Safety Speed Control Valve (SSC Valve)
Series ASS

**Meter-out control type:**
A control valve with cylinder speed control function, fixed throttle, and rapid air supply function

**Meter-in control type:**
A control valve with cylinder speed control function and rapid air supply function

<table>
<thead>
<tr>
<th>Model</th>
<th>Port size</th>
<th>Effective area (mm²)</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meter-out control</td>
<td>Model</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASS100</td>
<td>1/8</td>
<td>2.4</td>
<td>9.5</td>
</tr>
<tr>
<td>ASS300</td>
<td>1/4, 3/8</td>
<td>14.5</td>
<td>22.0</td>
</tr>
<tr>
<td>ASS500</td>
<td>1/2, 3/4</td>
<td>52.0</td>
<td>55.0</td>
</tr>
<tr>
<td>ASS600</td>
<td>3/4, 1</td>
<td>80.0</td>
<td>90.0</td>
</tr>
<tr>
<td>Meter-in control</td>
<td>Model</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASS110</td>
<td>1/8</td>
<td>2.4</td>
<td>5.4</td>
</tr>
<tr>
<td>ASS310</td>
<td>1/4, 3/8</td>
<td>16.5</td>
<td>23.0</td>
</tr>
</tbody>
</table>

**Specifications**
- Fluid: Air
- Max. operating pressure: 0.7 MPa
- Ambient and fluid temperature: –5 to 60°C (No freezing)
- Set pressure: 0.1 to 0.5 MPa

**How to Order**
- Type: ASS 3 00 02 B
- Body size: 1, 3, 5
- Port size: 1/8, 1/4, 3/8, 1/2, 3/4, 1
- Accessory: Nil, B
- Thread type: Nil, Rc, N, NPT, F, G

**Caution**
Be sure to read before handling. Refer to pages 15-18-3 to 15-18-4 for Safety Instructions and Common Precautions on the products mentioned in this catalog, and refer to pages 15-8-6 to 15-8-8 for Precautions on every series.
Prevents accidents caused by sudden cylinder rod extensions

If pressure is applied only to one side of the cylinder, the rod could get out of control, leading to accidents that could involve injury to humans or damage to the product or jigs. The meter-out type SSC valve prevents the sudden extensions by effecting meter-in control when there is no pressure, and resumes the ordinary meter-out control after the cylinder has been pressurized. With the meter-in type, there is no risk of sudden extensions because the cylinder speed is constantly under meter-in control.

System Circuit

During the operating stroke at initial actuation, the cylinder moves at a slow speed from A to B due to the fixed throttle of the SSC valve. When it reaches B, the head pressure (PH) rises quickly as indicated by the line from C to D. Therefore, there is no time loss associated with the pressure transmission lag indicated by the line from C to D, as in the case of meter-in control that is effected through the use of a speed controller.

During normal operation after the cylinder has been pressurized, the cylinder’s speed control is effected by the ordinary meter-out control.

Due to meter-in control, the cylinder moves from A to B regardless of whether it is an initial operation or a normal operation. When it reaches B, the head pressure (PH) rises quickly as indicated by the line from C to D. Therefore, there is no time loss associated with the pressure transmission lag indicated by the line from C to D, as in the case of meter-in control that is effected through the use of a speed controller.

During normal operation after the cylinder has been pressurized, the cylinder’s speed control is effected also by the ordinary meter-in control.
Flow Characteristics

### ASS100/ASS110

- Inlet pressure: 0.5 MPa
- Flow rate (l/min (ANR)) vs. Effective area (mm²)
- Number of needle rotations:
  - 0 to 10

### ASS300

- Inlet pressure: 0.5 MPa
- Flow rate (l/min (ANR)) vs. Effective area (mm²)
- Number of needle rotations:
  - 0 to 14

### ASS310

- Inlet pressure: 0.5 MPa
- Flow rate (l/min (ANR)) vs. Effective area (mm²)
- Number of needle rotations:
  - 0 to 10

### ASS500

- Inlet pressure: 0.5 MPa
- Flow rate (l/min (ANR)) vs. Effective area (mm²)
- Number of needle rotations:
  - 0 to 12

### ASS600

- Inlet pressure: 0.5 MPa
- Flow rate (l/min (ANR)) vs. Effective area (mm²)
- Number of needle rotations:
  - 0 to 14

### Cylinder Extension Prevention Primary Speed

- Conditions: Supply pressure at 0.5 MPa, No load
- Primary speed of meter-in type can be controlled as likely as during normal operation.

- Meter-out Control

- Bore size (mm): 0 to 200

- Primary speed (mm/s) vs. Bore size (mm)

- Number of needle rotations:
  - 0 to 15

- Effective area (mm²): 0 to 15

- Flow rate (l/min (ANR)): 0 to 5,000

- Safety Speed Control Valve Series ASS

- AS
- ASP
- ASN
- AQ
- ASV
- AK
- ASS
- ASR
- ASF
**Meter-out Control/Construction Principle**

**During primary operation**
(Piston rod extension prevention)

- **Fig. (A)** When air is supplied to the exhausted cylinder, the air causes the valve to close. Also, because the piston valve is fully closed due to the cylinder's low internal pressure, air is supplied gradually through the piston valve and the fixed throttle of the check valve. Therefore, the cylinder operates slowly under meter-in control.

- **Fig. (B)** As the piston moves and reaches the end of its stroke, the internal pressure in the cylinder rises. When this pressure becomes higher than the set pressure of the piston valve, the piston valve opens fully, and the air feeds rapidly into the cylinder.

**During normal operation**

- **Fig. (C)** Because the pressure in the cylinder is higher than the set pressure, the air from the switching valve causes the piston valve to open fully and feeds rapidly into the cylinder. Therefore, meter-out control of the cylinder speed is effected by the speed control valve in the exhaust conduit, regardless of the state of the SSC valve.

- **Fig. (D)** Because the check valve closes due to the internal pressure of the cylinder, the air in the cylinder passes through the valve and discharges through the switching valve. Thus, meter-out control of the cylinder speed is effected by the opening of the valve, which is adjusted by the set needle.

**Meter-in Control/Construction Principle**

**During primary operation**
(Piston rod extension prevention)

- **Fig. (A)** When air is supplied to the exhausted cylinder, the air causes the check valve to close. Also, because the piston valve is fully closed due to the cylinder's low internal pressure, air is supplied gradually via the throttle of the set needle. Therefore, the cylinder operates slowly under meter-in control.

- **Fig. (B)** As the piston moves and reaches the end of its stroke, the internal pressure in the cylinder rises, causing the piston valve to open fully, and the air feeds rapidly into the cylinder.

**During normal operation**

- **Fig. (C)** The air that has been supplied by the switching valve closes the check valve. Also, because the cylinder's internal pressure is lower than the set pressure, the piston valve closes fully, causing the air to be supplied gradually via the throttle of the set needle. Therefore, meter-out control of the cylinder speed is effected by the SSC valve, regardless of the state of the speed control valve in the exhaust conduit of the cylinder.

- **Fig. (D)** As the piston moves and reaches the end of its stroke, the internal pressure in the cylinder rises, causing the piston valve to open fully, and the air feeds rapidly into the cylinder.
Mounting and Adjusting of SSC Valve

Mounting: Mount IN on the direction control valve side, and OUT on the cylinder side.

Cylinder speed adjustment set needle
Pressure adjustment set needle

Bracket Part No.

<table>
<thead>
<tr>
<th>Model</th>
<th>Part no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASS100</td>
<td>XT14-82-3-1</td>
</tr>
<tr>
<td>ASS300</td>
<td>XT14-105-5-1</td>
</tr>
<tr>
<td>ASS500</td>
<td>XT14-89-2-1</td>
</tr>
<tr>
<td>ASS600</td>
<td>XT14-85-2-1</td>
</tr>
</tbody>
</table>

Meter-in Control Type

Mounting method
Connect tubing to the supply conduit (on the side that requires a rapid supply of air at the stroke end) with the IN side facing the directional control valve.

Adjusting method
To adjust meter-in control, the lurch prevention set pressure to high; then adjust the cylinder speed and then the set pressure.

Adjusting procedure
1. Initially, turn the pressure adjustment set needle located on the IN side clockwise to raise the set pressure. At the time of shipment, the set pressure is adjusted to approximately 0.2 MPa.
2. To prevent the cylinder from moving at high speeds, turn the cylinder speed adjustment set needle located on the OUT side clockwise to decrease the cylinder speed.
3. Next, operate the directional control valve repeatedly to move the cylinder, and adjust the cylinder speed adjustment set needle and the speed controller to achieve the prescribed cylinder speed. (If an SSC valve is used on both sides, perform the adjustment at the cylinder speed adjustment set needles on both sides.) After adjusting, tighten the lock nut. Keep the cylinder cushion needle as open as possible.
4. Adjust the pressure adjustment set needle excessively counterclockwise to prevent the cylinder from suddenly extending.

Note 1) Do not turn the pressure adjustment set needle excessively counterclockwise to prevent the cylinder from suddenly extending.
**Flow Control Equipment Precautions**

Be sure to read before handling. Refer to pages 15-18-3 to 15-18-4 for Safety Instructions and Common Precautions on the products mentioned in this catalog, and refer to main text for more detailed precautions on every series.

### Precautions

**Warning**

1. Products mentioned in this catalog are not designed for the use as stop valve with zero air leakage. A certain amount of leakage is allowed in the product’s specifications.

### Mounting

**Warning**

1. Check that the lock nut is tightened. A loose lock nut may cause actuator speed changes.

2. Confirm the degree of rotation of the needle valve. Products mentioned in this catalog are retainer type so that the needle is not removed completely. Over rotation will cause damage.

3. Do not use tools such as pliers to rotate the handle. It can cause idle rotation of the handle or damage.

4. Confirm air flow direction. Mounting backwards is dangerous, because the speed adjustment needle will not work and the actuator may lurch suddenly.

5. Adjust needle by opening the needle slowly after having closed it completely. Loose needle valves may cause unexpected sudden actuator extension. When needle valve is turned clockwise, it is closed and cylinder speed decreases. When needle valve is turned counter clockwise, it is open and cylinder speed increases.

6. Do not apply excessive force or shock to the body or fittings with an impact tool. It can cause damage or air leakage.

### Selection

**Series AS-F/FE/FG/FM**

**Warning**

1. Confirm that PTFE can be used in application. PTFE powder (Polytetrafluoroethylene resin) is included in the seal material. Confirm if the use of it may cause any adverse effect in the system.

### Tightening Torque

**Caution**

1. The tightening torque for pipe fittings is as shown in the table. As a rule, they should be tightened 2 to 3 turns with a tool after first tightening by hand. Be careful not to cause damage by over-tightening.

<table>
<thead>
<tr>
<th>Male thread</th>
<th>Suitable screw torque (N·m)</th>
<th>Hexagon width across flats (mm)</th>
<th>Adjustable spanner nominal (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M3</td>
<td>1/4</td>
<td>4.5</td>
<td>—</td>
</tr>
<tr>
<td>M5 10/32-UNF</td>
<td>1/6 turn after hand tightening</td>
<td>8</td>
<td>100</td>
</tr>
<tr>
<td>1/8</td>
<td>7 to 9</td>
<td>14</td>
<td>150</td>
</tr>
<tr>
<td>1/4</td>
<td>12 to 14</td>
<td>17</td>
<td>200</td>
</tr>
<tr>
<td>3/8</td>
<td>22 to 24</td>
<td>21</td>
<td>200</td>
</tr>
<tr>
<td>1/2</td>
<td>28 to 30</td>
<td>24</td>
<td>200</td>
</tr>
</tbody>
</table>

**Lock Nut Tightening Torque**

**Caution**

1. Suitable screw torque for a hexagon lock nut is shown in the table below. For standard installation, turn 15 to 30° using tool, after fastening by hand. Pay attention not to over torque the product.

<table>
<thead>
<tr>
<th>Body size</th>
<th>Suitable screw torque (N·m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M3</td>
<td>0.07</td>
</tr>
<tr>
<td>M5</td>
<td>0.3</td>
</tr>
<tr>
<td>1/8</td>
<td>1</td>
</tr>
<tr>
<td>1/4</td>
<td>1.5</td>
</tr>
<tr>
<td>3/8</td>
<td>4</td>
</tr>
<tr>
<td>1/2</td>
<td>10</td>
</tr>
</tbody>
</table>


**Flow Control Equipment**

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## Precautions

### Handling of One-touch Fittings

#### Caution

1. Refer to page 15-1-11 for One-touch Fitting.

### Series ASD

#### Operation

**Caution**

1. **Single acting cylinder**

   When controlling a single acting cylinder, the cylinder's return speed will differ depending on the operating conditions. Operate after confirming the maximum return speeds shown in the table below.

<table>
<thead>
<tr>
<th>Speed Controller</th>
<th>Cylinder</th>
<th>Solenoid valve</th>
<th>Tubing</th>
<th>Silencer</th>
<th>Maximum return speed (mm/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASD230F</td>
<td>CJ2</td>
<td>VJ500</td>
<td>TU0604 1 m</td>
<td>AN110-01</td>
<td>100 200 300</td>
</tr>
<tr>
<td>ASD330F</td>
<td>CM2</td>
<td>VZ500</td>
<td>TU0604 1 m</td>
<td>AN110-01</td>
<td>100 200 300</td>
</tr>
</tbody>
</table>

<Operating conditions>
- Cylinder extension speed: 100 mm/s
- Meter-out needle fully open

*Values at 0.5 MPa and 20°C.

### Series ASN2

#### Selection

**Warning**

1. **Inappropriate Circuits**
   - (a) "Perfect Valve" (VF66, VS7-8-FPG, VS7-8-FPG)
   - (b) Pilot check valve between Actuator and Valve

![Diagram of Inappropriate Circuits]

Residual pressure behind the exhaust needle may cause check valve malfunction in the "Perfect Valve".

#### Mounting

**Caution**

1. If installing flow controls to valve ports, interference may occur with the fittings. Please consult the catalog before installing.

![Diagram of Mounting]

### Series AK

**Caution**

1. Vibrations may generate due to operating conditions, etc., even if the specifications are in the range mentioned in the catalog. Please consult with SMC.

2. Cracking pressure is a pressure at which the valve starts opening and not a pressure at which the valve is fully open.

*Note* Use Series AS-F with -X214 for the throttle valve.

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**Flow Control Equipment**

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## Precautions

### Series ASS

#### Selection

**⚠️ Warning**

1. **Use meter-out controlling type after confirming the initial speed to prevent sudden actuator extension.**
   Due to its specifications, the extension preventing function does not have speed control capability so that adjustments are limited. Use the meter-in controlling type if desired speed is less than set speed.

2. **Circuit pressure remaining in cylinder is not usable.**
   Extension prevention works when pressure has been exhausted in cylinder. Therefore, prevent the extension by meter-in control using a speed controller in such a case.

#### Mounting

**⚠️ Warning**

1. **Install Actuator and SSC valve as close as possible.**
   Extensions prevention in the initial operation and standard speed control may not function.

2. **Do not use for relatively small capacity actuators.**
   i.e. short stroke cylinders (less than 100 mm), rotary actuators, etc.
   SSC valve may not properly operate.

3. **Use in load factor less than 50%.**
   Speed control under normal operations may not function.

### Series AQ

#### Operation

**⚠️ 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 smaller than the min. operating pressure.

### Series ASP

#### Caution on Design

**⚠️ Warning**

1. **This product cannot be used for accurate and precise intermediate stops of the actuator.**
   Due to the compressibility of air as a fluid, the actuator will continue to move until it reaches a position of pressure balance, even though the pilot check valve closes with an intermediate stop signal.

2. **This product cannot be used to hold a stop position for an extended period of time.**
   Pilot check valves and actuators are not guaranteed for zero air leakage. Therefore, it is sometimes not possible to hold a stop position for an extended period of time. In the event that holding for an extended time is necessary, a mechanical means for holding should be devised.

3. **Consider the release of residual pressure.**
   Actuators may move suddenly due to residual pressure, which can be dangerous during maintenance procedures.

#### Selection

**⚠️ Warning**

1. **When used in a balance control circuit, there are instances in which the check valve cannot release, even though the pilot pressure is 50% of the operating pressure.**
   In these cases, the pilot pressure should be the same as the operating pressure.

2. **For reference, SMC has conducted endurance tests in which ON, OFF operation of the check valve was performed at the maximum operating pressure, with a confirmed endurance of 10 million operations.**
   Since the tests were performed under limited conditions, use caution in evaluating the results.
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 labels of "Caution", "Warning" or "Danger". To ensure safety, be sure to observe ISO 4414 \(^{\text{Note 1}}\), JIS B 8370 \(^{\text{Note 2}}\) and other safety practices.

⚠️ 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.

\(^{\text{Note 1}}\) ISO 4414: Pneumatic fluid power--General rules relating to systems.
\(^{\text{Note 2}}\) JIS B 8370: General Rules for Pneumatic Equipment

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⚠️ 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. The expected performance and safety assurance will be the responsibility of the person who has determined the compatibility of the system. This person should continuously review the suitability of all items specified, referring to the latest catalog information with a view to giving due consideration to any possibility of equipment failure when configuring a system.

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 components until safety is confirmed.**
   
   1. Inspection and maintenance of machinery/equipment should only be performed once measures to prevent falling or runaway of the driver objects have been confirmed.
   2. When equipment is to be removed, confirm the safety process as mentioned above. Cut the supply pressure for this equipment and exhaust all residual compressed air in the system.
   3. Before machinery/equipment is restarted, take measures to prevent shooting-out of cylinder piston rod, etc.

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. Installation on equipment in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverages, recreation equipment, emergency stop circuits, clutch and brake circuits in 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.
1. Confirm the specifications.

Products represented in this catalog are designed for use in compressed air applications only (including vacuum), unless otherwise indicated. Do not use the product outside their design parameters. Please contact SMC when using the products in applications other than compressed air (including vacuum).

4. Use clean air

If the compressed air supply is contaminated with chemicals, synthetic materials, corrosive gas, etc., it may lead to breakdown or malfunction.

Operating Environment

1. Do not use in environments where the product is directly exposed to corrosive gases, chemicals, salt water, water or steam.
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 vibrations and/or shocks.
4. Do not mount the product in locations where it is exposed to radiant heat.

Maintenance

1. Maintenance procedures are outlined in the operation manual. Not following proper procedures could cause the product to malfunction and could lead to damage to the equipment or machine.
2. Maintenance work

If handled improperly, compressed air can be dangerous. Assembly, handling and repair of pneumatic systems should be performed by qualified personnel only.
3. Drain flushing

Remove drainage from air filters regularly. (Refer to the specifications.)
4. Shut-down before maintenance

Before attempting any kind of maintenance make sure the supply pressure is shut off and all residual air pressure is released from the system to be worked on.
5. Start-up after maintenance and inspection

Apply operating pressure and power to the equipment and check for proper operation and possible air leaks. If operation is abnormal, please verify product set-up parameters.
6. Do not make any modifications to the product.

Do not take the product apart.

Air Supply

1. Operating fluid

Please consult with SMC when using the product in applications other than compressed air (including vacuum). Regarding products for general fluid, please ask SMC about applicable fluids.

2. Install an air dryer, aftercooler, etc.

Excessive condensate in a compressed air system may cause valves and other pneumatic equipment to malfunction. Installation of an air dryer, after cooler etc. is recommended.

3. Drain flushing

If condensate in the drain bowl is not emptied on a regular basis, the bowl will over flow and allow the condensate to enter the compressed air lines. If the drain bowl is difficult to check and remove, it is recommended that a drain bowl with the auto-drain option be installed. For compressed air quality, refer to “Air Preparation Equipment” catalog.
Quality Assurance Information (ISO 9001, ISO 14001)

Reliable quality of products in the global market

To enable our customers throughout the world to use our products with even greater confidence, SMC has obtained certification for international standards “ISO 9001” and “ISO 14001”, and created a complete structure for quality assurance and environmental controls. SMC products pursue to meet its customers’ expectations while also considering company’s contribution in society.

Quality management system

ISO 9001

This is an international standard for quality control and quality assurance. SMC has obtained a large number of certifications in Japan and overseas, providing assurance to our customers throughout the world.

Environmental management system

ISO 14001

This is an international standard related to environmental management systems and environmental inspections. While promoting environmentally friendly automation technology, SMC is also making diligent efforts to preserve the environment.
The CE mark indicates that machines and components meet essential requirements of all the EC Directives applied. It has been obligatory to apply CE marks indicating conformity with EC Directives when machines and components are exported to the member Nations of the EU. Once "A manufacturer himself" declares a product to be safe by means of CE marking (declaration of conformity by manufacturer), free distribution inside the member Nations of the EU is permissible.

■ CE Mark
SMC provides CE marking to products to which EMC and Low Voltage Directives have been applied, in accordance with CETOP (European hydraulics and pneumatics committee) guidelines.

■ As of February 1998, the following 18 countries will be obliged to conform to CE mark legislation
Iceland, Ireland, United Kingdom, Italy, Austria, Netherlands, Greece, Liechtenstein, Sweden, Spain, Denmark, Germany, Norway, Finland, France, Belgium, Portugal, Luxembourg

■ EC Directives and Pneumatic Components
- Machinery Directive
The Machinery Directive contains essential health and safety requirements for machinery, as applied to industrial machines e.g. machine tools, injection molding machines and automatic machines. Pneumatic equipment is not specified in Machinery Directive. However, the use of SMC products that are certified as conforming to EN Standards, allows customers to simplify preparation work of the Technical Construction File required for a Declaration of Conformity.

- Electromagnetic Compatibility (EMC) Directive
The EMC Directive specifies electromagnetic compatibility. Equipment which may generate electromagnetic interference or whose function may be compromised by electromagnetic interference is required to be immune to electromagnetic affects (EMS/immunity) without emitting excessive electromagnetic affects (EMI/emission).

- Low Voltage Directive
This directive is applied to products, which operate above 50 VAC to 1000 VAC and 75 VDC to 1500 VDC operating voltage, and require electrical safety measures to be introduced.

- Simple Pressure Vessels Directive
This directive is applied to welded vessels whose maximum operating pressure (PS) and volume of vessel (V) exceed 50 bar/L. Such vessels require EC type examination and then CE marking.
national Standards

you to comply with EC directives and CSA/UL standards.

- **CSA Standards & UL Standards**
  UL and CSA standards have been applied in North America (U.S.A. and Canada) symbolizing safety of electric products, and are defined to mainly prevent danger from electric shock or fire, resulting from trouble with electric products. Both UL and CSA standards are acknowledged in North America as the first class certifying body. They have a long experience and ability for issuing product safety certificate. Products approved by CSA or UL standards are accepted in most states and governments beyond question. Since CSA is a test certifying body as the National Recognized Testing Laboratory (NRTL) within the jurisdiction of Occupational Safety and Health Administration (OSHA), SMC was tested for compliance with CSA Standards and UL Standards at the same time and was approved for compliance with the two Standards. The above CSA NRTL/C logo is described on a product label in order to indicate that the product is approved by CSA and UL Standards.

- **TSSA (MCCR) Registration Products**
  TSSA is the regulation in Ontario State, Canada. The products that the operating pressure is more than 5 psi (0.03 MPa) and the piping size is bigger than 1 inch. fall into the scope of TSSA regulation.

**Products conforming to CE Standard**

With CE symbol for simple visual recognition

In this catalog each accredited product series is indicated with a CE mark symbol. However, in some cases, every available models may not meet CE compliance. Please visit our web site for the latest selection of available models with CE mark.

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