Installation and Maintenance Manual Series VQ0000/1000/2000 Series Solenoid Valve, Base Mounted Type (Metal/Rubber Seal)

For future reference, please keep this manual in a safe place

ual should be read in conjunction with the current product catalogue

Safety Instructions

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 (Note1), JIS B 8370 (Note2) and other safety practices. Note 1: ISO 4414: Pneumatic fluid power - Recommendations for the

application of equipment to transmission and control 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.

1. 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.

2. 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.

- 3. Do not service machinery/equipment or attempt to remove component until safety is confirmed.
 - 1) Inspection and maintenance of machinery/equipment should only be performed after confirmation of safe locked-out control positions. 2) 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. 3) 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 back-pressure, i.e. incorporate a soft-start valve).
- 4. Contact SMC if the product is to be used in any of the following conditions:
- 1) Conditions and environments beyond the given specifications, or if product is used outdoors. 2) 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.
- An application which has the possibility of having negative 3) effects on people, property, or animals, requiring special safety analysis.



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

Standard specifications							
Valve specifications	Type of seal	Type of seal		Rubber seal			
	Fluid		Air • Inert gas	Air • Inert gas			
	Max. operating pressure		0.7MPa (High pressure type: 0.8MPa)				
		Single	0.1MPa (1.0 kgf/cm ²)	0.15MPa (1.5 kgf/cm ²)			
	Min. operating pressure	Double	0.1MPa (1.0 kgf/cm ²)	0.1MPa (1.0 kgf/cm ²)			
		3 position	0.1MPa (1.0 kgf/cm ²)	0.2MPa (2.0 kgf/cm ²)			
	Proof pressure	Proof pressure		1.5MPa (15.3 kgf/cm ²)			
	Ambient and fluid temperature		-10~+50°C Note 1)	-5~+50°C Note 1)			
	Lubrication		Not required				
	Manual override	Manual override		Non-locking push type/push-locking			
	Manual Overnue		tool, lever types (option)				
	Protection structure		IP40				
	Coil rated voltage	Coil rated voltage		12, 24VDC, 100, 110, 200, 220VAC (50/60Hz)			
	Allowable voltage	Allowable voltage		±10% of rated voltage			
	Type of coil insulation		Class B				
Solenoid specifications		24VDC	1WDC (42mA), Note 2) 1.5WDC (63mA), Note 3) 0.5WDC (21mA)				
		12VDC	1WDC (83mA), Note 2) 1.5WDC (125mA), Note 3) 0.5WDC (42mA				
	Power consumption	100VAC	Inrush 1.2VA (12mA), Holding 1.2VA (12mA)				
	(current value)	110VAC	Inrush 1.3VA (11.7mA), Holding 1.3VA (11.7mA)				
		200VAC	Inrush 2.4VA (12mA), Holding 2.4VA (12mA)				
		220VAC	Inrush 2 6VA (11 7mA) H	Iolding 2 6VA (11 7mA)			

Note 1: Use dry air to prevent dew condensation when operating at low temperature.

Note 2: Value for high-pressure (1.5W) type specifications.

Note 3: Value for low-wattage (0.5W) specifications.

Installation

Ensure all air and power supplies are ISOLATED before commencing installation Do not install these valves in explosive atmospheres

If these valves are exposed to water or oil droplets, ensure that the valves are protected

If it is intended to energise a valve for an extended period, please consult SMC

2 position single 2 position double 3 position closed centre 3 position exhaust centre 3 position pressure centre

Specifications are subject to change without notice

Electrical Wiring Sp (See chart below) VSQ11							ecifications	
D-sub connector						D-sub cable assen (VVZS3000-21A*) wire colour table	hbly	
$\left(\circ \right)$			Terminal No.		Polarity	Lead wire colour	Dot marking	
	1 station	SOLA	1	(-)	(+)	Black	-	
ြက္ က	I Station	SOL.B	14	(-)	(+)	Yellow	Black	
50 011	2 stations	SOLA	2	(-)	(+)	Brown	-	
	Z SLULIUIIS	I SOLB	15	(-)	(+)	Pink	Black	
60 00	2 stations	I SOLA	3	(-)	(+)	Red	-	
	3 Stations	I SOLB	16	(-)	(+)	Blue	White	
90 09	4	SOLA	4	(-)	(+)	Orange	-	
110 04	4 stations	SOL B	17	(-)	(+)	Violet	-	
20 03	5 stations	JE SOLA	5	(-)	(+)	Yellow	-	
40 02	J Stations	IL SOLD	18	(-)	(+)	Grey	-	
	6 stations	JOLA COLA	6	(-)	(+)	Pink	-	
	0 5000015		19	(-)	(+)	Orange	Black	
	7 stations	JOLA OLA	7	(-)	(+)	Blue	-	
Connector terminal N			20	(-)	(+)	Red	White	
	NU. 8 stations		8	(-)	(+)	Violet	White	
Irrespective of the type of val		U SOL.D	21	(-)	(+)	Brown	White	
or options the internal wiring	is 9 stations	JOLA SOLA	9	(-)	(+)	Grey	Black	
made double (connected to S		IL SULB	22	(-)	(+)	Pink	Red	
A and SOL B) for respective	10 stations	JULA SOLA	10	(-)	(+)	White	Black	
stations of the manifold The		1 SOLB	23	(-)	(+)	Grey	Red	
standard specification permits	s 11 stations	JULA OLA	11	(-)	(+)	White	Red	
mixture of single and double			24	(-)	(+)	Black	White	
wiring.	12 stations	SOLA	12	(-)	(+)	Yellow	Red	
Note: Use negative COM type		1 SOLB	25	(-)	(+)	White	-	
valves for negative COM spec	- rifi-	COM.	13	(+)	(Note) (-)	Orange	Red	

cation manifolds.

Fig 2

Wiring specifications (Flat cable connector)

Wiring specifications (D-sub connector)



Positive COM Negative COM

Irrespective of the type of valves or options, the internal wiring is made double (connected to SOL. A and SOL. B) for respective stations of the manifold. The standard specification permits mixture of single and double wiring. Note: Use negative COM valves for negative COM specification manifolds.



connection Fig 4

Tube Connection

Ensure that the end of the tube is cut square. Push the tube firmly into the fitting until it stops. Pull back on the tube to ensure that it is engaged.



Fig 5

Disconnection withdraw the tube.

Electrical connection of D-sub connector (Fig 6)



Insert connector 1 (Fig 6) into the body 2 (Fig 6)

Ensure that the connector enters directly onto the pins in the body 2. Tighten the two retaining screws 3 (Fig 6).

Electrical disconnection of D-sub connector. 1. Loosen the two captive screws 3 (Fig 6). Pull off the connector ① (Fia 6).

Electrical connection of flat cable connector (Fig 7) body 3 (Fig 7

Fig 7

until they lock.

Ensure that control wiring is separated from power wiring to prevent noise generation. Solenoid manual override

Exercise extreme CAUTION when operating manual overrides as connected equipment will commence operation.





Push down on the collet flange ① (Fig 5), hold down the collet, and

Ensure that the connector enters directly onto the pins in the body. Swing the two clamps 1 (Fig 7) in towards the connector 2 (Fig 7)

Non-locking push type (Fig 8)

Push down on the manual override button (Fig 8) until it stops (ON). Hold this position whilst carrying out checks. Release the manual override button will reset to the (OFF) position



V02000

Fia 8

Push locking type manual override (Fig 9)

VO1000

Push down on the manual override button, using a small screwdriver, until it stops. Turn the button through 90° clockwise to lock. Plug-lead type

Push-locking tool type <Option>



Fia 9



Fig 10

Push down on the manual override button with a small screwdriver until it stops. Release the screwdriver and the manual override will return

Non-locking tool type <Option> (Fig 11)

Turn the manual clockwise by 180°, set the mark \blacktriangle to the position 1. and press the manual in the direction indicated by the arrow (\downarrow) to lock it in ON state.

Turn the manual counterclockwise by 180°, set the mark \blacktriangle to the position 0 to release the lock and reset the manual.



Fig 11

Push down on the manual override button with a small screwdriver until it stops. While down, turn clockwise by 90° to lock it. Turn it counterclockwise to release it.

Push-locking lever type <Option> (Fig 12)



Fig 12

Push down on the manual override button with a small screwdriver or with your fingers until it stops. Turn clockwise by 90° to lock it. Turn it counterclockwise to release it.

* Be careful since manual operation will actuate the connected actuators.

ACAUTION

In this position the manual override will be `mechanically' locked in the ON position.

Unlocking

Turn the manual override button using a small screwdriver, 90° anticlockwise. Remove the screwdriver and the manual override will re-set to the OFF position.

Raised button type locking manual override (Fig 13)

Push down on the raised button until it stops. Turn the button through 90° by hand clockwise to lock.

In this position the manual override is 'mechanically' locked in the ON position.



Fig 13

Unlocking

Turn the raised button through 90° by hand anti-clockwise. Release the button and the manual override will re-set to the OFF position

Voltage leakage

Ensure that the voltage leakage across the coil is as follows: DC Coil: No more than 2% of the rated voltage. AC Coil: No more than 10% of the rated voltage.

Latching type coils must be energised for at least 10ms to ensure correct operation

Indicator lamp/surge voltage suppressor (Fig 14)

Standard Models are equipped with an indicator lamp and surge protection. The lamp positions are concentrated at one end of the solenoid for both single and double solenoids. On the double solenoid version A-side and B- side indicators match the colours of the manual overrides



Fig 15





Electrical connection of plug lead (Fig 17)

Push the connector ① (Fig 17), onto the pins of the solenoid valve ② (Fig 17) in a straight line ensuring that the lip of the lever 3 (Fig 17) is securely positioned in the groove (4) (Fig 17) of the solenoid cover.



Fig 17

Disconnection (Fig 17) Press the lever (3) (Fig 17) against the connector (1) (Fig 17) and pull the connector in a straight line away from the solenoid (2) (Fig 17).

Maintenance

Before carrying out any maintenance work ensure that air and power supplies are ISOLATED.

Plug-In type units Replacing cylinder port fittings (Fig 18)

Remove the retaining clip 1 (Fig 18) from the manifold 2 (Fig 18) using a small bladed screwdriver. Remove the fittings (3) (Fig 18) from the manifold 2 (Fig 18).



Insert the fitting 3 (Fig 18) into the manifold 2 (Fig 18) until it stops. Replace the retaining clip ① (Fig 18).

Removing a solenoid valve (Fig 19)

Loosen the valve clamp screw 1 (Fig 19) (captive screw). Press down on the clamp screw 1 (Fig 19) and lift the coil side 2 (Fig 19) of the valve body. Remove the valve from the manifold.

Replacing a valve (Fig 19)

Press down on the clamp screw 1 (Fig 19). Clamp bracket 3 (Fig 19) opens. Diagonally insert the hook on the valve end plate side into clamp bracket B 4 (Fig 19).



Fig 19

Press the valve body downwards. Releasing the clamp screw 1 (Fig 19) locks the valve. Tighten the clamp screw to the following torque

figures: VQ1000 0.25~0.36N-m (2.5~3.5 kgf/cm. VQ2000 0.5~0.7N-m (5~7 kgf/cm).

Removal from a DIN-rail (Fig 20)

Loosen the clamp screws 3 (Fig 20) on side (a) of the end plates 4 (Fig 20) at both ends of the manifold



Fig 20

Lift side (a) of the manifold base and slide the end plate ④ (Fig 20) in the direction of 2 (Fig 20) to remove.

Refitting to DIN-rail (Fig 21)

Hook side (b) (Fig 21) of the manifold base onto the DIN-rail. Press down on side (a) (Fig 21) and mount the end plate (2) (Fig 21) onto the DIN-rail.



Fig 21

Tighten the clamp screw 3 (Fig 21) on side (a) of the end plate 2(Fig 21). The appropriate tightening torque is 0.8~1.2 N-m (8~12 kaf/cm.

Built-in silencer element removal (Fig 22). Remove cover retaining screws () (Fig 22). Remove cover (2) (Fig 22). Retain gasket (3) (Fig 22). Remove old element ④ (Fig 22), discard.



Open the terminal block cover for wire connection.

rom the terminal block.

Wiring sequence (Fig 24)

and tighten the screw directly above (Fig 25)

 \oslash

Fig 23

1st row 2nd row

of manifold stations:

The quantity of terminal block:

used depends on the number

Manifold Qty. of terminal

2~8 stations 2 rows

9~12 stations 3 rows

respective of the type of

valves or options, the internal

wiring is made double (con-

nected to SOL, A and SOL, B)

for respective stations of the

nanifold. The standard specifi

and double wiring.

ation permits mixture of single

Note: Use negative COM valves

for negative COM specification

blocks

Sequence 1. How to remove terminal block cover

Loosen the screws on the terminal block cover and open it in the

direction shown by the arrow. The cover can then be removed

stations

8 stations

Q stations

11 stations

12 stations









Figure 24 shows the terminal block wiring schematic. All stations are double solenoid wired. Insert each lead wire into the terminal opening

Terminal no. Polarity

(+) (-)

(+)

(+)

(+) (+)

(+)

(+)

(+)

(+)

(+)

(+)

(+) (+)

(+)

(+)

(+)

(+)

(+)

(+)

(+)

(-) (+)

(-) (+)

Positive Negativ

COM COM

SOL.B 12B (-) (+)

COM. o COM (+) (-)

<u>COM.</u> • COM (+) (-)

(-) (+)

SOLA 1A

SOLB 1B

SOLA 2A

SOLB 2B

SOL.A o 3A

SOLB 3B

SOLA 4A

SOL.B 4B

SOLA 5A

SOL.B 5B

SOLA 6A

SOL.B 6B

SOLB 7B

SOLA 8A

SOLB 88

SOLA 9A

SOLB 98

SOLA 10A

SOL.B 0 10B

SOLA 0 11A

SOLB 0 11B

SOLA 0 12A

SOLA 7A



manifolds.

3 Slide the manifold base to the side where the screw is loosened. Make a clearance of 15mm or more.



Fig 28b

 Mount the station-increasing manifold block assembly and solenoid valve on the DIN rail. Install it to the DIN rail by applying the hook on the (b) side of the manifold block and pushing down the (a) side.



- **5** Slide the manifold bases with a slight clearance in-between and lock them by turning the manual between the manifold blocks clockwise.
- 6 Tighten the screw in the top surface of the end plate, and thus station-increasing is completed. (Appropriate tightening torque is 1.2~1.6 N-m (12~16 kgf/cm))







Cable 3-corex24AWG

White: B side solenoid (-) (+)

(Only for double solenoid type)

Fig 31