

Considerations when Switching from Air Cylinders

Air Cylinder and ROBO Cylinder

Air cylinders are devices used to push and grasp objects by means of supplying and releasing compressed air. Air cylinders are used widely in all industries, mainly for transfer equipment, assembly systems, various automation systems, etc.

Air cylinders generally have diameters of between 4mm and 320mm, and their lengths (strokes) can also be set in fine steps. There are several tens to hundreds of thousands of different air cylinder products, which makes it easy to select optimal models for a variety of applications. However, since product lines are overly complex, many with identical specs, it can be difficult to

select the best model for your specifications.

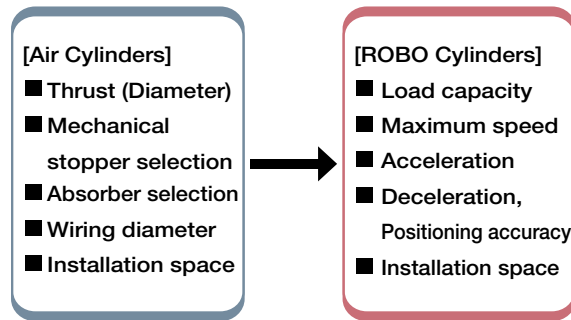
For this reason, there are many cases where air cylinders are selected largely out of past experience and familiarity. ROBO Cylinders are easy-to-use electric cylinders offering a variety of functions not achievable with air cylinders. The ROBO Cylinder product family makes it easy for you to select the model that best suits the needs of your application. However, the controls and configuration possibilities of ROBO Cylinders are completely different from air cylinders.

This section explains some of the key points to consider when switching from air cylinders to ROBO Cylinders.

Overview of Switching

The following explains the differences in the basic items to be checked when selecting ROBO Cylinders and air cylinders.

Since both are linear motion actuators, there are some common matters that must be taken into consideration. However, the different configurations and controls described above result in different designations for adjustments and check items between the two. A comparison of these various items is shown at right.



The above diagram shows that the two have different mechanical viewpoints to consider.

Installation Space

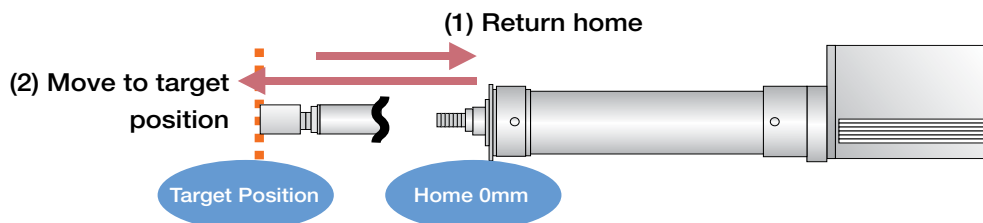
ROBO Cylinders are driven by a motor. Compared with air cylinders, simply from a size perspective, the ROBO Cylinder requires more attention paid to space requirements for installation.

Home Return

Unlike air cylinders, ROBO Cylinder operation is based on a “coordinates” concept. A home return operation is necessary at the beginning of operation because operations are controlled in movement quantities that are always referenced against a home point (0 point).

Specifically, in the case of incremental specifications, bear in mind that a pushing operation to the actuator stroke end will be performed as the initial operation when the power is turned ON.

- Incremental Specification: Return home operation after power is turned ON
- Absolute Specification : Absolute reset operation during initialization



Critical Rotating Speed

The ball screw inevitably deflects due to bending and its own deadweight. The ROBO Cylinder operates at high speeds causing the ball screw to rotate faster, and as the rotations increase the screw deflection also increases until the rotating axis is ultimately damaged. Hazardous rotational speeds that may damage the rotary axis are referred to as “critical speeds”, “whirling speeds” or “whipping speeds”.

Ball screw type ROBO Cylinders operate linearly as the ball screw is rotated with the end of the ball screw supported by a bearing. Although the maximum speed is specified for each ROBO Cylinder in accordance with the actuator type, some models with certain strokes have their maximum speed set in consideration of the aforementioned critical rotating speeds.

Maintenance

The key maintenance points of air cylinders and ROBO Cylinders are compared.

Air cylinders require periodic maintenance performed according to the frequency and conditions of use.

Although air cylinders offer a certain level of flexibility in that minor damage or malfunction can be ignored by means of increasing the source air pressure and moving the cylinder with a greater force, ignoring maintenance will inevitably shorten the service life of the air cylinder.

On the other hand, ROBO Cylinders have a more complex structure and use a greater number of parts and are therefore seen as requiring cumbersome maintenance work. This is wrong. ROBO Cylinders are clearly easier to use and offer longer life than air

General Purpose (Types, Modes, Parameters)

ROBO Cylinders offer the “air-cylinder specification (or air cylinder mode)” that allows the ROBO Cylinder to be used just like an air cylinder. When using these, it is possible to operate the actuator by simple ON/OFF control by an external signal in exactly the same way as an air cylinder. This type or mode may be sufficient in the case of a simple swap-out, but a variety of types and parameters have been introduced for customers who desire higher value-added uses.

Feel free to contact our Customer Center (Toll free for Western U.S. 800-736-1712, Central U.S. 800-944-0333, and Eastern U.S. 888-354-9470) to discuss features to match your use conditions and needs when the equipment is actually installed.

cylinders. Of course, ROBO Cylinders also require lubrication of sliding parts just as air cylinders do. However, ROBO Cylinders are equipped with a lubrication unit (AQ Seal) for ball screw and the sliding parts of the guides. This ensures a long maintenance-free period (5,000 km of traveled distance, or three years). After 5,000km or travel or 3 years, greasing every 6 months to 1 year as instructed in the Operating Manual will vastly prolong the service life of the product. In addition, absolute type controllers are currently equipped with a position retention battery. Since this is a consumable part, it must be periodically replaced (for periods that vary with the product).

[Primary Maintenance Tasks]

[Air Cylinders]

- Lubricating sliding parts
- Replacing gasket
- Draining
- Replacing absorber

[ROBO Cylinders]

- Lubricating ball screw and guide (after AQ seals have worn out)
- Replacing battery (absolute encoder types only)

Operation

Air cylinders are generally operated with the use of a direction control valve to determine the direction of reciprocating motion, as well as a flow control valve (speed controller) to determine the speed. Immediately after their system is started up, many users operate the air cylinder at low speed by restricting the flow control valve.

The same procedure is also recommended for ROBO Cylinders after the system is started up. With ROBO Cylinders, “speed setting” replaces the flow control valve. Operate your ROBO Cylinder at speeds where safety is ensured, and then change to the desired speed after safety is confirmed.