



# Installation and Maintenance Manual

## VR51-C06/C07, Two hand control valve

EN 574:1996, Type IIIA

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 RECOMMENDATION

#### 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 (Notes), JIS B 8370 (Notes) 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.

#### 1.2 Conformity to standard

VR51 is certified to and complies with

Machinery Directive 98/37/EC	<ul style="list-style-type: none"> <li>category 1 of EN 954-1:1996 "Safety of machinery - Safety related parts of control systems - Part 1. General Principles of Design" and</li> <li>type IIIA of EN 574:1996 "Safety of Machinery - Two-hand control devices - Functional aspects - Design principles".</li> </ul>
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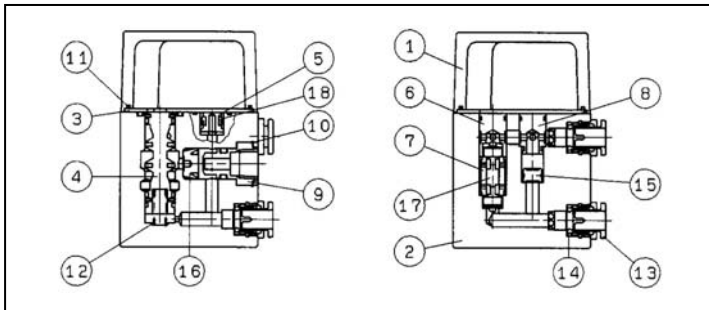
### 2 FEATURES

- When there is timing delay of 0.5 sec or more between the two air signal inputs to the VR51, the VR51 will not provide an output.
- VR51 stops outputting when one of the two air signal inputs stops.
- Input two air signals simultaneously if outputting needs to be restarted.

### 3 SPECIFICATIONS

Fluid	Air		
Operating pressure	0.25~1.0MPa		
Proof pressure	1.5MPa		
Ambient and fluid temperature	-5 to 60°C (with no freezing)		
Flow characteristics	C[dm <sup>3</sup> /(s·bar)]	b	Cv
P to A	0.3	-	-
A to R	1.0	0.12	0.25
Port size	Metric	ø6	
	Inch	ø1/4	
Applicable tube material	Nylon, Soft nylon, Polyurethane, FR soft nylon, FR double layer, FR double layer polyurethane		
Weight	340g		
Accessory Option	Silencer	Part no.: AN101-01	
	Bracket	Part no.: VR51B	

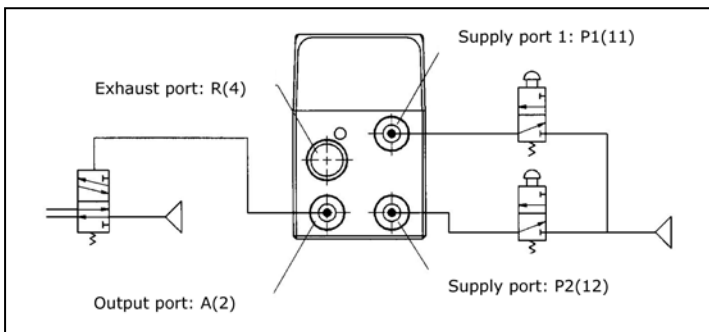
### 4 CONSTRUCTION



#### Parts list

No	Description	Material	Note
1	Cover	Aluminum diecast	Urban grey painting
2	Body	Aluminum diecast	Urban grey painting
3	Plate	Rolled steel	Nickel plating
4	Spool valve	Aluminum alloy	
5	Orifice	Brass	Electroless nickel plating
6	Valve sheet	Aluminum alloy	
7	Valve guide B	Aluminum alloy	
8	Valve guide A	Aluminum alloy	
9	Guide	Brass	Electroless nickel plating
10	Gripp	SUS	
11	Gasket	H-NBR	
12	Spring	SUS	
13	Cassette assembly	-	
14	Packing	NBR	
15	Valve assembly	-	Valve material: H-NBR
16	Valve	NBR	
17	Valve assembly	-	Valve material: H-NBR
18	U-packing	H-NBR	

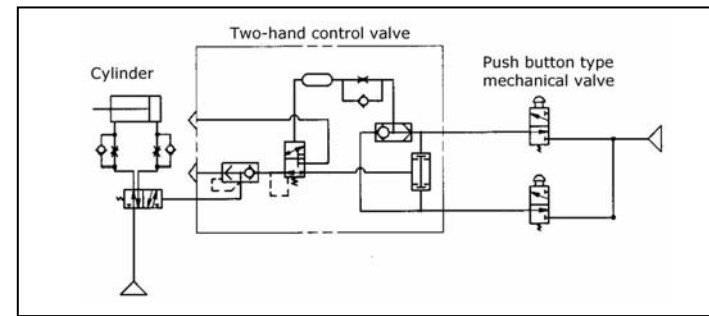
### 5 PIPING PORT LAYOUT



- Use the same control actuating devices for each input port.
- Use tubing of same length and diameter between VR51 and each control actuating device

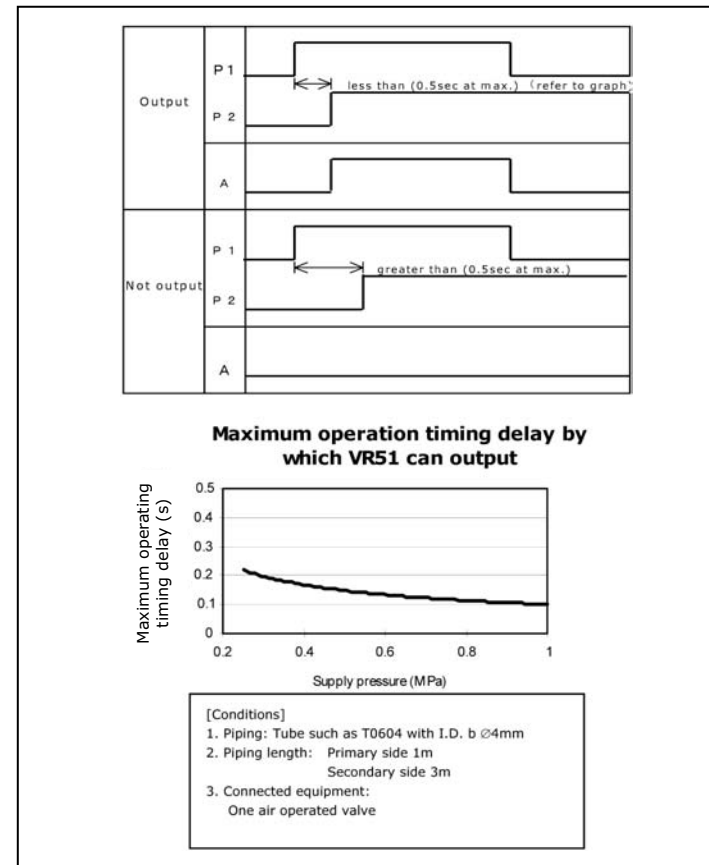
### 6 TYPICAL CIRCUIT

A typical circuit for a VR51 is shown below.



### 7 OPERATION TIMING AND OUTPUT

VR51 does not output when there is a timing delay of 0.5 sec or more between the two air signal inputs. The timing delay by which VR51 can output depends on the operating pressure. The timing delay becomes shorter at a higher operating pressure and it becomes longer at a lower operating pressure. The relationship between the maximum time delay and operation pressure is shown below. This should be considered only as a reference, since it is affected by the connected piping and equipments.



### 8 OPERATION BUTTON SETUP

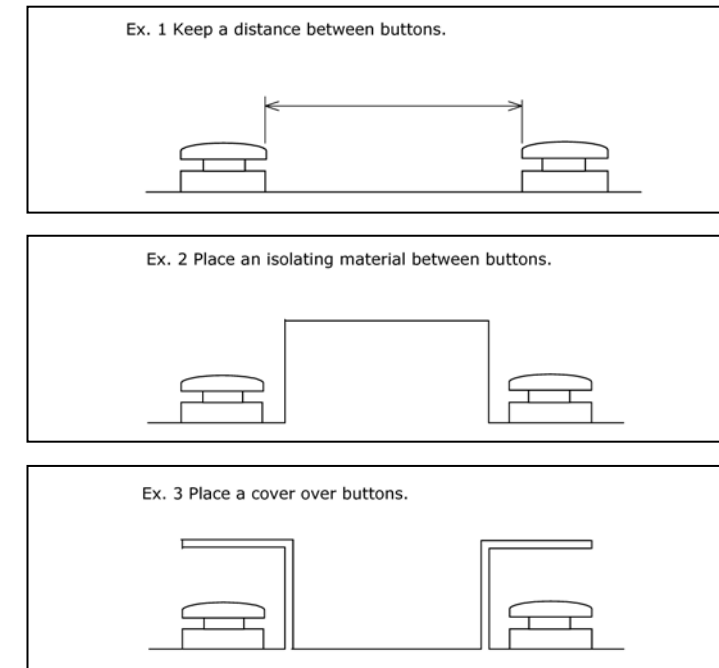
#### WARNING:

If an operation button needs to be setup, design and mount it in accordance with EN 574 "Safety of Machinery - Two hand control devices - Functional aspects - Design principles" Section 8 "Coincidental operation and circumvention prevention".

[Principle precautions]

- Set up the buttons designed for operation by two hands so as to protect them from being operated by one hand.
- Set up the buttons designed for operation by two hands so as to protect them from being operated by one arm.
- Set up the buttons designed for operation by two hands so as to protect them from being operated by forearm(s) or elbow(s).
- Set up the buttons designed for operation by two hands so as to protect them from being operated by one hand and any part of body (knee or waist for example).

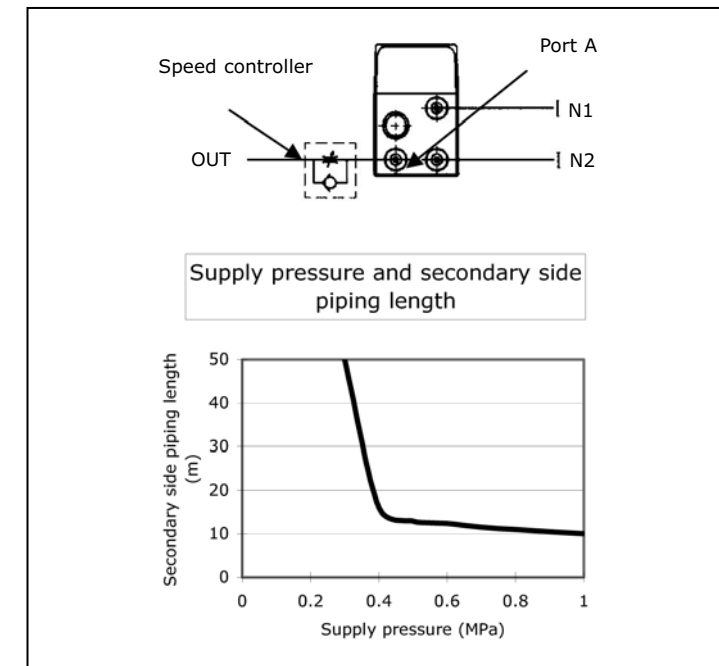
[Example of set-up]



### 9 PIPING LENGTH FOR SECONDARY SIDE

#### CAUTION:

- If the piping connected to the secondary side of VR51 is extremely long, or there is a large volume due to branching, the increase of the secondary pressure may get slow and port A may not output when the operation buttons are simultaneously operated. The volume which can be connected to the secondary side of VR51 is shown on the following graph. A T0604 (I.D. ø4mm) is connected as an example. Keep the length of the piping below the line of the graph. If the piping is compelled to have longer length or large volume due to branching, mount a speed controller (AS2051F-06 and AS3001F-06 etc.) close to the VR51's port A, referring to the following figure as a reference. As a result, the VR51 can be operated properly.



### 10 AIR SUPPLY

#### 10.1 Air pressure

#### WARNING:

- Do not use at air pressure less than 0.25MPa.
  - In VR51, the operational timing delay depends on operating pressure. It becomes shorter at higher operating pressure while it becomes longer at lower operating pressure. Therefore, if VR51 is operated at pressure less than 0.25MPa, it starts output even with timing delay of 0.5 sec or more and an operational safety couldn't be secured.

## 10.2 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.

## 11 MAINTENANCE



### WARNING:

- When beginning an operation, perform regular maintenance as necessary to keep the VR51 operating properly.
- When maintenance work is performed, check the following items and replace parts as necessary.
  1. Flaw, gouge, corrosion on the valve body and looseness and breakage of the screw.
  2. Damage of One-touch fitting.
  3. Twist, collapse and damage of tube.
  4. Hardening, deterioration and softening of tube.
  5. Air leakage.
  6. Air pressure in a range of 0.25MPa to 1MPa.
  7. Port A of VR51 outputs properly when two equipments for the operation mounted on IN side are operated simultaneously.
  8. Port A of VR51 doesn't output when two equipments for the operation mounted on IN side are operated with timing delay of 0.5 sec or more.
  9. Port A of VR51 stops outputting when one of equipments for the operation is stopped.
- **Do not disassemble, repair and retrofit this product.**
  - Otherwise, an equipment doesn't operate properly and it might cause an injury and damage. For repair and maintenance of this product, contact SMC in advance.

## 12 EUROPEAN CONTACT LIST

### 12.1 SMC Corporation

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

### 12.2 Websites

<b>SMC Corporation</b>	www.smcworld.com
<b>SMC Europe</b>	www.smceu.com