

A: The intermediate stopping method using a valve is achieved by a pressure balance. Therefore, compared with a mechanical lock, it has lower accuracy and cannot be held if an external force is applied. However, in some applications, it is applicable and can be reviewed with understanding of the following operational features.

[1] Closed center valve

Since there can be a difference in the leakage amount between Q_A and Q_B , the pressure in part A and B can become different and the slider may start to move. Furthermore, the leakage in A and B may mean the pressure decreases, so when the cylinder is restarted, it may move suddenly. For this reason, this type of valve should be avoided.

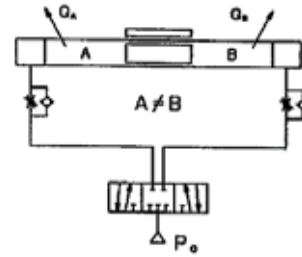


Fig.1 Closed center valve

[2] Pressure center valve

Part A and B are controlled by a valve, when triggered, this creates an equal pressure on either side of the piston, stopping the slider. Therefore, the amount by which the slider moves when the valve is centered increases as the inertial force of the load increases. The cylinder will not move unless an external force is applied, thus in vertical applications, the gravity is an external force so the intermediate stop cannot be held.

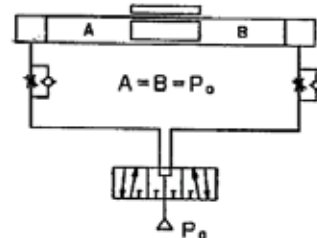


Fig.2 Pressure center valve

[3] Exhaust center valve

The operational performance is similar to the pressure center valve. When the cylinder is restarted, the cylinder moves suddenly since the back pressure is zero (atmospheric pressure). Furthermore, the internal pressure can become negative due to an inertial force and this can cause air leakage. Therefore, this type of valve should be avoided if possible.

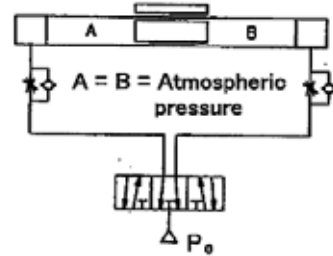


Fig.3 Exhaust center valve

[4] 3-port valve

This type of valve prevents significant slider movement from an external force when pressurising part A and B. If the external force is continuously applied, the cylinder will move gradually, but if the external force is applied in a constant direction, a regulator can be used to prevent this motion.

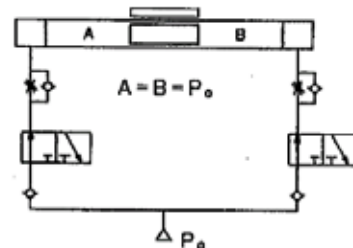


Fig.4 3-port valve

[Stop accuracy and other precautions]

The intermediate stop with a valve is basically achieved by a pressure balance between part A and B. Therefore, pressure balance type valves [2] and [4] are recommended. The stop accuracy changes depending on the load weight, speed, pressure and volumetric difference (difference between volumes of supply pressure and back pressure along with the position of the slider) because the air is a compressible fluid. However, the accuracy can be improved in the following manner. The key point for this improvement is "how quickly the pressure in part A and B can be equalised".

1. Keep the cylinder operating at low speeds to reduce the differential pressure and the inertial force.
2. Increase the effective area of a check valve (speed controller) to shorten the time to apply the back pressure.
3. Place the speed controller (restrictor) on the back of the valve to apply the back pressure to the air released to atmospheric pressure. (See Fig.5)
4. Use large diameter and short piping lengths.
5. Adopt standard piping, not common piping.

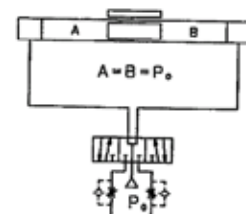


Fig.5 Change of the position of the speed controller

Note) Manifold is not applicable except for individual EXH.