RV-Series
Rotary Vane Valve Actuator

Shafer

EMERSON
Process Management

APPLICATIONS

For quarter-turn valves in critical applications.

- Full open/close operation of ball, plug and butterfly valves or other 90° rotation equipment.

- Quarter-turn valve applications on natural gas. The actuators are typically powered by natural gas using gas over oil tanks.

  - Emergency Shutdown
  - Station Blowdown
  - River Crossings
  - High/low Pressure Shut-off
  - Linebreak Protection
  - Two-way Remote Control
  - Station By-pass
  - Engine Loading/Unloading

- Quarter-turn valve control on crude oil or products pipelines with the actuators powered hydraulically or by nitrogen storage vessels.

- The Rotary Vane's concentric mounting, small size and balanced weight make it perfect for high vibration applications.

  - Slurry Pipeline Valves
  - Pumping Station Valves
  - Compressor Station Valves

- The Rotary Vane is ideal for offshore platform applications where the actuator's compact size and weight are primary benefits.

- Cryogenic or extremely low temperature applications.

- Subsea valve control at depths up to 1000 meters.
  Reference: "Subsea Valve Control Systems" Bulletin

- High speed applications with stroking times as fast as 250 milliseconds.
  Reference: "HS-Series" Bulletin

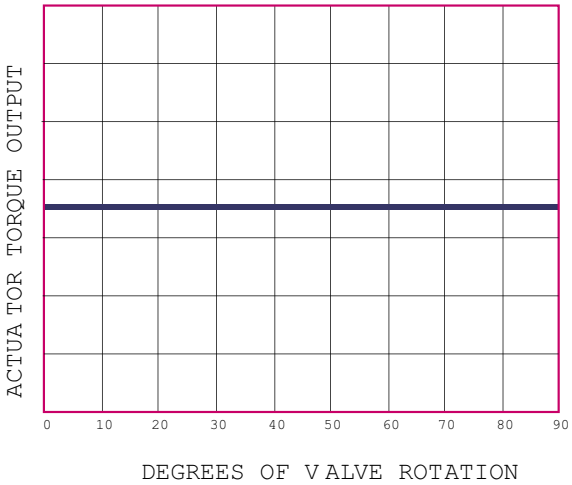
CAPABILITIES

Fourteen actuator sizes cover a broad torque range.

- Torque output range:
  1,000 to 6 million in-lbs. (113 to 677,907 N-m)
- Power supply pressure range:
  100 to 3,000 psi (6.9 to 206.8 bars)
  Hydraulic, gas/hydraulic
- Ambient temperature range:
  -20°F to 250°F (-29°C to 121°C) Standard
  -76°F to 250°F (-60°C to 121°C) Optional

PRINCIPAL OF OPERATION

Opposite chambers in the actuator are connected by pressure equalizing passages in the upper and lower heads. In this manner, the actuator produces perfectly balanced torque as hydraulic force simultaneously pushes both of the rotor vanes away from the stationary shoes.



Torque output of the rotary vane actuator remains constant throughout the full rotation of the valve. Constant torque output is an especially important feature in high flow applications, plug valve applications, and for valves which have rotating seats.

Constant torque output insures that your specified safety factor will not diminish at various positions during the valve stroke.

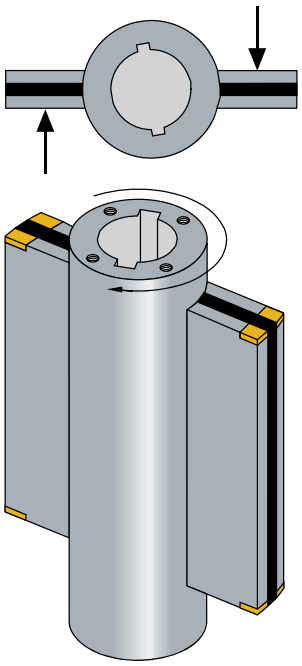
CONSTRUCTION

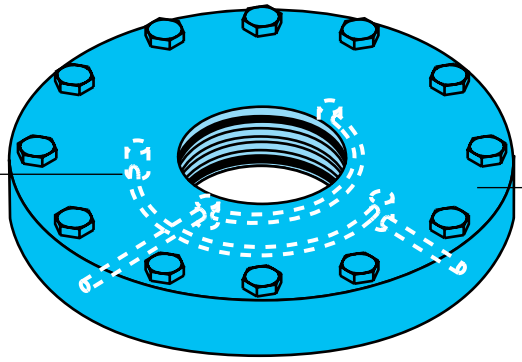
The ideal torque couple.

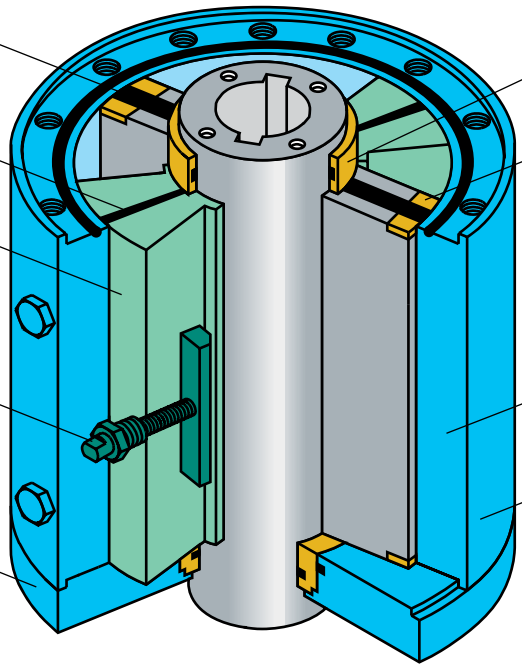
The rotary vane system models an ideal torque couple. The resultant force vectors acting on the vanes are always parallel, equal in magnitude and opposite in direction.

The two opposing forces form a couple and the couple is the most efficient form of producing rotation.

The rotary vane actuator, by design, will not generate any destructive side loading forces. The actuator will simply produce balanced torque.



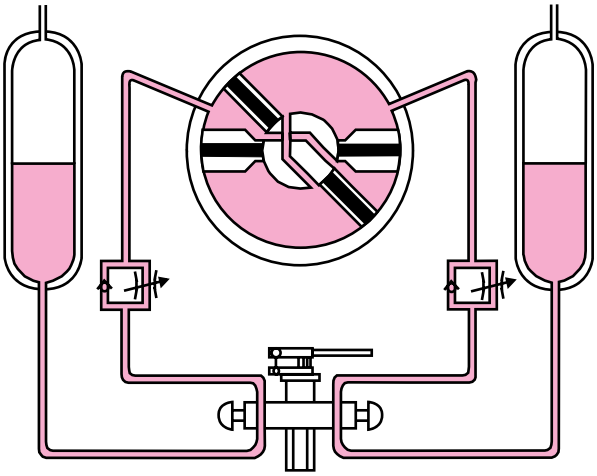




PERFORMANCE FEATURES

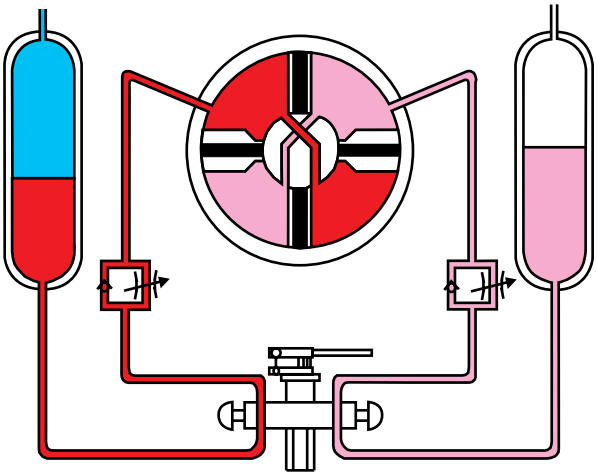
- Simplicity of design with only one moving part allows for a life expectancy of 50 years with minimal maintenance.
- The rotary vane is the most compact type of quarter-turn actuator available.
- The double vane design will not generate any side loading force on the valve stem or actuator bearings. Unlike other types of actuators, there is no gearing or scotch yoke mechanism which require internal power absorption during the stroke.
- The rotary vane supplies balanced and constant torque over the full 90 degrees of rotation.
- Externally adjustable travel stops absorb all end of stroke torque to protect the valve.
- The actuator withstands heavy vibration because the compact body is centered directly over the valve stem with its weight equally distributed around the valve flange.
- The complete actuator is designed for high pressure. Regulators, pressure reducing valves or relief valves are generally not required in the power supply circuit.
- Valve response is always instant, always smooth, and always dependable.

OPERATING SEQUENCE



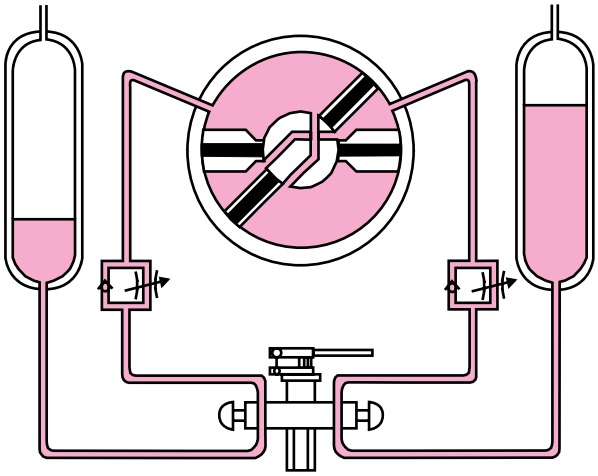
SEQUENCE 1

The actuator may be powered by a hydraulic power unit, stored gas pressure or by natural gas pressure from a pipeline. In this illustration, the actuator is fitted with gas hydraulic tanks and is powered by gas pressure. In the first sequence, the actuator is in the open position. There is no pressure in the actuator or tanks.



SEQUENCE 2

The actuator control system is used to admit high pressure gas into the closing gas hydraulic tank. The pressurized gas in the tank forces hydraulic fluid into the actuators closing port. Pressure equalizing passages allow both closing quadrants to be pressurized simultaneously providing balanced torque as the vanes push away from the stationary shoes. The actuator is rotating clockwise.



SEQUENCE 3

When the actuator reaches the fully closed position, the control system will allow all remaining pressure in the tank to vent to atmosphere, thus neutralizing the pressure in the tank and actuator.

High Pressure Gas

Pressurized Hydraulic Fluid

Non-Pressurized Hydraulic Fluid

CONTROLS AND ACCESSORIES

At Shafer we design, build and test the complete valve control system, including the actuator, controls and accessories. When you specify Shafer, you receive a complete valve operating system, factory tested, field proven and **guaranteed**.

RV-Series actuators can be operated locally, remotely, or automatically by a variety of sensory and control devices. We have developed over 4000 individual control systems to meet the many requirements of our customers.

TYPICAL CONTROL SYSTEMS

- Local Manual
- Remote Two-Way Electric
- Linebreak Protection,
  Sensing Rate of Pressure Drop
- Emergency Shutdown or Fail-Safe
- High/Low Pressure Shutoff

All accessories used by Shafer have undergone thorough testing and field evaluation to insure their performance as part of a larger system.

COMMON ACCESSORIES

- Manual Hydraulic Hand Pump
- Control Valves, Pneumatic and Hydraulic
- Sensors for Triggering Automatic Operation
- Power Storage Vessels and Power Supply Units
- Limit Switches and Position Transmitters
- Speed Controls
- Regulators
- Filters

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