



Operation Manual

PRODUCT NAME

*SPEED CONTROLLER STANDARD TYPE
IN-LINE TYPE*

MODEL/ Series/ Product Number

*AS1000 / AS2000 / AS3000
AS4000 / AS5000*

SMC Corporation

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Speed Controller Standard Type 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 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

Warning

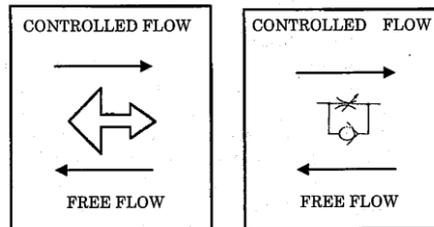
(5) Do not use tools such as pliers to rotate the knob.

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.

In case of AS1000-M3



(7) Adjust the speed by opening the needle slowly from the fully closed state.

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.

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
AS1000-M3	0.07	4.5
AS1000-M5	2	10
AS2000	5	12
AS3000	6	12
AS4000	10	29
AS5000	10	29

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 $5\ \mu\text{m}$ 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.

(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.

3. Application

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

4. Specifications

Fluid	Air
Proof pressure ^{Note1)}	1.5MPa(1.05MPa)
Max. operating pressure ^{Note1)}	1.0MPa(0.7MPa)
Min. operating pressure ^{Note1)}	0.05MPa(0.1MPa)
Ambient and fluid temperature	Standard : -5 to 60 deg.C (No freezing) -H ^{Note2)} : -5 to 80 deg.C (No freezing) -L ^{Note3)} : -30 to 60 deg.C (No freezing)

Note 1) (): Values for AS1000.

Note 2) AS5000 is available as special. AS1000 is not applicable.

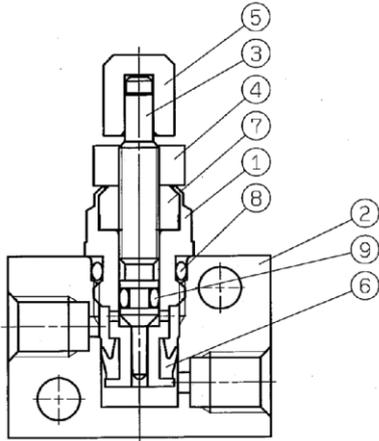
Note 3) AS1000, AS2000 are not applicable.

5. Troubleshooting

Trouble	Possible causes	Countermeasures
The speed (flow rate) cannot be controlled.	The direction of check valve is reverse.	Confirm which control is used meter-out or meter-in in accordance with operating conditions.
	There are some dust 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

AS1000-M3

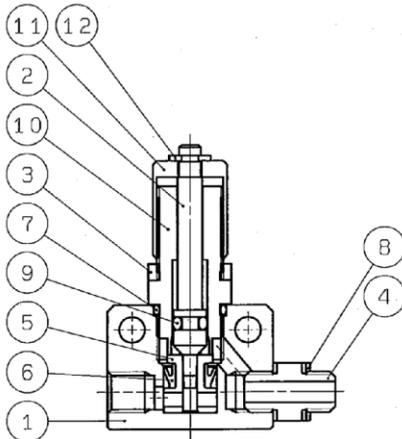


Component Parts

No.	Description	Material	Note
①	Body B	Brass	Electroless nickel plating
②	Body	Brass	Electroless nickel plating
③	Needle	Brass	Electroless nickel plating
④	Lock nut	Steel ^{Note)}	
⑤	Handle	Brass	Electroless nickel plating
⑥	U seal	HNBR	
⑦	Needle guide	Brass	Electroless nickel plating
⑧	O-ring	NBR	
⑨	O-ring	NBR	

Note) The round lock nut is made of electroless nickel plated brass.

AS1000-M5^{Note1)}



Component Parts

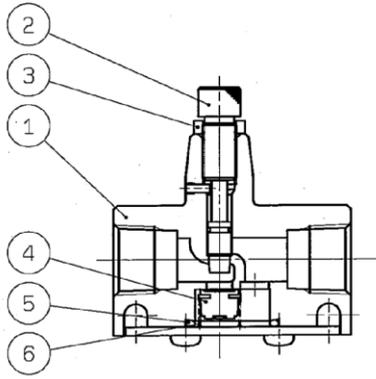
No.	Description	Material	Note
①	Body	Zinc alloy	
②	Needle	Stainless steel	
③	Lock nut	Steel ^{Note2)}	
④	Nipple	Stainless steel	
⑤	Valve seat	Brass	
⑥	U seal	HNBR	
⑦	O-ring	NBR	
⑧	Gasket	NBR/Stainless steel	
⑨	O-ring	NBR	
⑩	Needle guide	Brass	Electroless nickel plating
⑪	Handle	Brass	Electroless nickel plating
⑫	E type snap ring	Steel	

Note1) Construction drawing: AS1000-M5-N.

In case of AS1000-M5, nipples and gaskets are not attached.

Note2) The round lock nut is made of electroless nickel plated brass.

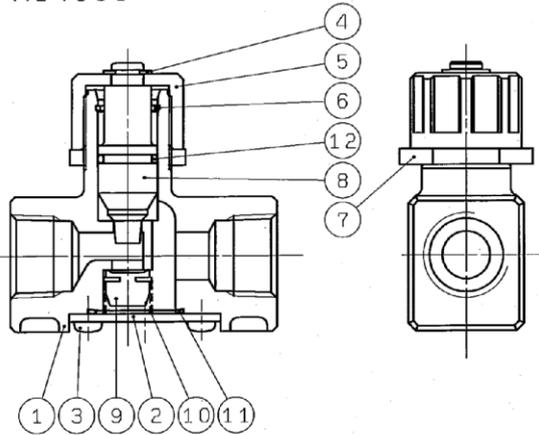
AS2000 · AS3000



Component Parts

No.	Description	Material		Note
		AS2000	AS3000	
①	Body	Zinc alloy	Aluminum alloy	
②	Needle	Brass	Brass	Electroless nickel plating
③	Lock nut	Brass	Carbon steel	AS2000 : Electroless nickel plating
④	Valve	NBR/Brass	NBR/Brass	
⑤	O-ring	NBR	NBR	
⑥	Spring	Stainless steel	Stainless steel	

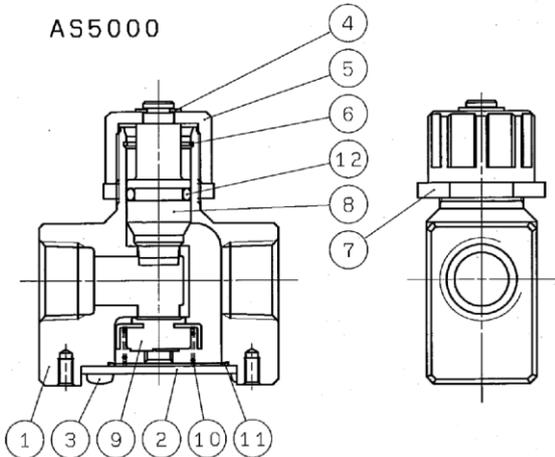
AS4000



Component Parts

No.	Description	Material	Note
①	Body	Aluminum alloy	
②	Cap	Rolled steel	
③	Cross-recessed head cap screw	Steel wire	
④	E type snap ring	Stainless steel	
⑤	Handle	Zinc alloy	
⑥	Ring	Steel wire	
⑦	Lock nut	Zinc alloy	
⑧	Needle	Aluminum alloy	
⑨	Valve	NBR/Brass	
⑩	Spring	Stainless steel	
⑪	O-ring	NBR	
⑫	O-ring	NBR	

AS5000



Component Parts

No.	Description	Material	Note
①	Body	Aluminum alloy	
②	Cap	Rolled steel	
③	Cross-recessed head cap screw	Steel wire	
④	E type snap ring	Stainless steel	
⑤	Handle	Zinc alloy	
⑥	Ring	Steel wire	
⑦	Lock nut	Zinc alloy	
⑧	Needle	Aluminum alloy	
⑨	Valve	NBR/stainless steel	
⑩	Spring	Stainless steel	
⑪	Seal	NBR	
⑫	O-ring	NBR	

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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