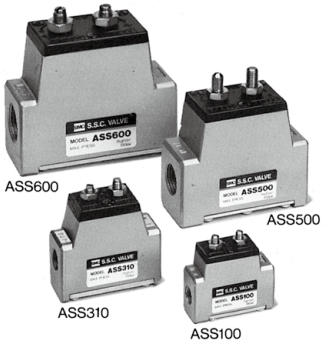
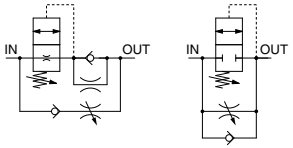
Extension Prevention System
SSC Valve

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



Symbol



Meter-out control **Meter-in control**

Model

Style	Model	Port size	Controlled flow		Free flow		Weight (g)
			Sonic conductance $dm^3/(s \cdot bar)$	Critical pressure ratio	Sonic conductance $dm^3/(s \cdot bar)$	Critical pressure ratio	
Meter-out control	**ASS100**	1/8	0.44	0.45	1.7	0.5	97
	ASS300	1/4, 3/8	2.6		4		220
	ASS500	1/2, 3/4	9.5		10		580
	ASS600	3/4, 1	14.6		16.4		950
Meter-in control	**ASS110**	1/8	0.44	0.25	1	0.35	97
	ASS310	1/4, 3/8	3		4.2		220

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

ASS 3 00 – □ 02 B

Body size

1	1/8
3	3/8
5	3/4
6	1

Type

00	Meter-out control type
10	Meter-in control type

∗ Meter-in type is available only for ASS110 and ASS310.

Accessory

Nil	None
B	With bracket

Port size

Port size		Applicable series
01	1/8	ASS100/110
02	1/4	ASS300/310
03	3/8	ASS300/310
04	1/2	ASS500
06	3/4	ASS500/600
10	1	ASS600

Thread type

Nil	Rc
N	NPT
F	G

Prevention of unexpected cylinder start-up

If pressure is applied only to one side of the cylinder, the rod could get out of control, leading to damage to the product or attachment. 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 sudden extension because the cylinder speed is constantly under meter-in control.

⚠ Specific Product Precautions

Design/Selection

⚠Warning

1. **Use the meter-out control 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 adjustments are limited. Use the meter-in control type if the desired speed is less than the set speed.

2. **Cannot be used with a circuit where there is residual pressure inside the cylinder.**

   Extension prevention works when pressure has been exhausted in the cylinder. Therefore, in such a case, prevent the extension with meter-in control using a speed controller.

Mounting

⚠Warning

1. **Install the actuator and SSC valve as close as possible.**

   Extension prevention at the time of initial operation and standard speed control may not function.

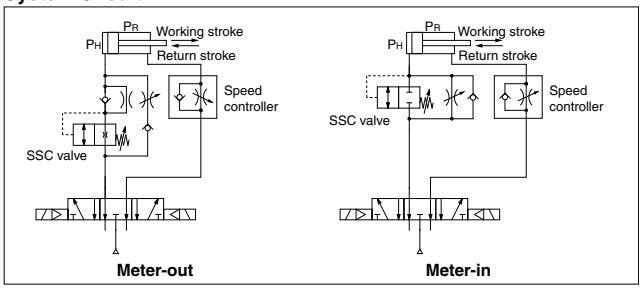
2. **Do not use for relatively small capacity actuators, i.e. short stroke cylinders with (100 mm or less), rotary actuators, etc.**

   The SSC valve may not properly operate.

3. **Use with a load factor of 50% or less.**

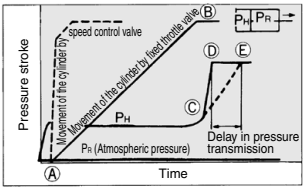
   Speed control may not function during normal operation.

System Circuit



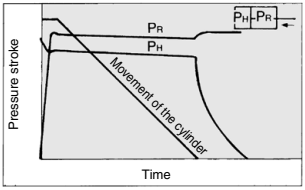
<Meter-out> Graph/Pressure to Time

Opening Stroke during Primary Operation

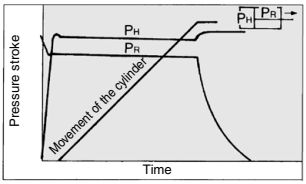


During the operating stroke at initial actuation, the cylinder moves at a slow speed from Ⓐ to Ⓑ due to the fixed throttle of the SSC valve. When it reaches Ⓑ, the head pressure (PH) rises quickly as indicated by the line from Ⓒ to Ⓓ. Therefore, there is no time loss associated with the pressure transmission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

Return Stroke during Normal Operation

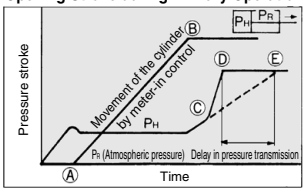


Working Stroke during Normal Operation



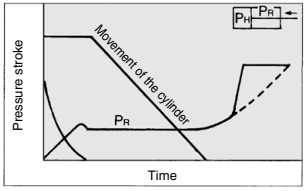
<Meter-in> Graph/Pressure to Time

Opening Stroke during Primary Operation

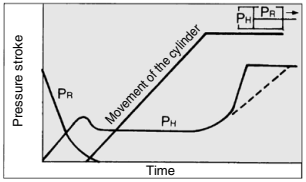


Due to meter-in control, the cylinder moves from Ⓐ to Ⓑ regardless of whether it is an initial operation or a normal operation. When it reaches Ⓑ, the head pressure (PH) rises quickly as indicated by the line from Ⓒ to Ⓓ.
Therefore, there is no time loss associated with the pressure transmission lag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

Return Stroke during Normal Operation



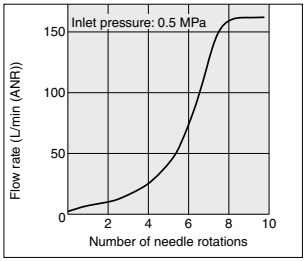
Working Stroke during Normal Operation



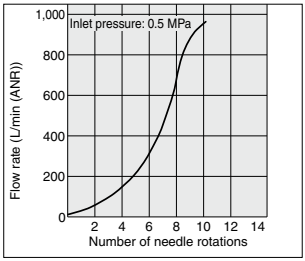
Flow Characteristics

Note) The flow characteristics are representative values.

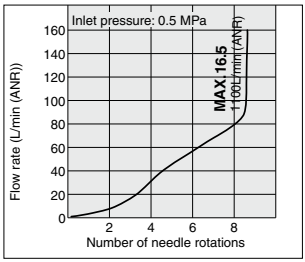
ASS100/ASS110



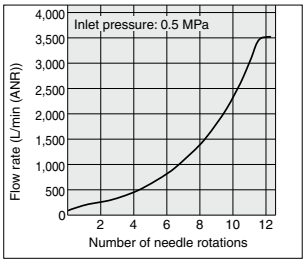
ASS300



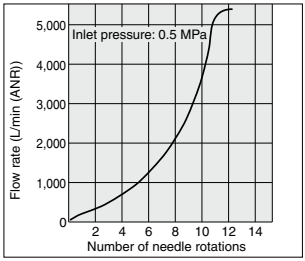
ASS310



ASS500

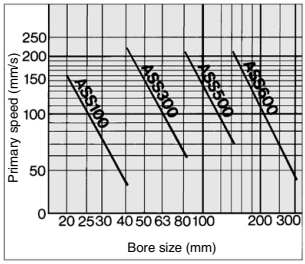


ASS600



Cylinder Extension Prevention Primary Speed

Meter-out Control

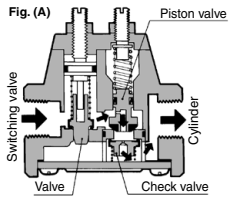


Conditions : Supply pressure at 0.5 MPa, No load

* Primary speed of meter-in type can be controlled as likely as during normal operation.

Meter-out Control/Construction Principle

During primary operation (Piston rod extension prevention)



Set pressure for piston valve > Pressure in the cylinder

Set pressure for piston valve < Pressure in the cylinder (Stroke end)

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. When this pressure becomes higher than the set pressure of the piston valve, the piston valve opens fully. Then, the air from the switching valve feeds rapidly into the cylinder by opening the check valve.

During normal operation

Switching valve → Cylinder **Cylinder → Switching valve**

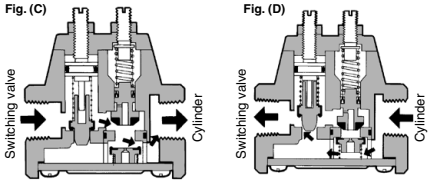
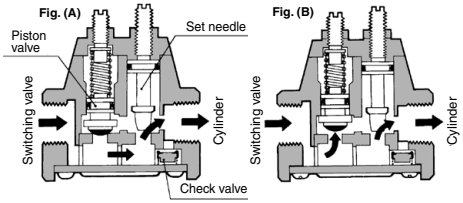


Fig. (C)
Because the pressure in the cylinder is higher than the set pressure, the air from the switching valve causes the piston valve to open fully and feeds rapidly into the cylinder by opening the check valve. Therefore, meter-out control of the cylinder speed is effected by the speed control valve 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/Constuction Principle

During primary operation (Piston rod extension prevention)



Set pressure for piston valve > Pressure in the cylinder

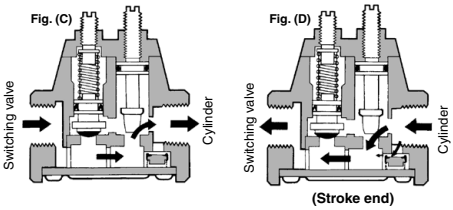
Set pressure for piston valve < Pressure in the cylinder (Stroke end)

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. When this pressure becomes higher than the set pressure of the piston valve, the piston valve opens fully. Then, the air from the switching valve feeds rapidly into the cylinder.

During normal operation

Switching valve → Cylinder **Cylinder → Switching valve**

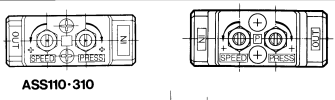


(Stroke end)

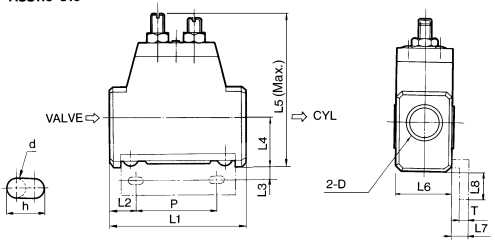
Fig. (C)
The air that has been supplied by the switching valve closes the check valve. Also, because the cylinder's internal pressure is lower than the set pressure, the piston valve closes fully, causing the air to be supplied gradually via the throttle of the set needle. Therefore, meter-out control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

Fig. (D)
The air in the cylinder initially opens the piston valve and the check valve and discharges rapidly through the switching valve. The fully opened piston valve closes as shown in **Fig. (D)** when the pressure in the cylinder is lower than the set pressure. Then the air passes through the check valve and becomes discharged (**Fig. (D)**). Thus, meter-in control of the cylinder speed is effected by the speed control valve of the supply conduit.

Dimensions



ASS110·310



Model		D	L1	L2	L3	L4	L5	L6	L7	L8	P	d	h	T
ASS100	ASS110	1/8	50	17	4	14	52	20	5	9	20	5	10	2
ASS300	ASS310	1/4, 3/8	63	16.5	5	23	73	26	6	12	30	6	12	3.2
ASS500	—	1/2, 3/4	90	30.5	6	27	99	38	6	13	35	7	14	2.3
ASS600	—	3/4, 1	112	26	6	31	116	46	6	14	65	7	14	3.2

Meter-out Control Type

Mounting method

Connect tubing directly to the cylinder with the IN side facing the directional control valve on the supply conduit (of the stroke that must be prevented from shooting out).

Note 1) If the tubing between the cylinder and the SSC valve is too long, it might not be possible to effect speed control during normal operation.

Note 2) The SSC valve cannot prevent quick extension if there is residual pressure in the cylinder.

Note 3) After the initial operation, make sure that the cylinder remains pressurized at the end of the stroke and that the cylinder has been filled with air before using the circuit to perform a normal operation.

Adjusting method

To adjust the meter-out control type, first adjust the cylinder speed for normal operation before adjusting the set pressure for preventing sudden extension.

Adjusting procedure

1. In the normal operation state (in which one of the conduits is pressurized) adjust the cylinder speed to the prescribed speed by operating the cylinder speed adjustment set needle located on the IN side. Turn the cylinder speed adjustment set needle counterclockwise to increase the speed and clockwise to decrease the speed. After adjusting, tighten the lock nut. Keep the cylinder cushion needle as open as possible.
2. Initially, turn the pressure adjustment set needle located on the OUT side clockwise to raise the set pressure. At the time of shipment, the set pressure is adjusted to approximately 0.2 MPa.
3. Release the pressure in the cylinder once. Then, supply air, and adjust the pressure by turning the pressure adjustment set needle counterclockwise. This is to effect the meter-in control of the cylinder movement through the SSC valve's fixed throttle in order to prevent quick extension, and to rapidly feed air pressure after the piston has reached the end of its stroke. After adjusting, make sure to tighten the lock nut.

Note 1) Pressure set adjustments must be made in accordance with the operating conditions.

Note 2) Set pressure adjustment must be made during the initial operation after the pressure in the cylinder has been released.

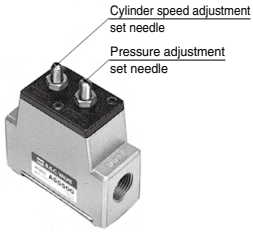
Note 3) If the set pressure is adjusted too low, it will not be possible to prevent sudden extension during the initial operation. If it is adjusted too high, it will restrict the cylinder speed during normal operation.

4. Again, verify the operation of the cylinder during normal operation. If there is a significant delay in starting the cylinder movement, causing it to lurch, or if the speed is extremely slow, tighten the speed controller on the exhaust side or the cylinder speed adjustment set needle of the SSC valve clockwise, or lower then set pressure of the supply side SSC valve. Then, readjust by performing steps 3 and 4 again.

Note) Verify the cylinder movement during normal operation after it has been prevented from suddenly extending during the initial operation and the air pressure has been supplied sufficiently at the end of the stroke.

Mounting and Adjusting of SSC Valve

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



Bracket Part No.

Model	Part no.
ASS1□0	XT14-82-3-1
ASS3□0	XT14-105-5-1
ASS500	XT14-89-2-1
ASS600	XT14-85-2-1

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.

Note 1) The longer the tubing of the cylinder, SSC valve, and speed controller, the longer is the delay during actuation.

Note 2) If a load is applied constantly, such as when the cylinder is mounted vertically, it is not possible to control the speed of the stroke in the same direction as that of the load.

Adjusting method

To adjust meter-in control, adjust 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 on the side with the SSC valve as open as possible.
4. Adjust the pressure adjustment set needle counterclockwise so that the cylinder moves, the cylinder speed is controlled by meter-in control, and the pressure is rapidly supplied to the cylinder after reaching the stroke end. After adjusting, tighten the lock nut.

Note) Do not turn the pressure adjustment set needle excessively counterclockwise to prevent the cylinder from suddenly extending.