



# Operation Manual

PRODUCT NAME

*STAINLESS STEEL THROTTLE VALVE  
WITH ONE-TOUCH FITTING*

MODEL/ Series/ Product Number

*HF2B-ASG\*\*\*\* - \*\*TV*

**SMC Corporation**

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# Stainless Steel Throttle Valve with One-touch Fitting/ASG 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)<sup>\*)</sup>, and other safety regulations.

\*) ISO 4414: Pneumatic fluid power - General rules and safety requirements for systems and their components  
ISO 4413: Hydraulic fluid power - General rules and safety requirements for systems and their components  
IEC 60204-1: Safety of machinery - Electrical equipment of machines - Part 1: General requirements  
ISO 10218-1: Robots and robotic devices - Safety requirements for industrial robots - Part 1: Robots  
etc.



## **Danger**

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



## **Warning**

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



## **Caution**

**Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate 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. Our products cannot be used beyond their specifications. Our products are not developed, designed, and manufactured to be used under the following conditions or environments. Use under such conditions or environments is not covered.**

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Use for nuclear power, railways, aviation, space equipment, ships, vehicles, military application, equipment affecting human life, body, and property, fuel equipment, entertainment equipment, emergency shut-off circuits, press clutches, brake circuits, safety equipment, etc., and use for applications that do not conform to standard specifications such as catalogs and operation manuals.
3. Use for interlock circuits, except for use with double interlock such as installing a mechanical protection function in case of failure. Please periodically inspect the product to confirm that the product is operating properly.



# Stainless Steel Speed Controller with One-touch Fitting/ASG Series Safety Instructions

## **Caution**

**We develop, design, and manufacture our products to be used for automatic control equipment, and provide them for peaceful use in manufacturing business.**

**Use in non-manufacturing business is not covered.**

Products we manufacture and sell cannot be used for the purpose of transactions or certification specified in the Measurement Act.

The new Measurement Act prohibits use of any unit other than SI units in Japan.

## **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.\*2)  
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.

**\*2) Vacuum pads are excluded from this 1 year warranty.**

A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.

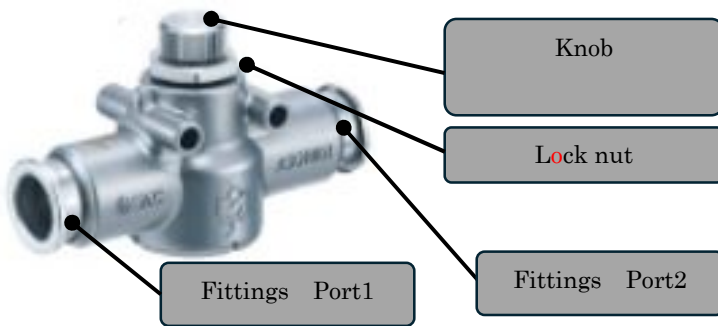
Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty

### **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 regulations 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.

## 2. Specific Product Precautions

### Parts and Names of Products



### Design/ Selection

#### Warning

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

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

SMC does 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 forcibly to achieve zero air leakage through main valve may result in damage of internal parts and the product may stop functioning properly. Please do not tighten the needle forcibly.

##### (3) Avoid water hammer

The product may be damaged if subjected to a hydraulic shock from water hammer or other sudden pressure fluctuations. Please take this into consideration by installing a water hammer mitigation device (accumulator, etc.).

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

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

##### (5) 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.

The flow rate may not be recognized from the fully closed position until around the first turn. This is due to the product design and not a malfunction.

Also, depending on product specifications, there may be variations in the zero needle rotations position.

### Design/ Selection

#### Warning

##### (6) Sonic conductance and critical pressure ratio values for products are representative values.

Values are those with the needle in fully open position.

#### Caution

##### (1) The surge pressure must be under the maximum operating pressure. If the surge pressure exceeds the maximum operating pressure, it will result in damage to fittings and tubing or the tubing may result in being fallen out.

##### (2) If using a fluororesin tubing in an environment where the fluid temperature changes drastically, it is recommended to use an inner sleeve. Otherwise, air leakage may occur or the tube may release from fitting due to deformation of the tubing.

### Mounting

#### Warning

##### (1) Operation Manual

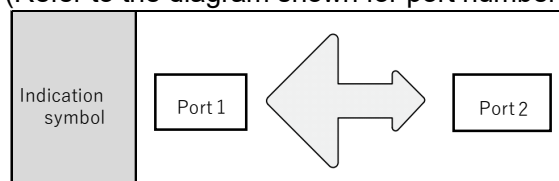
Install the products and operate it only after reading the operation Manual carefully and understanding its contents. Also, keep the Manual where it can be referred to as necessary.

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

When installing the products, allow access for maintenance.

##### (3) Piping direction

Pipe so that fluid flows from port 1 to port 2. (Refer to the diagram shown for port numbers.)



##### (4) Adjust the Flow rate by opening the needle slowly from the fully closed state.

Depending on the state of the handle (needle) open/close adjustment position, a large amount or quick change of flowrate can be dangerous. The handle (needle) is adjusted clockwise to decrease flow (close) and counterclockwise to increase flow (open).

## Mounting

### **Warning**

**(5) Confirm that the lock nut is securely tightened.**

Confirm that the lock nut is securely tightened, and the needle is locked after adjusting the cylinder speed.

When the product is used with a loose lock nut, the set flow rate may change unknowingly and the actuator speed may change, which leads to dangerous situations.

Forcibly tightening the lock nut exceeding the locked state may result in breakage. Follow the proper tightening torque when tightening.

Body size	Proper tightening Torque [N · m]	Lock nut width across flats [mm]
M5	0.17	7
1/8	0.3	9
1/4	1	12
1/8	1.5	14
1/2	2	17

**(6) Check the degree of rotation of the needle valve.**

As the needle valve has a stopper mechanism for maximum opening, it is not possible to rotate beyond the given limit.

Excessive rotation will cause damage to the product. Please check the specified number of rotations before using the product.

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

It can cause idle rotation of the knob or damage.

**(8) The handle of this product is attached only by press fitting.**

Excess torque may break the product.

The table below shows the maximum allowable torque of the handle.

Body size	Maximum allowable torque [N · m]
M5	0.05
1/8	0.17
1/4	0.23
3/8	0.25
1/2	0.40

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

It can cause damage or air leakage.

### **Caution**

**(1) If the connection tube oscillates or turns, do not use this product.**

It may cause damage to the product body or the fitting.

## Piping

### **Caution**

**(1) Refer to the Fittings & Tubing Precautions for handling One-touch fittings.**

**(2) 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.

### Precautions for One-Touch Tube Fittings

#### Piping

### **Caution**

**(1) Connection and disconnection of tube from one-touch fitting**

**① Installation of tube**

1) Cut the tube perpendicularly, being careful not to damage the external surface. Use an SMC tube cutter TK-1, 2, 3 or 6. Do not cut the tubing with pliers, nippers, scissors, etc., otherwise the tubing will be deformed, and problems may result.

2) The outside diameter of the polyurethane tubing swells when internal pressure is applied to it. Therefore, it may be impossible to re-insert the tubing into One-touch fittings. Check the tubing outside diameter, and when the accuracy of the outside diameter is +0.07mm or larger for  $\phi 2$ , and +0.15mm or larger for other sizes, re-insert it into the One-touch fitting without cutting the tube. When the tubing is re-inserted into the One-touch fitting, confirm that the tubing goes through the release button smoothly.

3) Hold the tubing, and slowly push it straight inline (target 0 to 5° from neutral axis) into the One-touch fitting until it comes to a stop.

4) Pull the tubing back gently to make sure it has a positive seal. Insufficient installation may cause air to leak or the tubing to release. As a guide for checking if the tubing is pulled out or not, refer to the following table.

## Precautions for One-Touch Tube Fittings

### Piping

#### Caution

##### ② Removal of the tube

- 1) Push the release button evenly and sufficiently to release the tube. Do not push in the tubing before pressing the release button.
- 2) Pull out the tubing while keeping the release button depressed. If the release button is not held down sufficiently, the tubing cannot be withdrawn.
- 3) To reuse the tubing, remove the previously inserted portion of the tubing by cutting. If the inserted portion is reused without being cut, it may result in air leakage and make the removal of the tubing difficult.
- 4) For tubing used at a high temperature or for an extended period of time, there is a possibility that it will not fit into a One-touch fitting again due to an enlarged O.D. Dispose of the old tubing and replace it with a new one.

## Precautions for One-Touch Tube Fittings

### Piping

#### Caution

##### (2) Connection of the metal rod accessories

Plug-in fittings with metal rods (KC series, KQ2 series, former KQ series, KN series, KM series, etc.) cannot be connected to one-touch fitting. If connected, the metal rod cannot be retained by the chuck of the one-touch fitting and products with metal rods may project during pressurization, causing serious personal injury or accident.

Even when products with metal rods can be connected, do not use any tube, resin plug, or resin reducer after connection. This may cause detachment.

##### (3) When mounting the tube, resin plug or metal rod, do not press the release button.

Do not press the release button unnecessarily before mounting tubing, resin plugs and metal rods. This can cause the disconnection of tube.

## Precautions for use with non-SMC tubing

#### Caution

- (1) When used with tubing other than those from SMC, the product will be outside the warranty due to the unverified connection with the one-touch fitting.

### Recommended Piping Conditions

- (1) When connecting piping to the One-touch fitting, use a pipe length with sufficient margin, in accordance with the piping conditions shown in Figure 1. Also, when using a tying band, etc., to bind the piping together, make sure that external force does not come to bear on the fitting. (see Figure 2)

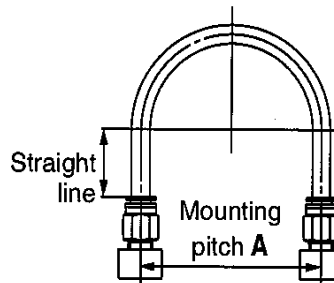
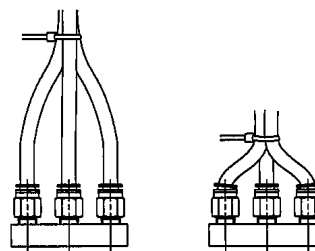


Figure 1 Recommended piping



Recommended Not recommended

Fig. 2 When using a tying band to bind the piping together

Tubing size	Mounting pitch A [mm]			Straight-line Pipe length [mm]
	Nylon tube	Soft nylon tube	Polyurethane tube	
φ4, φ5/32"	56or more	44or more	26or more	20or more
φ6	84or more	66or more	39or more	30or more
φ1/4"	89or more	70or more	57or more	32or more
φ8, φ5/16"	112or more	88or more	52or more	40or more
φ10	140or more	110or more	69or more	50or more
φ3/8"	134or more	105or more	69or more	48or more
φ12	168or more	132or more	88or more	60or more
φ1/2"	178or more	140or more	93or more	64or more

## Fluid used



### Warning

- (1) Type of fluids**  
Compressed air, nitrogen, or water is used as the fluid,  
For other fluids, please contact SMC.
- (2) When there is a large amount of drainage**  
(For compressed air use)  
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 (For compressed air use)**  
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.

## Fluid used



### 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.
- (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.**
- (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.



### 3. Application

This product is intended for flow control

### 4. Specifications

Fluid	Air, Nitrogen, Water* <sup>1</sup>
Proof pressure range	1.5 MPa
operating pressure	0~1.0 MPa* <sup>2</sup>
Ambient and fluid temperature* <sup>3</sup>	Air, Nitrogen 0 to 150 °C (No freezing) Water 1 to 60°C(No freezing)
Applicable tubing material * <sup>2</sup>	FEP, PFA, Nylon, Soft nylon, Polyurethane, Polyolefin

\*1) The surge pressure must be under the maximum operating pressure.

\*2) Check the operating pressure range and operating temperature range of the tubing.

\*3) It is recommended that you use the inner sleeve in the following conditions.

- When using in an environment where the fluid temperature changes drastically.
- When using at a high temperature.

\* Temperature Condition of Mounting the Inner Sleeve.

Tubing	Temperature
FEP tubing/Series TH	80°C or more
Super PFA tubing/Series TL	120°C or more

Cross Reference Table of the Inner Sleeve (Metric size)

Tubing O.D.	Tubing material			Applicable inner sleeve	
	TUS (Soft polyurethane)	TH/TH (FEP)	TL/TIL (Super PFA)	Part no.	Length [mm]
Φ4	-	TH0402	-	TJ-0402	18
	TUS0425	TH0425	-	TJ-0425	18
	-	-	TL0403	TJ-0403	18
Φ6	TUS0604	TH0604	TL0604	TJ-0604	19
Φ8	TUS0805	-	-	TJ-0805	20.5
	-	TH0806	TL0806	TJ-0806	20.5
Φ10	TUS1065	-	-	TJ-1065	23
	-	TH1075	-	TJ-1075	23
	-	TH1008	TL1008	TJ-1008	24
Φ12	TUS1208	-	-	TJ-1208	24
	-	TH1209	-	TJ-1209	24
	-	TH1210	TL1210	TJ-1210	24

Cross Reference Table of the Inner Sleeve (Inch size)

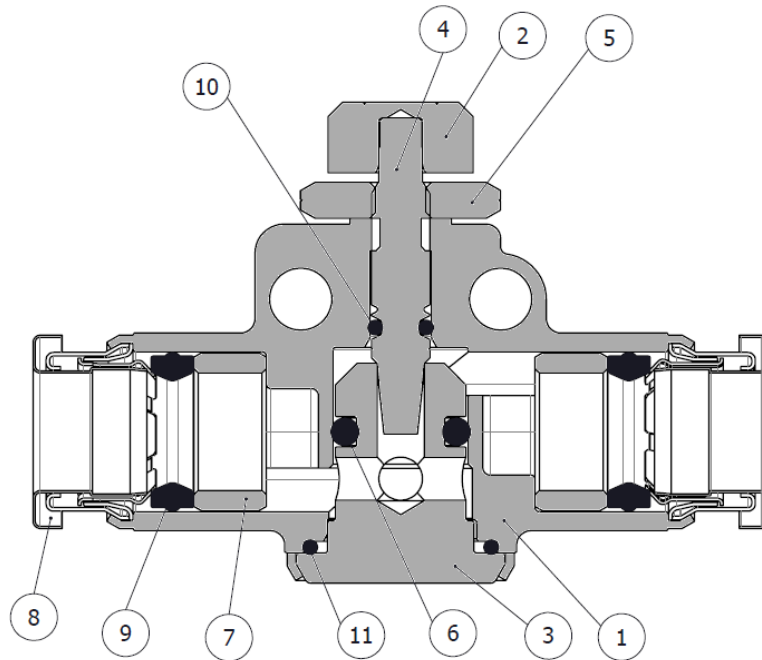
Tubing O.D.	Tubing material		Applicable inner sleeve	
	TH/TIH (FEP)	TL/TIL (Super PFA)	Part no.	Length [mm]
Φ5/32"	TH0402	-	TJ-0402	18
	TH0425	-	TJ-0425	18
	-	TL0403	TJ-0403	18
Φ1/4"	TIHB07	TIL07	TJ-0604	19
	TIHA07	-	TJ-0746	19
Φ5/16"	TH0806	TL0806	TJ-0806	20.5
Φ3/8"	TIHB11	TIL11	TJ-1065	23
	TIHA11	-	TJ-1107	23
Φ1/2"	TIH13	TIL13	TJ-1395	24

## 5. Troubleshooting

Trouble	Possible causes	Countermeasure
Speed cannot be adjusted.	Dust inside.	Fully open the needle and apply air blow inside. If the problem is not solved even after air blow, install an air filter to the upstream piping, and replace the product with a new one.
Air leaks from the One-touch fitting. Or the tubing disconnects.	Tubing has been cut using pliers or nipper.	Use tube cutters.
	Tubing of a brand other than SMC is used.	Use of SMC tubing is recommended since the product will be outside the warranty when tubing of a brand other than SMC is used.

## 6. Construction

### ASG Series / In-Line Type



#### Component Parts

No.	Description	Material	Note
1	Body A	Stainless steel	
2	Knob	Stainless steel	
3	Seat ring	Stainless steel	
4	Needle	Stainless steel	
5	Lock nut	Stainless steel	
6	O-ring	FKM	
7	Spacer	Stainless steel	
8	Cassette	Stainless steel	
9	Seal	FKM	
10	O-ring	FKM	
11	O-ring	FKM	

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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