

# Application, Advantages and Features of Standard, Sanitary and Scraper Rotary Valves for Powder Handling Systems

## Overview

To understand the features of standard, sanitary and scraper type rotary valves in terms of their application in engineering systems.

## Background

Rotary valves are flow controlling or flow regulating equipment and comprise the following mechanical components (Figure 1):

1. Inlet: The pathway to allow material into the valve.
2. Rotor: Provides a simple and effective solution by dividing the internal area of the valve into segments/pockets called vanes.
3. Vanes: Primarily to carry material in each of its vanes (pockets) and discharge it to the subsequent equipment as the rotor rotates in the housing body.
4. Body/Housing: The outer structure of the valve holding the rotor.
5. Outlet: The exit pathway for material from the vanes to be discharged into the subsequent equipment.
6. Clearance: Clearance is the spacing/gap between the rotor and the housing/body of the valve in which it rotates. This clearance (spacing) plays a critical role in the valve performance when maintenance of vacuum is a necessity - converting the valve to an airlock valve with clearance  $\leq 0.15$  mm.

## Types

There are three major types of rotary valves based on its application:

1. Standard
2. Sanitary
3. Scraper

Aishin manufactures both airlock type and flow control types of these valves.

## Uses

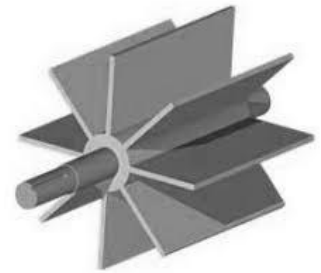
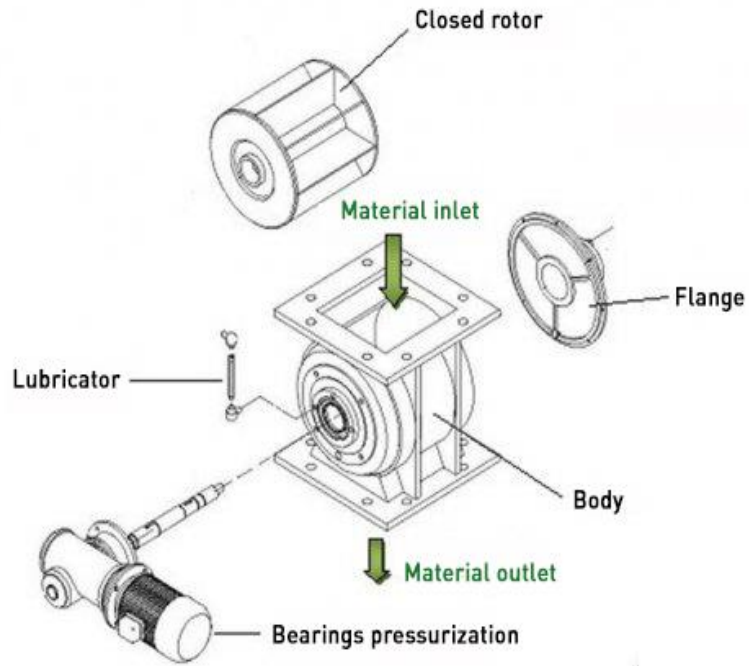
**1. Pneumatic transfer of material:** While transferring material pneumatically, the vacuum created in the equipment is required to be maintained. Vacuum loss can be minimized to a certain extent by having minimal pathway for air to enter from gaps between rotor valve and housing. With clearance  $\leq 0.15$  mm, the airlock valve can assist in minimum loss of vacuum as material is transferred into the subsequent equipment.

**2. Flow control and flow regulation:** Each pocket of rotor has fixed volume. Material falls in the rotary from the discharging equipment and fills the rotor vanes. Thus, material is discharged into the receiving equipment as the rotor rotates. This helps control material discharge. By controlling the rotation speed of the rotor in housing, the discharge flow of material can be regulated as required. (Clearance not being a concern here)

## Material of construction:

1. All rotary valves are casted to avoid chances of malfunctioning due to welding and to establish durability and strength.
2. Desired material of construction such as SS304, SS316L, MS, Polymeric/PTFE coated vanes among others

# Figure 1: Mechanical Components of a Rotary Valve



## Standard Rotary Valve

The model seen in Figure 2 is a standard rotary valve with non-removable rotor. The number of vanes is generally 6 or 8 and can vary based on the process requirement and capacity. To have the desired capacity, the rotations per minute (RPM) of the rotor can be varied with the help of variable frequency drive (VFD). A standard rotary valve is used when the system does not require the rotary valve to be cleaned regularly. Once installed, cleaning and maintenance of the standard rotary valve can take up some time and efforts. Wet or dry cleaning with compressed air can be performed but thorough cleaning cannot be ensured.

**Figure 2: Standard Rotary Valve**



## Sanitary Rotary Valve

Sanitary rotary valves are designed to ensure quick, effortless cleaning and maintenance of hygiene standards of the system. As shown in Figure 3, by using an Allen key, the rotor can be manually removed from the body/housing of the rotary valve. It can then be wet or dry cleaned and placed back into the housing body of the rotary valve for operating. This entire process of disassembly and assembly can be performed single-handedly in less than five minutes. The major washing downtime for cleaning the valves can be optimised.

**Figure 3: Sanitary Rotary Valve**



## Scraper Rotary Valve

One question that arises while considering the application of rotary valve is – Can we handle material of sticky or clingy nature? The answer is – Yes, using a sanitary scraper rotary valve specially designed to minimize challenges associated with discharge from the rotary valve due to material properties. In Figure 4, a scraper can be seen at the outlet end of the rotary valve. The scraper rotates along with the rotor and securely scrapes off adhering bulk material from the pocket walls of the rotor. The tip of the scraper and the wall of the vanes has minimal clearance. This arrangement assists in smooth functioning and scrapping of the material. Thus, use of scraper type of rotary valve not only helps achieve optimum capacity but also improves discharge efficiency.

**Figure 4: Scraper Rotary Valve**



## Features and Benefits

| Feature  | Benefits                                |
|--|---|
| Quick assembly-disassembly                     | Reduced cleaning time                   |
| Easy rotor removal mechanism using Allen key   | Reduced cleaning and process downtime   |
| Minimum air leakage (clearance $\leq 0.15$ mm) | Utility savings and minimal vacuum loss |
| Casted body                                    | Increased strength and life of valve    |

- Available in different rotor type and rotor material
- Available in varied sizes from 150 mm
- MOC as per client requirement
- National fire protection association (NFPA) certification for fire/explosion safety



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