



# Installation and Maintenance Manual AV Series Soft Start Valve

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

This manual should be read in conjunction with the current valve 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 (Note 1), JIS B 8370 (Note 2) 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.

## WARNING

### 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.
- 3) 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.

## Specifications

| Model                         | AV2000                                 | AV3000   | AV4000                             |  |
|-------------------------------|--|--|------------------------------------|--|
| Port size                     | 1/4                                    | 3/8  | 1/2                                |  |
| Proof pressure                | 1.5MPa (15.3 kgf/cm <sup>2</sup> )     |  |                                    |  |
| Operating pressure range      | 0.2~1MPa (2~10.2 kgf/cm <sup>2</sup> ) |  |                                    |  |
| Pressure gauge port size      | 1/8                                    |  |                                    |  |
| Ambient and fluid temperature | 0~60°C (Note 1)                        |  |                                    |  |
| Cv factor                     | P→A                                    | 1.19   | 2.20                               |  |
|                               | A→R                                    | 1.39   | 2.89                               |  |
| Weight (kg)                   |  | 0.37   | 0.48                               |  |
|                               |  |  | 0.74                               |  |
| Electric spec.                | Coil rated voltage                     | 100, 200, 110~120, 220V AC (50/60Hz); 12, 24V DC           |                                    |  |
|                               | Allowable voltage fluctuation          | -15% to +10% of rated voltage                              |                                    |  |
|                               | Coil insulation type                   | Type B equivalent (130°C)                                  |                                    |  |
|                               | Apparent power (power consumption) AC  | Inrush   | 5.6VA (50Hz)/5.0VA(60Hz)           |  |
|                               |  | Holding  | 3.4VA(2.1W)/50Hz; 2.3VA(1.5W)/60Hz |  |
|                               | Power consumption DC                   |  | 1.8W                               |  |
| Electrical entry              |  | DIN connector  |                                    |  |
| Semi-standard spec.           |  | With indicator light and surge voltage suppressor (Note 2) |                                    |  |
| Pilot valve manual override   |  | Non-locking push type, slotted locking type                |                                    |  |
| Protection                    |  | IP65   |                                    |  |

Note 1: Use dry air when temperature is low.

Note 2: The grommet type is equipped with a surge voltage suppressor (lead wire connection type) but not an indicator light.

## Installation

### WARNING

Ensure all AIR and POWER supplies are ISOLATED before commencing installation.

DO NOT install these valves in explosive atmospheres. If a valve is exposed to oil/water droplets ensure that it is protected. If it is intended to energise a valve for an extended period of time please consult SMC.

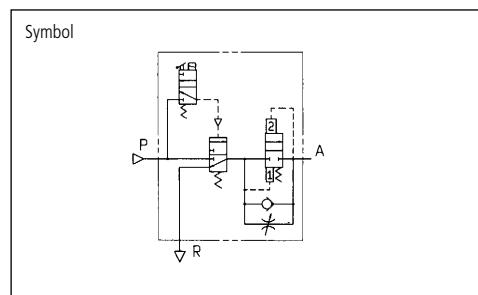
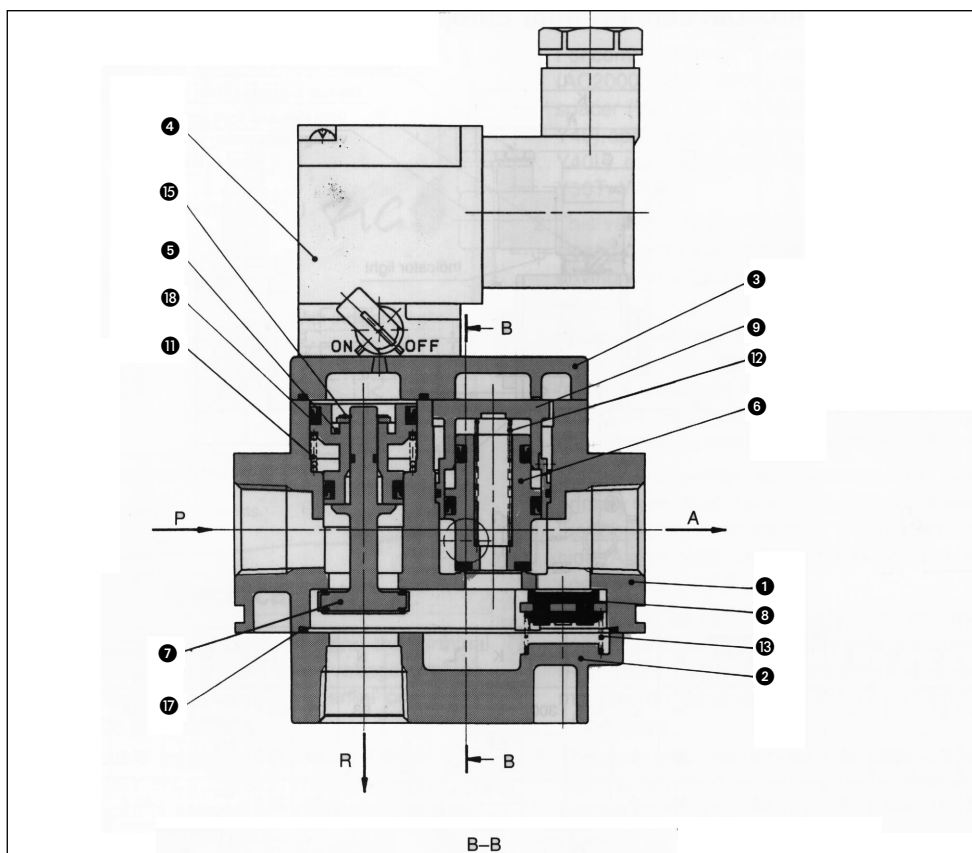


Fig 1

## Construction and parts list (Fig 2)



### Parts list

| No. | Description | Material       | Notes        |
|-----|-------------|----------------|--------------|
| 1   | Body        | Aluminum alloy | Baked finish |
| 2   | Cap         | Aluminum alloy | Baked finish |
| 3   | Cover       | Aluminum alloy | Baked finish |

### Spare parts/exchange parts

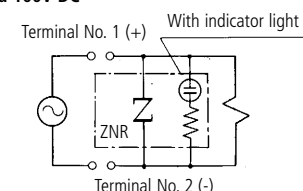
| No. | Description                    | Material             | Parts No.  |          |                  |
|-----|--------------------------------|----------------------|------------|----------|------------------|
|     |                                |                      | AV2000     | AV3000   | AV4000           |
| 4   | Pilot valve assembly           | -                    |            | SF4-□-80 |                  |
| 5   | Piston A assembly              | Polyacetal resin-NBR | P424204A   | P424304A | P424404A         |
| 6   | Piston B assembly              | Brass-NBR            | P424205A   | P424305A | P424405A         |
| 7   | Main valve assembly            | Brass-NBR            | P424206A   | P424306A | P424406A         |
| 8   | Check valve                    | Brass-NBR            | P424207A   | P424307A | P424407A         |
| 9   | Piston guide assembly          | Polyacetal resin-NBR | P424208A   | P424308A | P424408A         |
| 10  | Needle assembly                | Brass-NBR            | P424209A   | P424309A | P424409A         |
| 11  | Valve spring                   | Iron                 | P424211    | P424311  | P424411          |
| 12  | Piston spring                  | Stainless            | P424212    | P424312  | P424412          |
| 13  | Check spring                   | Stainless            | P424213    | P424313  | P424413          |
| 14  | Needle spring                  | Iron                 | P424214    | P424314  | P424414          |
| 15  | Ctype retaining ring for shaft | Iron                 | G-5        | STW-5    | STW-8            |
| 16  | Ctype retaining ring for hole  | Iron                 | 0-9        | 0-10     | 0-12             |
| 17  | Packing                        | NBR                  | P424210    | P424310  | P424410          |
| 18  | Packing                        | NBR                  | P424218    | P424315  | P424415          |
| 19  | O-ring                         | NBR                  | 10 X 8 X 1 | 11 41090 | 12.5 X 9.5 X 1.5 |

\*1 The product number of the O-ring is (Stock) Morisei Kako's product number.

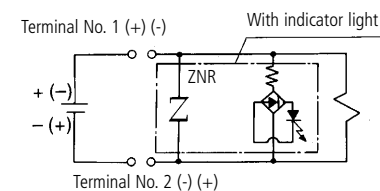
Fig 2

## Surge Voltage suppression (Fig 3)

### AC and 100V DC



### 24V DC or less



Note: No polarity (+, -) exists.

Fig 3

## Operation of the manual override (Fig 5)

### WARNING

Before attempting to operate any manual override ensure ALL safety precautions are in operation as connected equipment will commence operation.

### Locking position

Rotate the raised lever 8 (Fig 5) to the 'ON' position 10 (Fig 5).

### WARNING

In this position the manual override will remain in the operated condition.

### Un-locking (Fig 5)

Rotate the manual override lever 6 (Fig 5) to the 'OFF' position 9 (Fig 5).

## Operating principle (Fig 5)

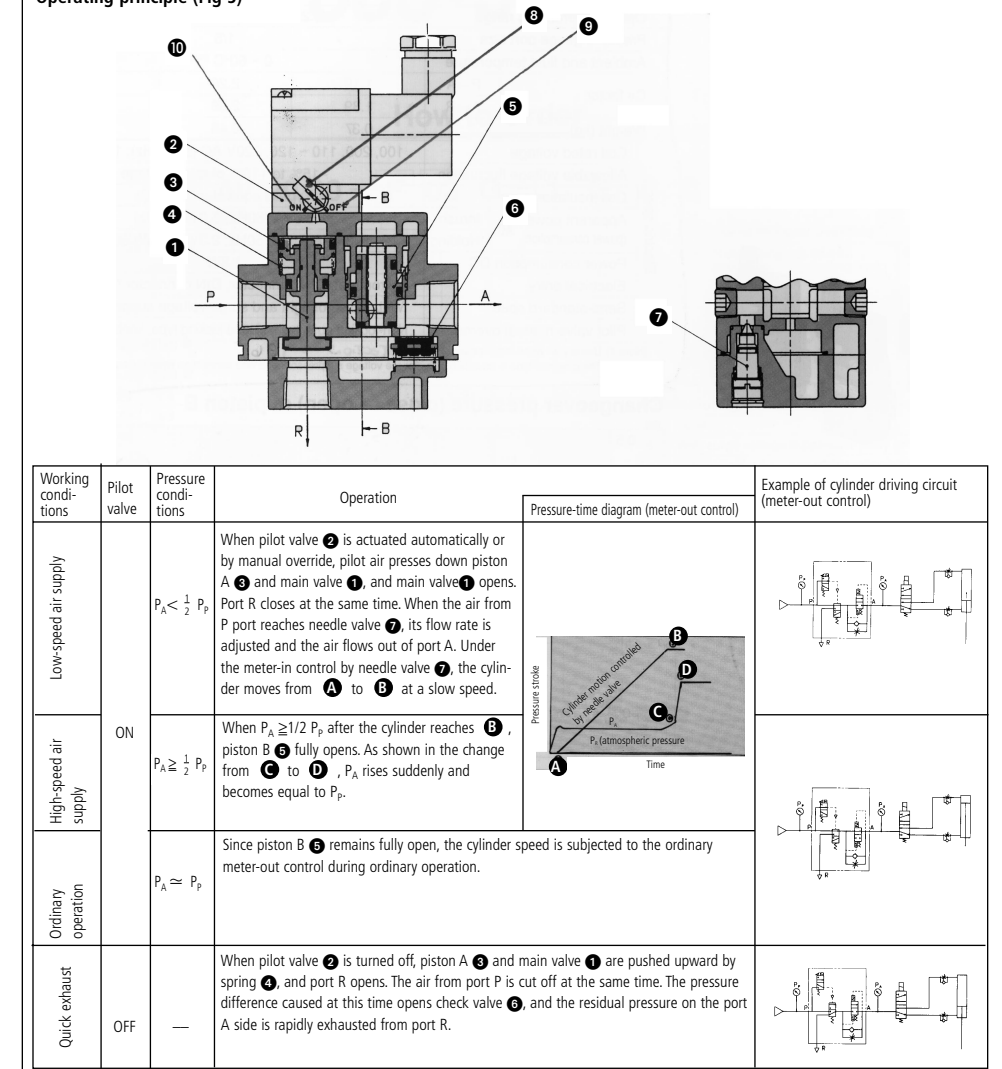
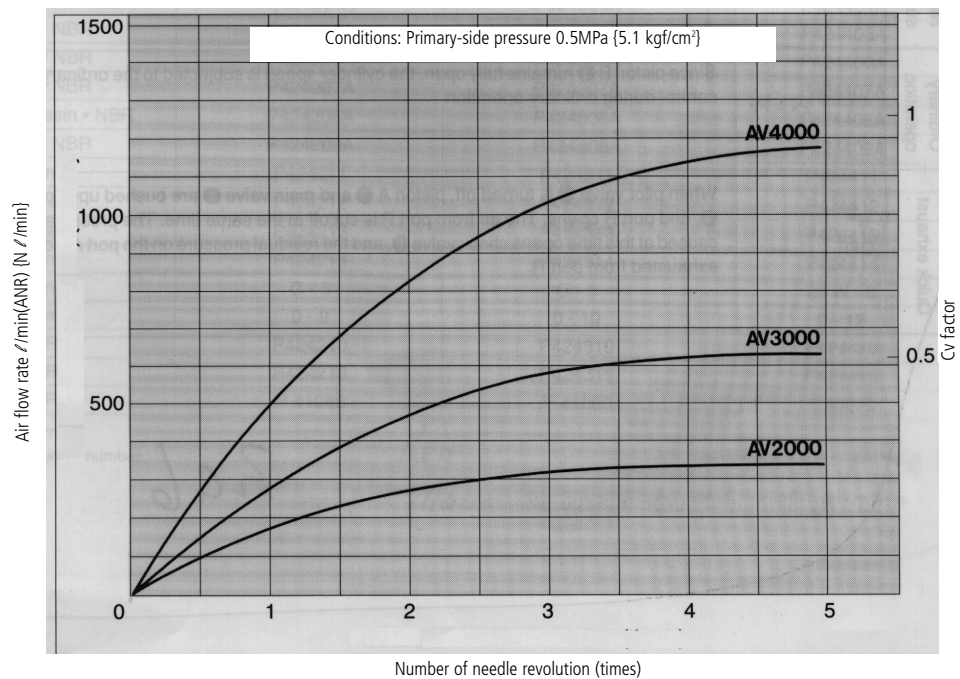


Fig 5

**Flow characteristics of needle valve**



**Fig 6**

**Needle valve adjustment (Fig 2)**

Use a small screwdriver to adjust the needle valve **10** (Fig 2). Clockwise rotation will decrease the air-flow rate, and anti-clockwise rotation will increase the air-flow rate. Refer to the needle valve flow characteristics shown in Fig 6.

**CAUTION**

The use of this valve in conjunction with a closed centre solenoid valve will not prevent the load from 'shooting' out or equipment driving with a load factor of 50% or more. If a regulator is mounted on the secondary pressure side ensure this regulator is of a residual pressure release type. Ensure that the secondary side pressure is equal to the primary side pressure before attempting to operate a solenoid valve on the secondary side.

Should you require any additional information please contact your local SMC office.

When you enquire about the product, please contact the following

|                         |                    |                                    |
|-------------------------|--------------------|------------------------------------|
| <b>SMC Corporation:</b> |                    |                                    |
| <b>ENGLAND</b>          | Phone 01908-563888 | <b>TURKEY</b> Phone 212-2211512    |
| <b>ITALY</b>            | Phone 02-92711     | <b>GERMANY</b> Phone 6103-402-0    |
| <b>HOLLAND</b>          | Phone 020-5318888  | <b>FRANCE</b> Phone 01-64-76-10-00 |
| <b>SWITZERLAND</b>      | Phone 052-34-0022  | <b>SWEDEN</b> Phone 08-603 07 00   |
| <b>SPAIN</b>            | Phone 945-184100   | <b>AUSTRIA</b> Phone 02262-62-280  |
|                         | Phone 902-255255   | <b>IRELAND</b> Phone 01-4501822    |
| <b>GREECE</b>           | Phone 01-3426076   | <b>DENMARK</b> Phone 8738-0800     |
| <b>FINLAND</b>          | Phone 09-68 10 21  | <b>NORWAY</b> Phone 67-12 90 20    |
| <b>BELGIUM</b>          | Phone 03-3551464   | <b>POLAND</b> Phone 48-22-6131847  |