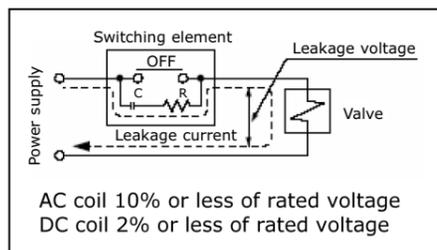


#### WARNING:

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

#### Leakage voltage

- Particularly when using a resistor in parallel with a switching element and using a C-R element (surge voltage suppressor) to protect the switching element, take note that leakage current will flow through the resistor and C-R element, etc., creating a danger that the valve may not shut OFF.



#### Low temperature operation

- Unless otherwise indicated in each valve's specifications, the valve can be used at temperatures as low as -20°C, but take measures to prevent freezing or solidification of drainage and moisture, etc.

## 7 EUROPEAN CONTACT LIST

### 7.1 SMC Corporation

Country	Telephone	Country	Telephone
Austria	(43) 2262-62 280	Italy	(39) 02-92711
Belgium	(32) 3-355 1464	Netherlands	(31) 20-531 8888
Czech Republic	(420) 5-414 24611	Norway	(47) 67 12 90 20
Denmark	(45) 70 25 29 00	Poland	(48) 22-548 50 85
Finland	(358) 9-859 580	Portugal	(351) 22 610 89 22
France	(33) 1-64 76 1000	Spain	(34) 945-18 4100
Germany	(49) 6103 4020	Sweden	(46) 8 603 12 00
Greece	(30) 1- 342 6076	Switzerland	(41) 52-396 3131
Hungary	(36) 23 511 390	Turkey	(90) 212 221 1512
Ireland	(353) 1-403 9000	United Kingdom	(44) 1908-56 3888

### 7.2 Websites

SMC Corporation	www.smcworld.com
SMC Europe	www.smceu.com