



# Operation Manual

PRODUCT NAME

Quick Exhaust Valve

MODEL/ Series/ Product Number

AQ1500、AQ1510

AQ2000 (-H、-L)

AQ3000 (-H、-L)

AQ5000 (-H、-L)

AQ400

**SMC Corporation**

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# Quick Exhaust Valve 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>\*1)</sup>, and other safety regulations.

\*1) 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.



# Quick Exhaust Valve 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 industries.**

**Use in non-manufacturing industries 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

### 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.)

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

##### (2) The product cannot be used as a quick exhaust valve to achieve zero leakage.

A certain amount of leakage is allowed in the products specifications.

##### (3) Do not disassemble the product or make any modifications.

An accident and/or injury may occur.

##### (4) Do not exhaust air from the EXH port while air is being supplied to the IN port (solenoid valve side). It may cause failure in the product.

#### Caution

##### (1) In the following cases, insufficient exhaust or vibration may cause noise.

- (a) With residual pressure or back pressure on the IN side.
- (b) When the differential pressure between the IN and OUT sides is a smaller than the minimum operating pressure.
- (c) When the effective area of the IN side piping of AQ, or the solenoid valve, is smaller than AQ.

### Installation

#### Warning

##### (1) Operation Manual

Install and operate only after reading the operation manual carefully and understanding the contents. Keep the manual where it can be referred to if necessary.

##### (2) Maintenance space

Allow sufficient space for maintenance and inspection.

##### (3) Mount after confirming the direction of flow.

Confirm the direction of the flow with IN, OUT and EXH ports indicated on the product body.

(4) If product experiences noisy leakage, or the equipment does not operate correctly, stop using the product immediately.

##### (5) Do not apply excessive force or shock to the body of fittings with an impact tools.

It can cause damage or air leakage.

### Piping

#### Caution

##### (1) Before piping

Before piping, perform air blow (flushing) or cleaning to remove cutting chips, cutting oil, dust, etc. from the pipe.

### Air Supply

#### Warning

##### (1) Type of fluids

Use compressed air as the fluid used.

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

Compressed air containing a large amount of condensate can cause malfunction of pneumatic equipment. An air dryer or water droplet 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 malfunction of pneumatic equipment. If the drain bowl is difficult to check and remove, 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) Types of air

Do not use compressed air which contains chemicals, synthetic oils containing organic solvents, salts or corrosive gases, etc., as this can cause damage or malfunction.

## Air Supply



### Caution

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

Install an air filter close to the upstream side of the valve. A filtration degree of 5mm or less should be selected.

**(2) Install an aftercooler, air dryer or water separator etc.**

Do not use compressed air containing a lot of condensate, which can cause failure of the flow control or other pneumatic equipment. Install an aftercooler, air dryer or water droplet separator.

**(3) Use the product within the specified fluid and ambient temperature range.**

When operating at temperatures 5°C or lower, water in the circuit may freeze and cause breakage of seals or malfunction. Measures should be taken to prevent freezing.

For the details of compressed air mentioned above, refer to SMC catalog "Compressed Air Purification System".

**(2) Maintenance operations**

If handled improperly, compressed air can be dangerous. A knowledgeable and experienced person should perform assembly, handling, repair and element replacement of pneumatic systems.

**(3) Draining**

Remove condensate from air filters regularly.

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

When components are removed, first confirm that measures are in place to prevent workpieces from dropping and/or equipment running away, etc. Cut the supply pressure and electric power and exhaust all compressed air from the system. Before restarting the equipment, confirm that measures are taken to prevent sudden movement.

## Operating environment



### Warning

**(1) Do not use in an environment where corrosive gases, chemicals, sea water, water or steam are present.**

For materials of the flow control equipment, refer to their construction drawings.

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

**(3) Do not operate in a location subject to vibration or impact.**

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

## Maintenance



### Warning

**(1) Maintenance should be performed according to the procedure indicated in the Operation Manual.**

Improper handling can cause damage and malfunction of equipment and machinery.

### 3. Application

This equipment aims to control the driving speed of actuators.

### 4. Specifications

| Model                       | AQ1500                    | AQ1510 | AQ2000                     | AQ3000  | AQ5000  | AQ400       |
|-----------------------------|---------------------------|--------|----------------------------|---------|---------|-------------|
| Port size                   | M5                        | 1/8    | 1/8 1/4                    | 1/4 3/8 | 1/2 3/4 | 1/4 3/8 1/2 |
| Fluid                       | Air                       |        |                            |         |         |             |
| Proof pressure              | 1.5MPa                    |        |                            |         |         |             |
| Max. operating pressure     | 0.7MPa                    |        | 1MPa                       |         |         |             |
| Min. operating pressure     | 0.1MPa                    |        | 0.05MPa                    |         |         | 0.15MPa     |
| Ambient & fluid temperature | -5 to 60° C (No Freezing) |        |                            |         |         |             |
| High temperature type (-H)  | -                         | -      | -5 to 80° C (No Freezing)  |         |         | -           |
| Low temperature type (-L)   | -                         | -      | -30 to 60° C (No Freezing) |         |         | -           |

Note

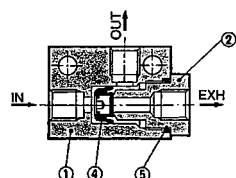
- 1) Use 3, 4, or 5 port valve with exhaust port as switching valve.
- 2) Quick Exhaust Valve fails to operate properly if the pressure at IN port decreases slower than that of OUT port during the operation.

### 5. Malfunctions and Countermeasures

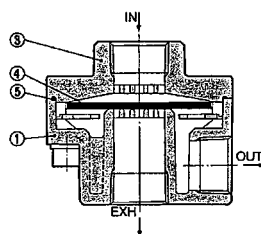
| Trouble                             | Possible causes                        | Countermeasures    |
|-------------------------------------|--|--------------------|
| Air constantly leaks from EXH port. | Dust is caught on seat of EXH port     | Remove the dust.   |
|                                     | Surface of seat and valve are damaged. | Replace the parts. |
| Valve dose not operate.             | Valve is damaged.                      | Replace the part.  |

## 6. Construction

AQ1500/1510



AQ2000/3000/5000



### Component Parts

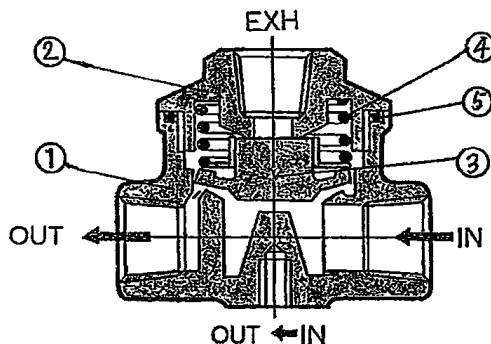
| No. | Description | Material / Model |                 |                     |
|-----|-------------|------------------|-----------------|---------------------|
|     |             | AQ1500           | AQ1510          | AQ2000、3000、5000    |
| 1   | Body        | Zinc die-casted  | Zinc die-casted | Aluminum die-casted |
| 2   | Guide       | Brass            | Brass           | —                   |
| 3   | Cover       | —                | —               | Aluminum die-casted |

### Replacement Parts

| No. | Description | Material           | Part no.         |                        |           |           |        |
|-----|-------------|--------------------|------------------|------------------------|-----------|-----------|--------|
|     |             |                    | AQ1500           | AQ1510                 | AQ2000    | AQ3000    | AQ5000 |
| 4   | Valve       | NBR <sup>*1)</sup> | 30083            | 30093                  | 30073     | 30053     | 30063  |
| 5   | O-ring      | NBR <sup>*1)</sup> | KA00327<br>9x7x1 | KA00476<br>JISB2401P-7 | CA40-1601 | CA50-1602 | 30066  |

Note \*1) -H type : NBR→FKM, -L type : NBR→CR.

AQ400



### Component Parts

| No. | Description | Material            |
|-----|-------------|---------------------|
| 1   | Body        | Aluminum die-casted |
| 2   | Cover       | Zinc die-casted     |

### Replacement Parts

| No. | Description | Material | Part No.     |
|-----|-------------|----------|--------------|
| 3   | Valve       | NBR      | 30013        |
| 4   | Spring      | SWPA     | 30016        |
| 5   | O-ring      | NBR      | JISB2401G-50 |



| Revision history  |
|---|
| C: Added the -H type and -L type.<br>E: Delete SMC address. "Safety Instruction" changed. |

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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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