



To Use This Product Safely

Be sure to read this before use. For general cylinder information, see Intro 41, and for cylinder switches, see P. 1512.

Specific Precautions: Cell Top Cylinder ULK Series

Design / Selection

1. Common

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 balanced circuit that accommodates the protrusion of the Piston Rod.

If the brake is operated at any position during the stroke such as intermediate stop, and air pressure is applied to only one side of the cylinder, the Piston Rod will pop 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. Since Cell Top cylinder is a non-lube specification, never lubricate it. It causes brake malfunction.

The holding force (Max static load) is the ability to hold static load that is not accompanied by vibration or shock, in a state where the brake is operating 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 sliding 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 .

The operating range of CKD cylinder switches 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.

In order to improve stopping accuracy, ensure that the brake stops the cylinder as soon as possible after receiving the stop signal.

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 and no load is ± 1.0 mm (reference value). It varies depending on the equipment used. For details, refer to the page on stopping accuracy and overrun.

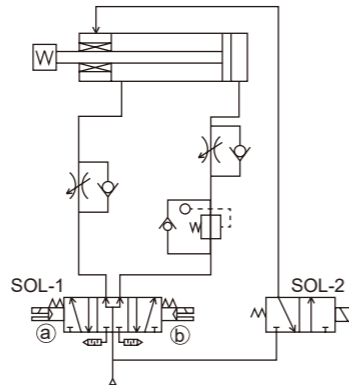
Basic circuit

Even when used for fall prevention or emergency stop, be sure to use the following circuit. 2-position valves cannot be used because the cylinder's own thrust acts on the brake part even when stopped. Balance the thrust and load with the following circuit. The brake may not release if a load is applied to the brake.

For Horizontal Load

If piped as shown in Fig. 1, equal pressure is applied to both sides of the piston when stopped, preventing the rod from popping out when the brake is released. Also, install a regulator with check valve on the head side to balance the thrust.

Fig. 1

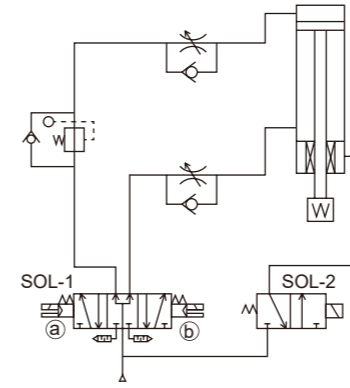


a	SOL-1	b	SOL-2	Operating State
OFF	OFF	OFF	OFF	Stop
ON	OFF	OFF	ON	Retract
OFF	ON	ON	ON	Advance

For downward vertical load

As shown in Fig. 2, if the load is downward, the rod will malfunction in the Load Direction when the brake is released. Therefore, install a pressure reducing valve with a check valve on the head side, reduce the thrust in the Load Direction, and balance the load.

Fig. 2

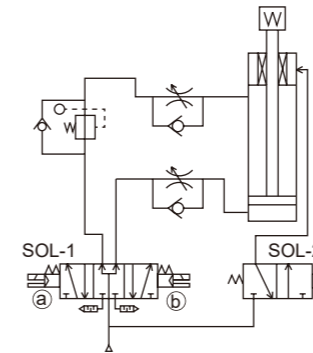


a	SOL-1	b	SOL-2	Operating State
OFF	OFF	OFF	OFF	Stop
ON	OFF	ON	ON	Descend
OFF	ON	ON	ON	Ascend

For upward vertical load

As shown in Fig. 3, if the load is upward, the rod will malfunction in the Load Direction when the brake is released. Therefore, install a pressure reducing valve with a check valve on the rod side, reduce the thrust in the Load Direction, and balance the load.

Fig. 3



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

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 maintain balance of the thrust, including the load, the side with the larger thrust should have a Regulators with a check valve.

CAUTION

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. Select by referring to the ULK-V brake valve electrical specifications. Also, connect the valve directly to the brake port to improve stopping accuracy.

When using a PLC (programmable controller)

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

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

Although the contact service life of the reed switch varies depending on usage conditions, it will generally last several million cycles. If the device used is in continuous operation day and night or high frequency operation, it will reach the contact life region in a short period of time, so use a solid state switch that does not have a contact part.

With Brake / With Lock

ULK

JSK2/
JSM2

JSG

JSC3,
JSC4

USSD

UFCD

USC

Cylinder
Switch

Ending

With Brake / With Lock

ULK

JSK2/
JSM2

JSG

JSC3,
JSC4

USSD

UFCD

USC

Cylinder
Switch

Ending

During Use

1. Common

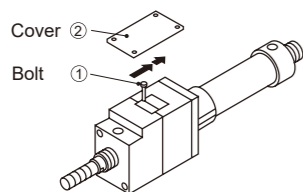
Warning

- Release brakes before coupling the load to the end of the rod.

If done with the brake activated, rotational force or load exceeding the holding force will act on the Piston Rod, causing damage to the brake mechanism.

- If the brake is released while air is applied to only one side of the cylinder, the Piston Rod can pop out at high speed, creating a dangerous situation. When releasing the brake during adjustment work, etc., always observe the following:

- Check that no one is in the movable range of the load and that no problems will arise if the load moves when brakes are released.
- When releasing the brake, perform position locking or take other measures:
 - Placing the load at the lower end
 - Pressurizing both sides
 - Placing a support
 Implement fall prevention measures such as these.
- Confirm that air is not pressurized on only one side of the cylinder when releasing brakes.
- The ULK Series can be manually released by pushing down the brake plate in the direction of the arrow using a bolt or the like. However, note that only the PUSH side will be released if the brake plate is not entirely pushed down. Since there are two brake plates, it will not release unless both brake plates are tilted. (During normal use, always remove the bolt and attach the cover before use.)①②



- Brakes are released manually or by pressurizing the brake release port. During load installation, if the brake is left released by this operation, the load may fall. Therefore, always return the manual release operation to its initial state, or confirm that the brake is effective with no air in the brake release port before installation.

- Do not apply torque to the rod when braking, as the holding force will decrease, creating hazardous conditions. Also, use with a mechanism that prevents rod rotation.

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

- If there is any play, such as looseness, in the brake signal dog, stopping accuracy is affected. Securely fix to eliminate play, etc.

- If the piston speed is fast, the detection dog must be long enough to match relay response time. Note that if the dog length is short, the stop signal will not be output and it will not stop.

- The brake section can be removed from the Cylinder Body. Do not disassemble or inspect brakes or hazards may result when brakes are used again.

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

- The required grease is applied when brakes are replaced, so there is no need to apply grease to rods.

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

CAUTION

- Adjust the air balance in 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, problems such as the Piston Rod popping out when the brake is released or the brake not releasing normally can be prevented.

- 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, be careful when performing step operation where the stroke from the start of operation to the next position is short.

Load to Piston Rod

More strictly than general air cylinders, use in a state where the load on the Piston Rod is always applied in the axial direction. Furthermore, when moving the load, regulate it sufficiently with a guide so that there is no backlash or twisting.

Maintaining the rod sliding parts

Be careful not to scratch or dent the Piston Rod sliding part. It causes damage to packings, leading to leakage or brake failure.

- Air supply pipes that are too narrow or too long can reduce stopping accuracy.

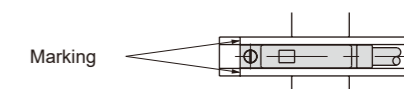
- If the cylinder has been stopped for a long time, such as first thing in the morning or afternoon, the frictional resistance increases and the piston speed changes, so the stopping accuracy may deteriorate. Perform a break-in operation to obtain stable stopping accuracy.

2. Common (With T-type Switch)

CAUTION

- When Moving the Switch Position in the Stroke Direction

- The 1-color indicator switch can be finely adjusted by about ±3 mm from the mounting position at the time of shipment. If the adjustment range exceeds ±3 mm, or if fine-tuning the position of a 2-color indicator switch, move the band position.
- Loosen the switch mounting screw, move the switch along the rail, and tighten at the specified position. For T2, T3, T0, T5, T2W, T3W, use a flathead screwdriver (watch screwdriver, precision screwdriver, etc.) with a grip diameter of 5 to 6 mm, tip width 2.4 mm or less, and thickness 0.3 mm or less to tighten the switch fixing screw with a tightening torque of 0.1 to 0.2 N·m. For T1, T□C, T2J, T2Y, T3Y, T8, tighten with a tightening torque of 0.5 to 0.7 N·m.
- The switch rail has a marking 4 mm from the end face of the rail. Use it as a guide for mounting position when replacing the switch. The switch rail marking is set to the switch maximum sensitivity position at factory shipment. If the switch type changes or the band is moved, the maximum sensitivity position changes, so adjust the position each time.

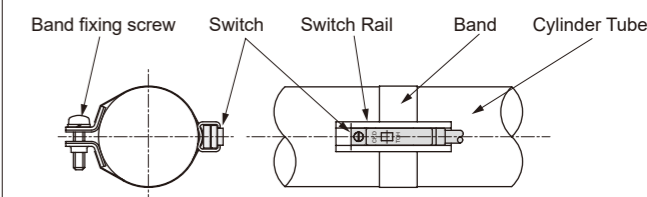


- When Moving the Switch Position in the Circumferential Direction

- Loosen the band fixing screw, move the switch rail circumferentially, and tighten it at the specified position. The tightening torque is 0.6 to 0.8 N·m.

- When Moving the Band Position

- Loosen the band fixing screw, move the switch rail and band along the cylinder tube, and tighten them at the specified position. The tightening torque is 0.6 to 0.8 N·m.



For precautions during mounting, installation, adjustment, use, and maintenance, please see "Precautions for Use" in this catalog and the CKD Components product site (<https://www.ckd.co.jp/kiki/en/>) → "Model No." → [Instruction Manual].