

OPERATING INSTRUCTIONS

Rotary Ball Valve With Hydraulic Cylinder Operator

Introduction

The GA Industries Ball Valve is full ported, 90 degree rotation, resilient seated valve with a unique seating arrangement operating on the differential area principle.

The valve is opened and closed by means of an hydraulic cylinder mechanism, powered by pressurized oil.

Description of Valve

The ball valve assembly is comprised of the body assembly containing the rotor, a rotation mechanism, and hydraulic cylinder. These components will be described below.

Body

The valve body is provided with an access port permitting the replacement of the rotor seat without the need of dismantling the entire valve or removing the valve from the line.

Rotor

When the rotor is oriented in the "valve open" position, the valve provides a full unobstructed passageway for the fluid to flow. A 90 degree rotation of the rotor provides a tightly closed valve.

The rotor assembly is comprised of two principle parts, the rotor element itself (part #2) and the seat retainer (#4). The seat retainer is supported by a resilient back-up ring which acts as a seal and spring. The outside diameter of the back-up ring is smaller than the body seat diameter. The resulting differential area times the static system pressure provides the seating force to the seat retainer. The amount of seating load can be adjusted by tramming the seat retainer screws (part #5). In stimulated operating conditions at the factory, the seat retainer screws are adjusted (trammed) so as to provide a tight seating valve with equivalent system pressure within the valve.

Mechanism

The mechanism converts the linear cylinder movement to a rotary action. The linkage is designed to produce a decelerating rotation towards the seated position. This design also results in an increasing torque being produced where it is most needed, seating the valve.

Cylinder

The hydraulic cylinder attached to the rotation mechanism provides the power to move the valve open and closed. The hydraulic cylinder is powered by oil pressure to the top of the cylinder piston (cap end) to close the valve, and applying pressure to the bottom of the cylinder piston (rod end) to open the valve.

The opening and closing speed of the valve is controlled by throttling the flow of oil exhausting from the hydraulic cylinder as the cylinder is stroked.

Installation

The valve should be installed with the flow entering the valve in accordance with the nameplate on the valve flange or arrow indication on the drawing. The preferred method of installation is with the cylinders on top of the valve, in the uppermost position. This orientation allows the access port to be located on the side of the valve rather than the top, facilitating maintenance performed through the access port.

The pressurized oil supply should be connected to the control piping as shown. Electrical connections should be made to the limit switches in accordance to the plans and specifications.

Maintenance

During the normal operation of the valve, it is recommended that the mechanism be greased periodically. There are four grease fittings on the housing, two of which can be found on the outside of the unit, while two grease fittings are inside the housing and are accessible through pipe plug fittings.

Seating

The sound of fluid passing back through the valve while in the closed position may indicate a worn or damaged seat. It may also be the result of the rotor not rotating precisely 90 degrees. Any over or under rotation may be corrected by way of the stroke adjustments. The stroke adjustment on the cylinder controls the opening position "stop" point and usually never needs correcting. The stroke adjustment stud on the mechanism housing locates the rotor in the proper seated position. It is recommended that before any adjustments are made, the existing position of the adjustment be noted so that the stud can be returned to its exact original factory set position if required. To test for over and under rotation, turn the "close adjustment" up to three turns counterclockwise or clockwise to determine if the leakage rate diminishes.

Rotor Seat Replacement

If it is determined that the rotor seat may be damaged or worn, it can be replaced through the access port. The ball valve must be in the open position and isolated. The bottom drain plug can be loosened, or similar connection loosened to de-pressurize the ball valve body.

After removing the access port cover, the rotor seat may be inspected.

If it appears that the seat is alright, it may be possible to loosen the tramming screws (#5 seat retainer screws) very slightly permitting a tighter seat engagement with the body seat. A $\frac{1}{4}$ to $\frac{1}{2}$ turn of the tramming screws may be adequate. (On a $\frac{1}{2}$ " cap screw $\frac{1}{4}$ turn provides 0.019 inches of seat retainer movement). It is not necessary to loosen or remove the seat retainer screws (part #5) to replace the rotor seat.

After the new seat is installed, it is recommended that a waterproof grease be applied to the seating surfaces and the rotor manually opened and closed so that the seating can be observed before the access port is replaced and the valve put back into operation.

Mechanism

There are several methods of dismantling the mechanism. In either case, the rotor (part #22), the link (part #23), and the crosshead (part #27) are moved as a unit.

To remove the hydraulic cylinder, the valve should first be isolated from the system pressure and pump discharge pressure. The valve should be rotated to the "open" position and then the pressurized water supply should be shut off (excessive pressure in the control piping should be bled by loosening the control piping connections). The crosshead pins, part #28, can be removed by removing the cylinder bolts, part no. 30, while supporting the cylinder. The cylinder can be pulled away from the cylinder spacer, part no. 39, until the crosshead pins are exposed and can be driven out. (Note: On some mechanisms it is possible to remove the crosshead pins through the pipe plug holes provided for the grease fittings. In this case, the rotor should be positioned until the crosshead pins line up with the top and bottom holes in the case and the pins can be driven out without the need of removing the cylinder from the cylinder spacer). The remainder of the dismantling is elementary to a qualified mechanic.