Pneumatic components

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: Rotary actuator vane RV3* Series

Design/selection

1. Common

⚠WARNING

■ Do not brake or hold the product by trapping it with pneumatic pressure.
If no stopping device is provided outside the product and braking is applied partway in the stroke by sealing air in with directional control valves, the stopped position may not be maintained because of air leakage, possibly resulting in injury to the operator or damage to devices or equipment.

■ Consider load fluctuation, rising/lowering operation and changes in frictional resistance for safe design.
Rotary actuator operation speed may increase, causing bodily injury or damage to workpiece/device/equipment.

■ Do not use the rotary actuator as a shock absorbing structure.
If abnormal pressure is applied or if air leaks, the deceleration effect will be lost, and physical or property damage may result.

■ Be sure to tighten very securely in order to prevent the fixed parts or connected sections from loosening.
Always use a secure tightening method when the operating frequency is high or when using the high rotor at places with high levels of vibration.

■ Rotary actuator modification
Do not modify the rotary actuator.

⚠CAUTION

■ Do not apply torque exceeding rated output externally to the product.
If force exceeding rated output is applied, the product could be damaged.

■ If repeatability is required for the oscillating angle, provide an external stopper to directly stop the load.
Stopping using the stopper equipped with the rotary actuator may cause the initial oscillation angle settings to change.

■ Always use the rotary actuator within the specified oscillation time range.
Use in low-speed areas less than this range will prevent smooth movement because of the stick-slip phenomenon.

■ Install a speed controller in order to control the oscillation speed of the rotary actuator.
Adjust the speed gradually from the low speed to the required speed.

■ Precautions for rotary actuator switch
Take care when using multiple rotary actuators in proximity.
When using two or more rotary actuators with switches in proximity or if a magnetic body moves very close to the rotary actuator, the magnetic interference could cause the switch to malfunction. Rotary actuators should be designed at intervals of 40 mm or more. (Follow the allowable interval shown on each rotary actuator.)

In the mid-oscillation angle position, pay attention to the ON time of the switch.
When the switch is set at the middle position of the oscillating angle and the load is driven when the magnet is passed, if the oscillating speed is too fast, the operation time will be short when the switch turns ON and the load may not finish the required movement.
In this case,

$$V = \frac{\text{Operational range of switch (degrees)}}{\text{Load operation time (ms)}} \times 1000 \text{ (degree/s)}$$

is the oscillation speed.

Mounting, installation and adjustment

1. Common

⚠WARNING

■ When adjusting the angle by supplying pressure, do not rotate the device too much in advance.
When adjusting while supplying pressure, the device could rotate and drop during adjustment, depending on how it is oriented, possibly resulting in operator, component, or device injury or damage.

■ Confirm that the device operates correctly before starting.
After installing the devices, connect the compressed air and power. Carry out appropriate functional inspections and leakage inspections to confirm that the devices are correctly installed and operating safety before starting the system.

■ When coating
If the resin sections are painted, the resin could be adversely affected by the paint or solvent. Contact CKD to confirm whether painting is possible.
Moreover, do not remove, peel off or paint over the nameplate attached to the rotary actuator.

■ When adjusting the rotary actuator's oscillating angle with the pressure supplied, take measures to prevent the rotary actuator from rotating more than necessary.
Rotating more than is required may cause a dangerous situation.

■ When using an axial fitting, select a free-moving axial fitting.
If a stationary axial fitting is selected, the eccentricity could cause the fitting to twist and lead to defective operation, product damage, physical harm or property damage.

■ Secure sufficient space for maintenance and inspection.

■ An axial load (thrust load) on the vane shaft may cause faulty operation to occur. Therefore, do not apply such loads. If this is unavoidable, use a structure with a thrust bearing as shown in Fig.1.

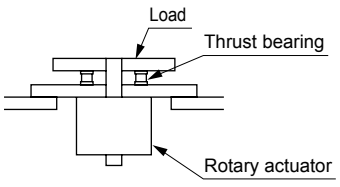


Fig. 1

■ Avoid bending the end of the rotary actuator shaft or a malfunction may occur.
When unavoidable, use a mechanism transmitting only rotation as shown in Fig. 2.
When connecting the vane shaft end and load at any position in the oscillating range, use flexible couplings, etc., that will not twist off to prevent the vane shaft from breaking and bearings from wearing or seizing, etc.

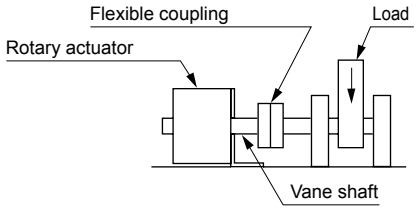


Fig. 2 Radial load

■ Install the external stopper in a position far from the rotary shaft.
If the stopper is installed near the rotary shaft, torque generated by the product could be applied to the rotary shaft. This reaction on the stopper may damage the rotary shaft or bearings, possibly resulting in injury to the operator or damage to equipment or devices.

⚠CAUTION

■ When installing a load or jig, etc., on the rotary actuator vane shaft, check that load is not applied to the body as shown in Fig. 3.

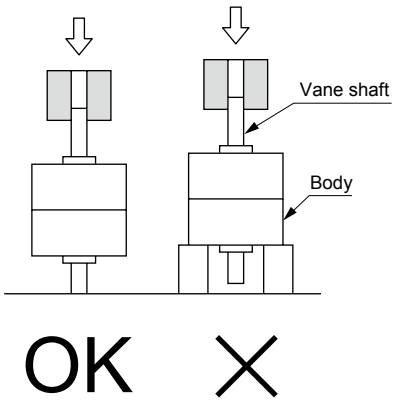


Fig. 3

■ Do not wipe items showing the model number, such as the nameplate, with organic solvents.
This may erase the display.

■ Do not put feet directly onto shaft or devices mounted onto shaft.
Climbing directly onto the shaft could damage the bearings, etc.

■ If the load weight is large and oscillation is fast, the resulting shocks due to the inertial energy may exceed those that can be absorbed, possibly damaging the rotary actuator.
Install a shock absorber to absorb inertia.

Mounting, installation and adjustment

2. Oscillating angle variable RV3$^{S}_{D}$A

⚠WARNING

■ Do not loosen the angle adjustment screws outside of the adjusting range for variable oscillation angle rotary actuators.

Loosening beyond the adjusting range may cause the angle adjustment screw to fall out, potentially causing bodily injury or damage to the workpiece/device/equipment.

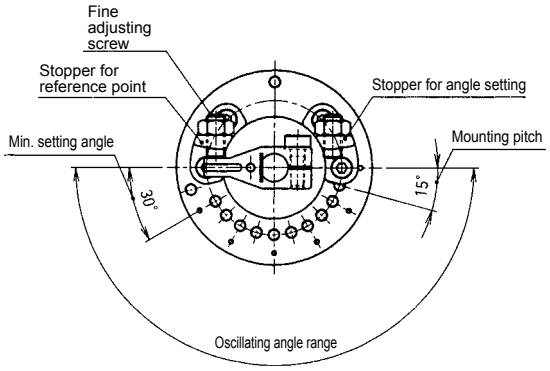
⚠CAUTION

■ Stopper

- Operate the rotary actuator only after installing a stopper to serve both as a reference point stopper and angle setting device.
- When the stopper is set to the oscillating origin or max. oscillating angle, if set to the positive side beyond the adjusting range, the vane could hit the internal stopper and cause damage. Always adjust the angle so that the finger stops at the external stopper.
- The reference point stopper is fixed in position and cannot be moved.

■ Structure of the variable oscillating angle mechanism

An external stopper is installed to the tap hole provided on the rotary actuator's body. There is a reference point stopper and angle setting stopper. The reference stopper is fixed at a set point (oscillating origin), and the angle setting stopper is fixed at a position where the required setting angle can be attained. The rotating actuator stops at the set angle when the finger attached to the shaft contacts the stopper. The position can be finely adjusted with the adjust screw provided on the stopper.



■ Oscillating angle settings

For non-specified setting angles (standard)

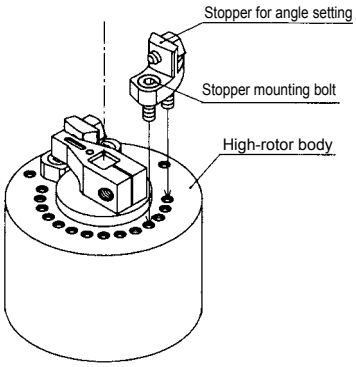
The reference point stopper is fixed and the angle setting stopper is attached at shipment. Accordingly, the angle setting stopper must be installed at a position to achieve the desired angle for use.

The installation pitch is 15°. Refer to the oscillating angle setting methods for details on installation.

If the angle setting is specified (made to order)

The reference point and angle setting stoppers are installed at the designated angle at shipment.

Before starting use, each stopper must be finely adjusted to the accurate angle by turning the fine adjust screw.



■ Oscillating angle setting method

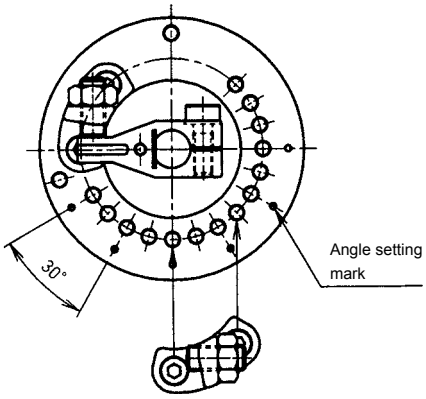
If the setting angle is an integer multiple of the stopper's installation pitch (15°)

(1) Install the stopper in the appropriate position to set the angle by mounting to the relevant tapped hole. When installing the stopper, use the 30° pitch angle setting mark provided near the tap hole as a guide.

Setting angle

Model No.	Setting angle (installation pitch in multiples of 15°)
RV3$^{S}_{D}$A3 RV3$^{S}_{D}$A10 RV3$^{S}_{D}$A20	30°, 45°, 60°, 75°, 90°, 105°, 120°, 135°, 150°, 165°, 180°
RV3$^{S}_{D}$A30	30°, 45°, 60°, 75°, 90°, 105°, 120°, 135°, 150°, 165°, 180°, 195°, 210°, 225°, 240°, 255°, 270°

Example for the 90° case



(2) Next, turn and finely adjust the fine adjust screws on the reference point stopper and angle setting stopper to set the correct angle. Always tighten the lock nut after setting.

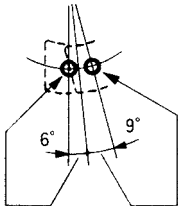
Adjustable angle width

Stopper fine adjustment range for reference point	±3° *1
Stopper fine adjustment range for angle setting	-9° to +6°
Stopper fine adjustment range for angle setting at max. setting angle	-9° to +3° *2

*1 : RV3DA3 is -1° to +3°
*2 : RV3DA3 is -9° to +1°

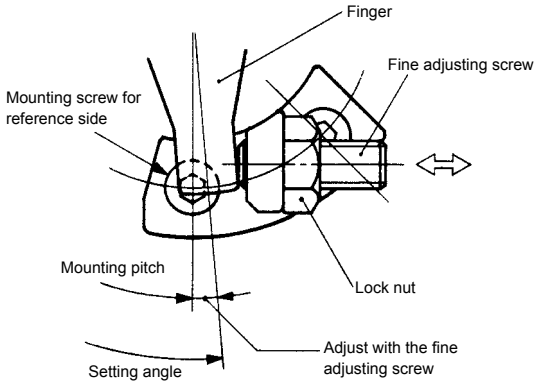
If the setting angle is between integer multiples of the stopper's installation pitch (15°)

(1) If the setting angle is between integer multiples of the stopper's installation pitch (15°), install and fix the stopper at the tap hole shown with the arrow below.



Mount so that the reference position is the front 6° range of the stopper mounting pitch (15°) for the front mounting screw, and the back 9° range for the back mounting screw.

(2) Next, turn and finely adjust the fine adjust screw on the stopper and set the correct angle. Always tighten the lock nut after setting.



3. Shock absorber RVC

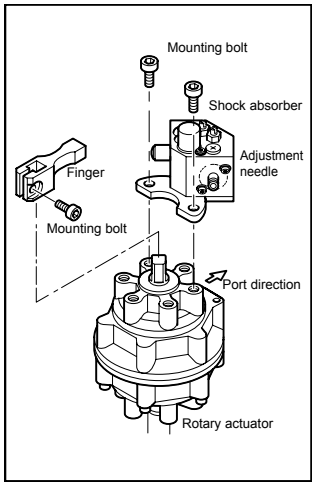
⚠WARNING

■ Precautions for shock absorber handling

- Do not loosen or disassemble any parts other than the adjustment needle. Doing so may lead to oil leakage.
- The hex nut at the base of the adjustment needle is not a locking nut, so do not turn it. Otherwise, oil leakage may result.
- Do not use the product where the product is exposed to dust or cuttings or may come in contact with liquids such as water, oil, etc. This may lead to reduced durability or failure.

⚠CAUTION

■ Mounting the shock absorber Mounting figure



1. Use the mounting holes on the body to mount the shock absorber and install onto the square shaft of the rotary actuator.
2. Install so that the shock absorber is above the rotary actuator port. Check that the shock absorber has been mounted securely.
3. The finger of the shock absorber can now be installed, but check that the rotary actuator shaft is positioned at the oscillating origin. (Refer to the oscillating origin position)
4. When at the oscillating origin, the shock absorber fingers contact the shock absorber piston and will not engage. Turn the square shaft counterclockwise to where the fingers engage.
5. The shock absorber cannot be used as a stopper.

Use/maintenance

1. Common

⚠CAUTION

■ This rotary actuator is a no-lubrication actuator.

The actuator can be lubricated, but once it has been oiled, it must be maintained in an lubricated state. There are times that the lubricant applied in advance may be washed off due to oiling, stopping partway may result in malfunction.
Use Class 1 turbine oil (non-additive) ISO VG32 for lubrication.
Never use other oils (spindle oil, machine oil, etc.). They could damage the seal section.
Recommended lubricants are indicated in the table below. Use this as a reference.

Manufacturer	Name
IDEMITSU KOSAN CO., LTD.	DIANA FRESIA S-32
FUJIKOSAN CO., LTD.	Fukkol Turbine 32
MITSUBISHI OIL CO., LTD.	Mitsubishi Turbine Oil 32
SHOWA SHELL SEKIYU CO., LTD.	SHELL VITREA 32
MITSUI & CO., LTD.	Mitsui Turbine Oil 32
JAPAN ENERGY CO., LTD.	Turbine 32
JAPAN OIL. CO., LTD.	Turbine Oil 32
Cosmo Oil Co., Ltd.	Cosmo Turbine 32
EXXON MOBIL CO., LTD.	STANOL 43N
KYGNUS SEKIYU K. K.	Turbine Oil 32

2. Oscillating angle variable RV3$^{S}_{D}$A

■ The stopping angle is set by touching the fine adjusting screw of each stopper with the finger.

Stopping angle accuracy does not include wear due to operation. If the stopping angle changes due to wear, recalibrate using the fine adjusting screws.