



# Operation Manual

## PRODUCT NAME

*SPEED CONTROLLER STANDARD TYPE  
LARGE FLOW IN-LINE TYPE*

## MODEL/ Series/ Product Number

*AS420 / AS500 / AS600  
AS800 / AS900*

**SMC Corporation**

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# Speed Controller Standard Type Large Flow In-line Type / AS Series Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of "Caution," "Warning" or "Danger." They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)\*1), and other safety regulations.

\*1) ISO 4414: Pneumatic fluid power -- General rules relating to systems.

ISO 4413: Hydraulic fluid power -- General rules relating to systems.

IEC 60204-1: Safety of machinery -- Electrical equipment of machines .(Part 1: General requirements)

ISO 10218: Manipulating industrial robots -Safety.

etc.



**Caution**

**Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.



**Warning**

**Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.



**Danger**

**Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.



## Warning

### **1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.**

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results.

The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product.

This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

### **2. Only personnel with appropriate training should operate machinery and equipment.**

The product specified here may become unsafe if handled incorrectly.

The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

### **3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.**

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.

2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.

3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

### **4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.**

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.

2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.

3. An application which could have negative effects on people, property, or animals requiring special safety analysis.

4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.



# Speed Controller Standard Type Large Flow In-line Type / AS Series Safety Instructions

## **Caution**

### **1. The product is provided for use in manufacturing industries.**

The product herein described is basically provided for peaceful use in manufacturing industries. If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.  
If anything is unclear, contact your nearest sales branch.

## **Limited warranty and Disclaimer/Compliance Requirements**

The product used is subject to the following "Limited warranty and Disclaimer" and "Compliance Requirements".

Read and accept them before using the product.

### **Limited warranty and Disclaimer**

**1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.**

**Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.**

**2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.**

**This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.**

**3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.**

### **Compliance Requirements**

**1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.**

**2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulation of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.**

## **Caution**

**SMC products are not intended for use as instruments for legal metrology.**

Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country.

Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.

## 2. Specific Product Precautions

### Design/ Selection

#### Warning

##### (1) Confirm the specifications.

Do not operate at pressures, temperatures, etc., beyond the range of specifications, as this can cause damage or malfunction. (Refer to the specifications.)

Please contact SMC when using a fluid other than compressed air (including vacuum).

We do not guarantee against any damage if the product is used outside of the specifications range.

##### (2) Products mentioned in this catalog are not designed for use as stop valves with zero air leakage.

A certain amount of leakage is allowed in the products specifications. Tightening the needle to reduce leakage to zero may result in equipment damage.

##### (3) Do not disassemble the product or make any modifications, including additional machining.

Doing so may cause human injury and/or an accident.

##### (4) The flow rate characteristics for each product are representative values.

The flow rate characteristics are characteristics of each individual product. Actual values may differ depending on the piping, circuitry, pressure conditions, etc. Also, depending on product specifications, there may be variations in the zero needle rotations position of the flow rate characteristics.

### Mounting

#### Warning

##### (1) Operation Manual

Install the products and operate it only after reading the operation manual carefully and understanding its contents. Also, keep the manual where it can be referred to as necessary.

##### (2) Ensure sufficient space for maintenance activities.

When installing the products, allow access for maintenance.

##### (3) Confirm that the lock nut is tightened.

A loose lock nut may cause speed changes in the actuator.

##### (4) Check the degree of rotation of the needle valve.

The Products in this catalog are retainer type so that the needle is not removed completely. Over rotation will cause damage.

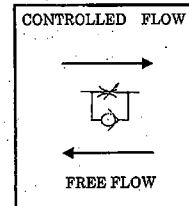
### Mounting

##### (5) Do not use tools such as pliers to rotate the knob.

This can cause idle rotation of the knob or damage.

##### (6) Confirm the air flow direction.

Mounting backward is dangerous, because the speed adjustment needle will not work and the actuator may lurch suddenly.



##### (7) Adjust the needle by opening the needle slowly after having closed it completely.

Loose needle valves may cause unexpected sudden actuator lurching.

When a needle valve is turned clockwise, it is closed and cylinder speed decreases. When a needle valve is turned counterclockwise, it is open and cylinder speed increases.

##### (8) Do not apply excessive force or shock to the body or fittings with an impact tool.

This can cause damage or air leakage.

##### (9) When the air leaks much enough to make sound, or when the equipment doesn't operate normally, stop using it right away.

According to the manual, perform suitable function and leak tests to confirm that the mounting is correct.

##### (10) To ensure the actuator functions properly, check that piping is not loose and that there is no air leakage.

##### (11) To ensure the actuator functions properly, check that there is no external damage to product and equipment.

#### Caution

##### (1) The proper tightening torques for hexagon lock nuts are shown in the table below. For standard installation, turn 15 to 30° using a tool after fastening by hand.

Pay attention not to over tighten the product. Check the dimensions for each product for the width across flats.

Model Number	Proper tightening torque (N·m)	Lock nut width across flats
AS420	9	23
AS500	9	23
AS600	9	29
AS800	35	23
AS900	40	26

## Piping

### Caution

#### (1) Preparation before piping

Before piping is connected, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil and other debris from inside the pipe.

## Air Supply

### Warning

#### (1) Type of fluids

Please consult with SMC when using the product in applications other than compressed air.

#### (2) When there is a large amount of drainage

Compressed air containing a large amount of drainage can cause the malfunction of pneumatic equipment. An air dryer or water separator should be installed upstream from filters.

#### (3) Drain flushing

If condensation in the drain bowl is not emptied on a regular basis, the bowl will overflow and allow the condensation to enter the compressed air lines. This causes the malfunction of pneumatic equipment.

If the drain bowl is difficult to check and remove, the installation of a drain bowl with an auto drain option is recommended.

For compressed air quality, refer to SMC catalog "Compressed Air Purification System".

#### (4) Use clean air

Do not use compressed air that contains chemicals, synthetic oils that include organic solvents, salt, corrosive gases, etc., as it can cause damage or malfunction.

### Caution

#### (1) Install an air filter.

Install an air filter upstream near the valve. Select an air filter with a filtration size of 5µm or smaller.

#### (2) Take measures to ensure air quality, such as by installing an aftercooler, air dryer, or water separator.

Compressed air that contains a large amount of drainage can cause the malfunction of pneumatic equipment, such as flow control equipment. Therefore, take appropriate measures to ensure air quality, such as by providing an aftercooler, air dryer, or water separator.

## Air Supply

#### (3) Ensure that the fluid and ambient temperatures are within the specified range.

If the fluid temperature is 5°C or less, the moisture in the circuit could freeze, causing damage to the seals or leading to equipment malfunction. Therefore, take appropriate measures to prevent freezing.

For compressed air quality, refer to SMC catalog "Compressed Air Purification System".

## Operating environment

### Warning

#### (1) Do not use in an atmosphere containing corrosive gases, chemicals, sea water, water, water steam, or where there is direct contact with any of these.

Refer to each construction drawing for information on the materials of flow control equipment.

#### (2) Do not expose the product to direct sunlight for an extended period of time.

#### (3) Do not use in a place subject to heavy vibration and/or shock.

#### (4) Do not mount the product in locations where it is exposed to radiant heat.

## Maintenance

### **Warning**

- (1) Perform maintenance and inspection according to the procedures indicated in the operation manual.**

If handled improperly, malfunction or damage of machinery and equipment may occur.

- (2) Maintenance work**

If handled improperly, compressed air can be dangerous.

Assembly, handling, repair and element replacement of pneumatic systems should be performed by a knowledgeable and experienced person.

- (3) Drain flushing**

Remove drainage from air filters regularly.

- (4) Removal of equipment, and supply/exhaust of compressed air**

Before components are removed, first confirm that measures are in place to prevent workpieces from dropping, run-away equipment, etc.

Then, Cut the supply pressure and electric power, and exhaust all compressed air from the system using the residual pressure release function.

When machinery is restarted, proceed with caution after confirming that appropriate measures are in place to prevent sudden movement.

- (5) After maintenance**

After installation, repair and modification, connect compressed air and electricity and conduct appropriate inspections to confirm proper operation and no leakage. If there is audible leakage, or if the equipment does not operate properly, stop operation and confirm that the equipment is installed correctly.

### 3. Application

This product is designed to control the speed of a pneumatic actuator.

### 4. Specifications

Fluid	Air
Proof pressure	1.5MPa
Max. operating pressure	1.0MPa
Min. operating pressure	0.05MPa
Ambient and fluid temperature	-5 to 60°C (No freezing)

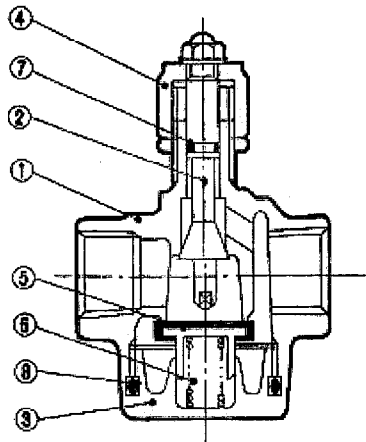
### 5. Troubleshooting

Trouble	Possible causes	Countermeasures
The speed (flow rate) cannot be controlled.	The direction of check valve is reversed.	Confirm which control is used meter-out or meter-in in accordance with operating conditions.
	There is some dust or contaminant trapped inside.	Fully open a needle and air blow from the free flow side.
	Rubber lining of valve is broken.	Change valve.
	Valve spring is broken.	Change spring.



## 6. Construction

AS420 · AS500 · AS600



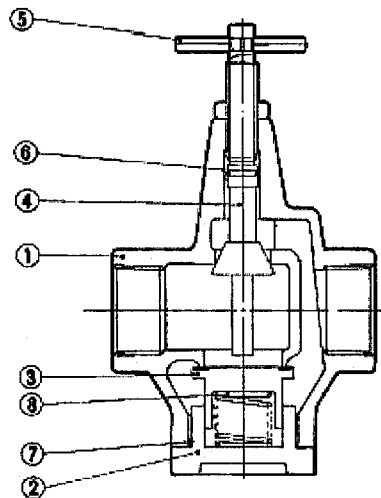
### Component Parts

No.	Description	Material
1	Body	Aluminum alloy
2	Needle	Brass
3	Bottom cover	Aluminum alloy
4	Handle	Zinc alloy

### Replacement Parts

No.	Description	Material	Part no.	
			AS420-500	AS600
5	Check Valve	NBR, Brass	14254	14273
6	Spring	Stainless steel	14255	14275
7	O-ring	NBR	KA00476	KA00476
8	O-ring	NBR	KA00472	KA00474

AS800 · AS900



### Component Parts

No.	Description	Material
1	Body	Aluminum alloy
2	Valve guide	Aluminum alloy
3	Check valve	NBR, Brass
4	Needle	Brass
5	Handle	Carbon steel

### Replacement Parts

No.	Description	Material	Part no.	
			AS800	AS900
6	O-ring	NBR	KA00069	KA00072
7	O-ring	NBR	KA00460	KA00462
8	Spring	Stainless steel	14115	14124

Revision history

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Note: Specifications are subject to change without prior notice and any obligation on the part of the manufacturer.  
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