Pneumatic Component

For Safe Use of This Product

Please read before use. Check P. 41 at the beginning for general cylinders and P. 1512 for cylinder switches.

Specific Precautions: Rodless Cylinder with Brake SRT3 Series

Design / Selection

⚠WARNING

■Structure so that the human body does not directly touch the driven object and the moving parts of the cylinder with brake.

Install a protective cover so that the human body cannot touch it directly. Or, if there is a risk of touching, provide a sensor etc. to make a safe structure such as emergency stop before touching or sounding a warning sound to notify danger.

■Use a balance circuit that considers the cylinder shooting out.

If the brake is operated at an arbitrary position during the stroke such as intermediate stop, and air pressure is applied to only one side of the cylinder, the piston will shoot out at high speed when the brake is released. In such a case, there is a risk of causing injury to the human body such as pinching hands and feet, and causing damage to the machine, so use a balance circuit like the recommended pneumatic circuit to prevent shooting out.

■The Rodless cylinder with brake is a lubrication-free specification, so absolutely do not lubricate it. It causes brake malfunction.

■Please note that holding force is the ability to hold a static load without vibration or shock after the brake is activated under no load.

Therefore, please be careful when using near the upper limit of the holding force at all times.

■Do not apply impact load, strong vibration, or rotational force when the brake is operating.

If impact load, strong vibration, or rotational force is applied from the outside, the holding force will decrease and it is dangerous, so please be careful.

■When performing intermediate stop, consider the stopping accuracy and overrun amount.

Because it is a mechanical lock, it does not stop instantly in response to the stop signal, but stops with a time delay. The stroke that slides due to this delay is the overrun amount. And the range between the maximum and minimum overrun amount is the stopping accuracy.

- Place the limit switch in front of the desired stop position by the overrun amount.
- The limit switch requires a detection length (dog length) of the overrun amount + α.
- In the case of our cylinder switch, the operating range is 7 to 16 mm (depending on the switch model). . If the overrun amount exceeds this, perform self-holding of the contact on the switch load side.

■Do not use multiple cylinders with brakes in synchronization. If synchronization is lost, excessive moment load or load concentration may occur on the cylinder where the brake worked first, causing brake release failure, reduced life, damage, etc.

■To further improve stopping accuracy, shorten the time from the stop signal until the brake operates and stops as much as possible.

To do so, use a DC type control electric circuit and valve with good response, and place the valve and cylinder as close as possible.

■Please note that stopping accuracy is affected by changes in piston speed.

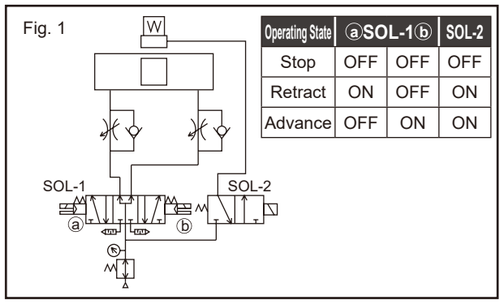
If the piston speed changes due to load fluctuation or disturbance during the reciprocating stroke of the cylinder, the dispersion of the stop position will increase, so consider keeping the piston speed constant immediately before the stop position. Also, during the cushion stroke and while in the acceleration range from the start of operation, the speed change is large, so the dispersion of the stop position becomes large. The stopping accuracy at piston speed 300 mm/s with no load is +/- 1.5 mm (reference value).

■Precautions for Basic Circuit

● For Horizontal Load

Please pipe as shown in Fig. 1 for use. In the case of a rodless cylinder, the cross-sectional areas on both sides of the piston are equal, so a pressure reducing valve for balancing is not necessary.

Fig. 1

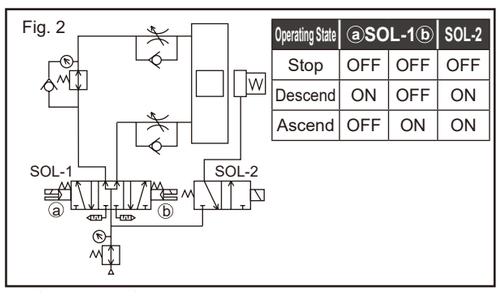


Operating State	ⓐSOL-1ⓑ	SOL-2
Stop	OFF	OFF	OFF
Retract	ON	OFF	ON
Advance	OFF	ON	ON

● For Vertical Load

If the load is downward as shown in Fig. 2, the table will malfunction in the Load Direction when the brake is released, so install a pressure reducing valve with check valve on the upper side to reduce the thrust in the Load Direction and balance the load.

Fig. 2



Operating State	ⓐSOL-1ⓑ	SOL-2
Stop	OFF	OFF	OFF
Descend	ON	OFF	ON
Ascend	OFF	ON	ON

Note: If pressure fluctuation occurs due to other Pneumatic Component, install a dedicated pressure reducing valve to stabilize operation.

■When releasing the brake, make sure to release the brake earlier than the cylinder operation. If the cylinder operation is faster, the brake may not release.

■If back pressure is applied during locking, the lock may be released, so use a single valve or an individual exhaust type manifold for the brake release valve.

■To prevent the piston from shooting out at startup, be sure to use a 3-position PAB connection (both-side pressurization) valve for cylinder drive.

■To balance the thrust including the load, be sure to insert a pressure reducing valve with check valve on the side with larger thrust.

⚠CAUTION

■Cannot be used in environments where welding spatter etc. falls on the cylinder.

■Cannot be used in places where cutting oil, coolant fluid, oil mist, etc. come directly into contact with the cylinder.

If it is unavoidable due to cylinder installation, be sure to provide a cover etc. to protect the cylinder.

■Cannot be used in environments where foreign matter such as chips, dust, dirt, spatter, etc. come directly into contact with the cylinder or fly around.

If it is unavoidable due to cylinder installation, provide a cover etc. so that it can be protected. Also, be sure to consult us when using in such an environment.

■Slit type rodless cylinders represented by SRL3 structurally have external air leakage at a level that does not affect speed control.

■Be careful not to generate negative pressure inside the cylinder tube. When used as an air balancer or when the table is driven by external force, inertial force, etc. with all ports blocked, negative pressure may be generated in the cylinder, causing the seal belt to detach and air leakage to occur. Be careful not to generate negative pressure in the cylinder by driving with external force, inertial force, etc.

■Precautions Regarding Stopping Accuracy

● Stop Pitch and Load Factor

Stopping accuracy varies depending on stop pitch and load factor. The load factors in the table below are recommended to obtain the specified stopping accuracy.

Stop Pitch	Load Factor
50 mm or less	20% of Thrust
50 mm to 100 mm	40% of Thrust
100 mm or more	60% of Thrust

● Selection of Brake Valve

Stopping accuracy and overrun amount vary depending on the response of the brake valve. Also, connect the valve directly to the brake port to improve stopping accuracy.

● When Using PC (Programmable Controller)

If a PC (Programmable Controller) is used for the electric control device of the brake valve, the stopping accuracy will deteriorate due to the scan time (calculation processing time). When using a PC, do not incorporate only the brake valve into the PC circuit.

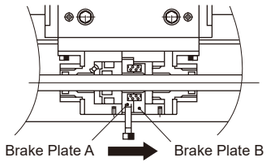
■Do not change the load weight significantly when the brake is stopped. The stop position may change.

■Abrasion powder with the protective tape may be generated when the cable carrier slides. Please consider the usage environment.

During Use

⚠WARNING

■How to release the brake manually



● Remove the cover, screw a Hexagon Socket Head Cap Screw etc. into the brake plate A and tilt it in the direction of the arrow to make the brake plates A and B parallel, and the Piston Rod becomes free. Please note that unless the two brake plates are securely tilted, release will be in one direction only.

■The brake can be released by manual release operation or by pressurizing air to the brake release port. When installing a load, if the brake is released by this operation, the load may fall, so be sure to return the manual release operation to the initial state, or confirm that the brake works with no air in the brake release port before installation.

■Do not apply force exceeding the brake holding force listed in the catalog to the cylinder.

■If the cylinder speed is fast, the length of the detection dog must take into account the response time of the relay. Please note that if the dog length is short, the stop signal will not be output and it will not stop.

■During equipment maintenance, for safety, please take separate measures to prevent the load from falling due to its own weight.

■Never disassemble and inspect the brake part as it is dangerous when reused.

■The required amount of grease is applied to the brake part, so avoid applying more grease and do not wipe off the grease.

■The brake part cannot be replaced.

■Please always use with the dust cover attached except during manual release, as it may cause a malfunction.

⚠CAUTION

■Do not apply strong impact or excessive moment to the table.

■Perform sufficient alignment when connecting to a load that has an external guide mechanism.

● The longer the stroke, the larger the variation in the axis center, so please consider a connection method (floating) that can absorb the displacement amount.

■Adjust the air balance of the cylinder.

With the brake released, attach the load to the cylinder and balance the load by adjusting the air pressure on the rod side and head side of the cylinder. By ensuring this load balance, it is possible to prevent malfunctions such as cylinder shooting out when releasing the brake and brake not releasing normally.

■Adjust the mounting position of the detection part such as the cylinder switch.

When performing intermediate stop, adjust the mounting position of the detection part such as the cylinder switch considering the overrun amount with respect to the desired stop position.

■Load fluctuation during the reciprocating stroke of the cylinder causes changes in piston speed, and changes in piston speed increase the dispersion of the stop position. Adjust the mounting so that there is no load fluctuation during the cylinder reciprocating stroke, especially immediately before stopping.

■During the cushion stroke and while in the acceleration range from the start of operation, the speed change is large, so the dispersion of the stop position becomes large. Therefore, please note that if step operation with a short stroke from the start of operation to the next position is performed, the accuracy in the specification column may not be achieved.

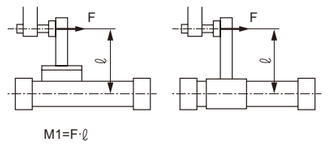
■Abrasion powder with the protective tape may be generated when the cable carrier slides. Please be careful when using in an environment that dislikes dust.

■Ensure that the moment including the inertial force generated during load movement or stopping does not exceed the allowable load. If this value is exceeded, damage will occur.

● When the overhang is large and stopping at both ends with the piston, a bending moment acts due to the inertial force of the load even if it is within the range of the internal cushion's absorbed energy. When kinetic energy is large and an external cushion etc. is used, please hit the workpiece center of gravity as much as possible.

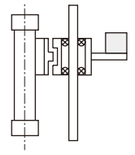
● When an external stopper is used, please select taking into account the bending moment due to cylinder thrust.

● Moment acting when stopped by an external stopper



● When an external guide is attached, if it is not aligned, the movement will not be smooth, and at the same time, the resistance due to twisting will act as a moment, so structure the connection part to absorb misalignment.

● Example of using guide



■Avoid electric welding after installing the rodless cylinder. Current flows through the cylinder, causing sparks between the dust proof belt and the cylinder tube, damaging the dust proof belt.

■Operating a unit with excessive inertia will cause damage to the Cylinder Body and malfunction, so be sure to use it within the allowable range.

■Do not make scratches, dents, etc. on the Cylinder Body. It causes malfunction.

■Please note that in usage conditions where negative pressure is generated in the cylinder due to external force, inertial force, etc., external air leakage and malfunction may occur due to detachment of the seal belt.

■Please treat our shock absorber as a consumable part. Replace it when a decrease in energy absorption capacity is observed or when operation is no longer smooth.

■If the air supply piping is thin or long, the stopping accuracy will deteriorate, so please consider this sufficiently.

■If the cylinder has been stopped for a long time, such as first thing in the morning or afternoon, the frictional resistance increases and the piston speed changes, so the stopping accuracy may deteriorate. Perform a break-in operation to obtain stable stopping accuracy.

For precautions during installation, adjustment, use, and maintenance, please refer to "During Use" in this catalog and the Instruction Manual on the CKD Component Product Site (https://www.ckd.co.jp/kiki/en/) -> "Model Number".