Safety Precautions

Be sure to read this section before use.

Refer to Intro Page 73 for general information of the cylinder, and to Intro Page 80 for general information of the cylinder switch.

Product-specific cautions: Mechanical Power Cylinder MCP Series

Design/selection

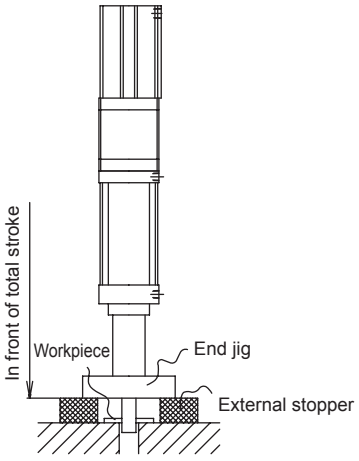
⚠DANGER

- Before starting, be sure to supply air to the travel section's retract side to apply back pressure. The piston rod may pop out, which is extremely dangerous.

⚠CAUTION

- If an external force in the direction of cylinder retraction is applied to the piston rod when the cylinder retracts after the boost, operate within the following value limits (maximum) to prevent the risk of coupling release failure or booster failure.
  MCP-W-2: 1000N or less
  MCP-W-5: 3000N or less

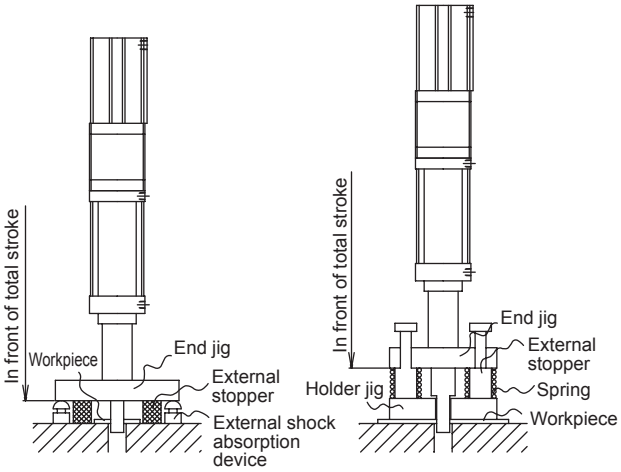
- When using the product for punching out or cutting workpieces, the piston rod may pop out. When the piston rod pops out, it can contact the rod cover (W) for the rapid feed section cylinder and cause impact sound or damage to the cylinder from the impact. Always use an external stopper or shock absorber within the total stroke.



- Do not apply lateral load or eccentric load to the piston rod.
  If the cylinder is operating in a direction other than the vertical direction, the tip load will be applied to the cylinder. In this case, use a guide that prevents the load from being applied to the cylinder.

- Use the cylinder in a mechanism in which the piston rod does not rotate so that no torque is applied to the rod. Otherwise, there is a risk of coupling release failure or booster failure.

- Do not use multiple synchronized cylinders.



If external force is applied in the direction of the cylinder retraction due to the spring or external shock buffer when the cylinder retracts, the external force should be within the following values:
MCP-W-2: 1000N or less
MCP-W-5: 3000N or less

- After boosting, provide a time lag of 0.5 seconds or more between booster section retraction and rapid feed section retraction. If the rapid feed section retracts before the booster, the cylinder could be damaged if the booster pops out when the coupling is released. Also, do not use the booster while in the meter-out position. The cylinder could be damaged if the booster pops out when the coupling is released.

- Use discrete solenoid valves for booster and rapid feed sections. When using embedded into a manifold, be sure to take countermeasures such as using a single exhaust spacer.

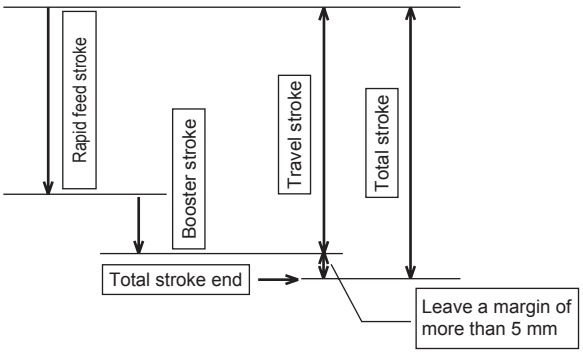
- Do not advance the booster at the same time that the rapid feed section reaches the end of its travel. Coupling faults could result. Provide a time lag of one second or longer from after the rapid feed section moves forward and contacts the workpiece to when the booster section starts traveling.

- Using the product near a welder, etc., can magnetize the product, which may cause the cylinder switch to malfunction. Avoid use in an environment that may have magnetic fields.

- Because MCP-S is a single acting cylinder, the applied load (jig weight) on the piston rod end should be 20 kg or less for the 2t and 50 kg or less for the 5t.

■ When using the booster stroke, the total stroke should be well within the stroke end.

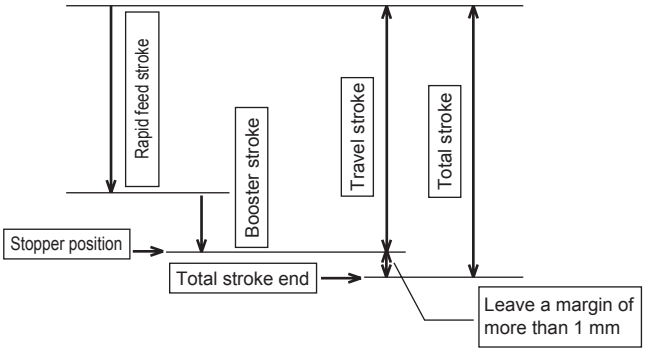
(1)If there is no external stopper
(When using the booster stroke up to the full stroke)



Set the total stroke so that it is greater than the sum of the travel stroke and 5 mm.
However, the travel stroke is equal to the sum of the rapid feed stroke and the booster stroke.

Applications
·Press-fitting, bending (pressing), etc.

(2)If there is an external stopper
(When not using the booster stroke up to the full stroke)



Set the external stopper so that the total stroke is greater than the sum of travel stroke and 1 mm.
However, the travel stroke is equal to the sum of the rapid feed stroke and the pressing length.

Applications
·Punching, cutting, etc.

■ The retraction end of the booster section can be detected by installing a cylinder switch on the booster section.
To install a cylinder switch, purchase only the switch body.

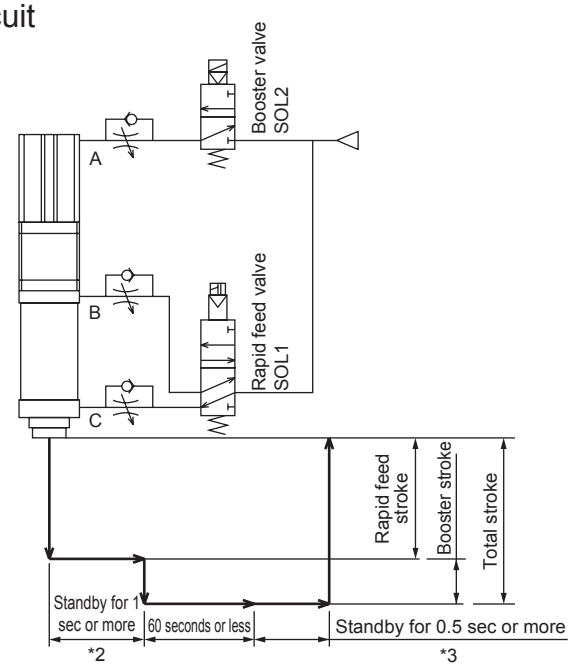
■ In the state where the booster section has not been allowed to completely return, if the booster is made to move forward repeatedly, damage to the booster section cylinder could result. In the case where the cycle time is short, use the cylinder switch to detect if the booster section cylinder is moving back to the end of the stroke.

■ Because there is a possibility of a failed release of connection or a run-out of the piston rod, do not use the quick exhaust valve on the head side of the rapid feed section.

■ MCP-W cannot be held in the booster state for a long period of time. Retract within roughly 60 seconds after boosting has commenced.

Design/selection

Circuit



Solenoid valve / Operation status	Travel stroke SOL1	Booster stroke SOL2
Rapid feed advancement	ON	OFF
Rapid feed stroke end	ON	OFF
Standby for 1 sec or more *2	ON	OFF
Booster advancement	ON	ON
Booster retraction *1	ON	OFF
Standby for 0.5 sec or more *3	ON	OFF
Rapid feed return	OFF	OFF

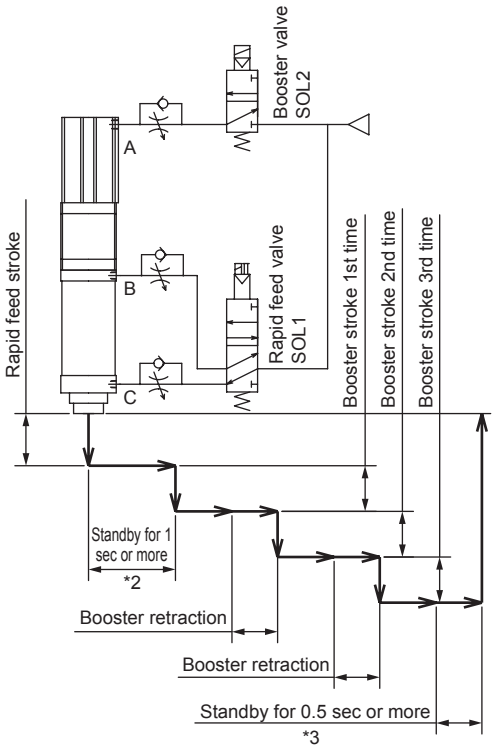
*1 : Piston rod cannot be retracted while the booster section is returning.
*2 : Time required for the air to be exhausted from the rapid feed rod side and the rapid feed and booster sections to connect.
*3 : Time required for the air to be exhausted from the booster head side and the rapid feed and booster sections to release.

■ Due to the time required to couple the rapid feed section and booster section, a 1-second wait is necessary before the booster cylinder starts to advance from the rapid feed stroke end (after the rapid feed cylinder advances and stops).
If the exhaust from the rapid feed rod side is restricted as in the following cases, the wait may have to be longer than 1 second. Set the standby time with a margin of safety.
·When the solenoid valve flow volume is minimal
·When speed controller at rod side of the rapid feed cylinder is restricting flow (Fig. C above)
·When the piping for the rapid feed section is long
·When the piping diameter for the rapid feed section is narrow

■ Because the booster section is retracted before the rapid feed section, a 0.3 to 0.5-second wait is necessary from the start of booster cylinder retraction to the start of rapid feed cylinder retraction.
If the exhaust from the booster section is restricted as in the following cases, the wait may have to be longer than 0.5 seconds. Set the standby time with a margin of safety.
·When the solenoid valve flow volume is minimal
·When the piping for the booster section is long
·When the piping diameter for the booster section is narrow

■ By repeating pressurizing and exhaust of only the booster section after rapid feed, a 10 mm boost can be obtained per repeat. (Repeat boosting 3 times when 30 mm boosting is required)

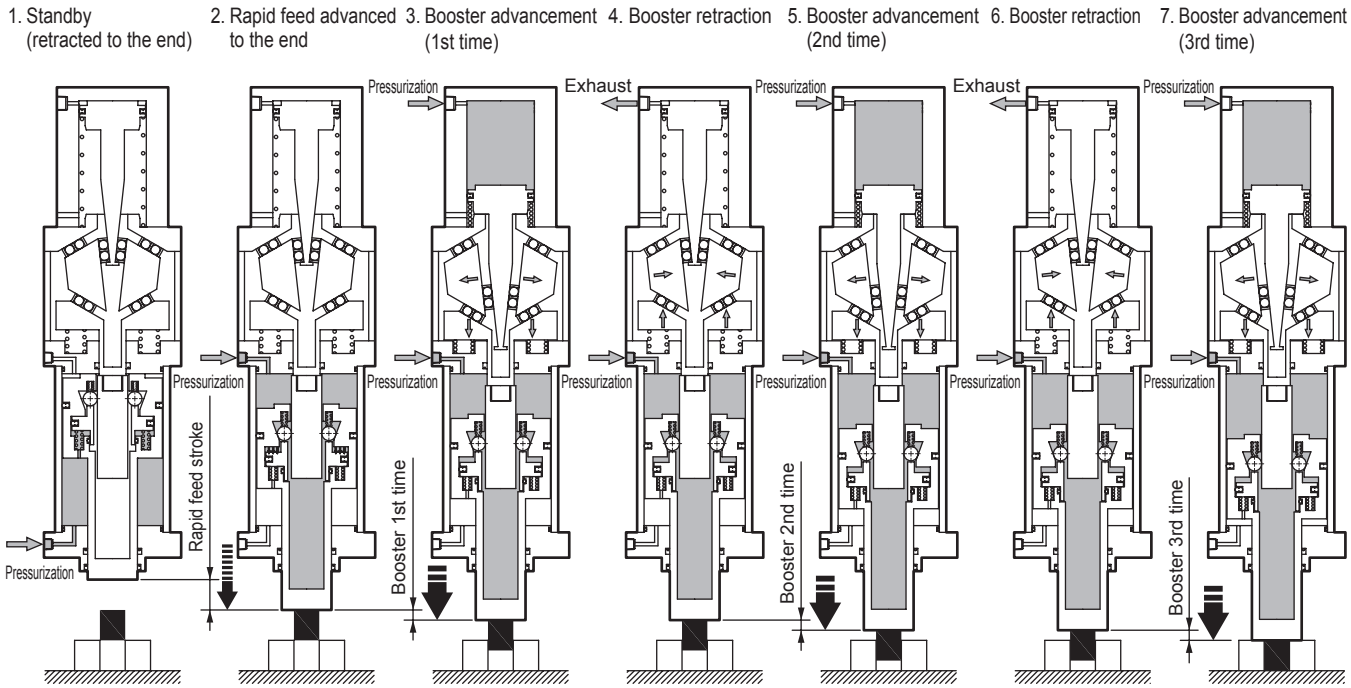
[Circuit example when press-fitting 30 mm]



Solenoid valve / Operation status	Rapid feed stroke SOL1	Booster stroke SOL2
Rapid feed advancement	ON	OFF
Rapid feed stroke end	ON	OFF
Standby for 1 sec or more *2	ON	OFF
Booster advancement 1st time	ON	ON
Booster retraction *1	ON	OFF
Booster advancement 2nd time	ON	ON
Booster retraction *1	ON	OFF
Booster advancement 3rd time	ON	ON
Booster retraction *1	ON	OFF
Standby for 0.5 sec or more *3	ON	OFF
Rapid feed return	OFF	OFF

*1 : Piston rod cannot be retracted while the booster section is returning.
*2 : Time required for the air to be exhausted from the rapid feed rod side and the rapid feed and booster sections to connect.
*3 : Time required for the air to be exhausted from the booster head side and the rapid feed and booster sections to release.

[Operation diagram when press-fitting 30 mm]



Mounting, installation and adjustment

⚠ CAUTION

- Do not disassemble the product.
- Do not lubricate the cylinder, as this may cause malfunction.
- While the mounting direction is unrestricted, if the cylinder is operating in a direction other than the vertical direction, the end load will be applied to the cylinder. In this case, use a guide that prevents the load from being applied to the cylinder.
- Tighten so that torque is not applied to the cylinder. When fixing the workpiece to the end of the piston rod, use a wrench to tighten for mounting.