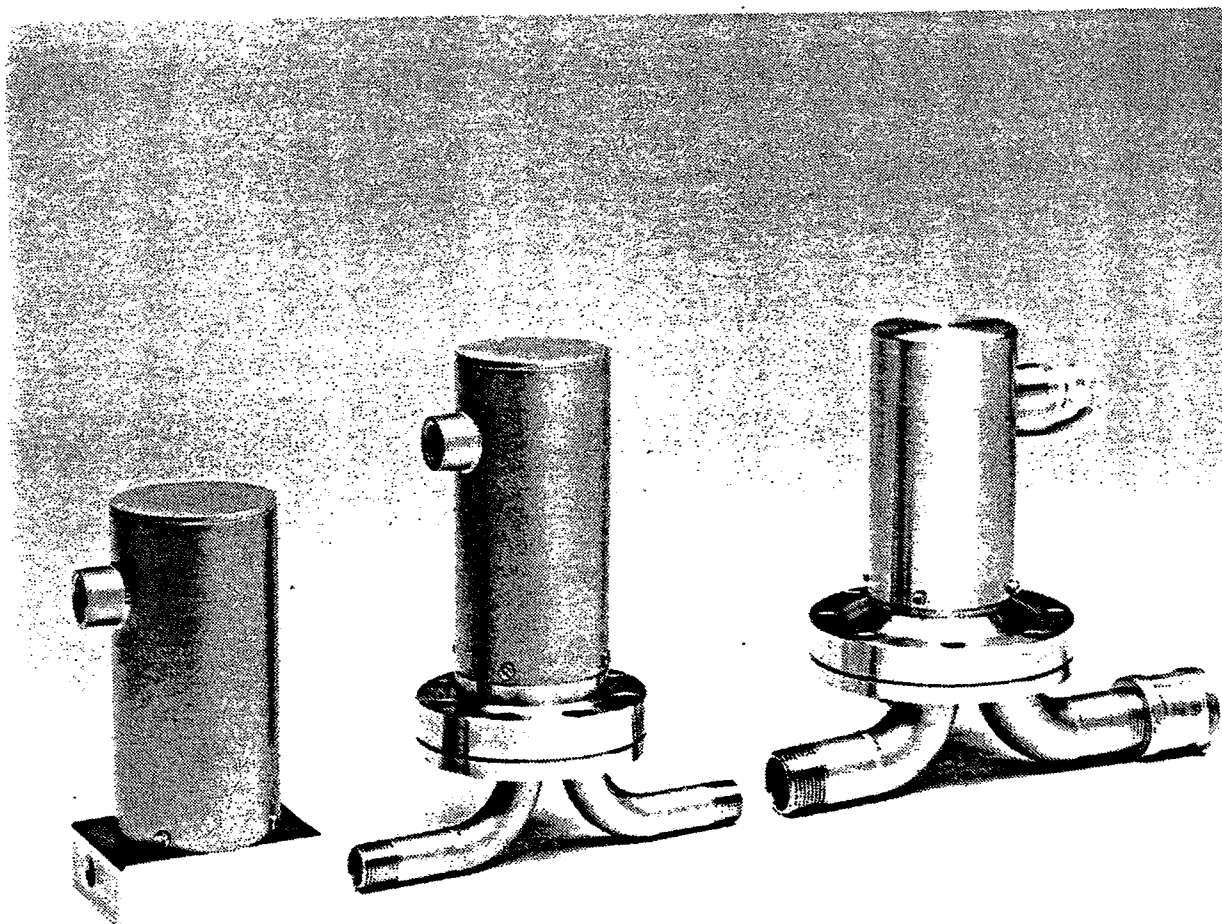


## ELECTRIC ROTARY RAMP METERING VALVE

### INTRODUCTION:

The Kurz Series 730 Electric Rotary Ramp Valve provides the metering required for both isokinetic and constant flow control operations. These exclusive valves were designed by and are manufactured solely by Kurz Instruments Inc. The description of the Series 730 valves found in the SYSTEM OVERVIEW should be referred to for highlights of this valve design, as well as the specification sheet available separately.

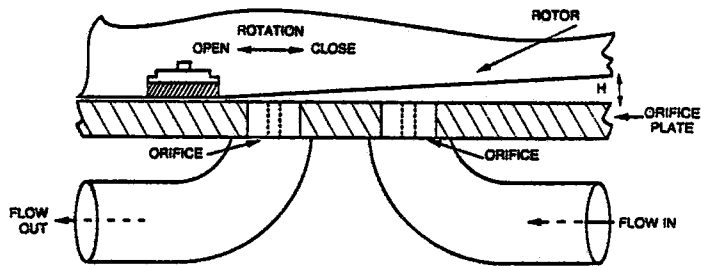
Several typical 730 Series valves are pictured below.



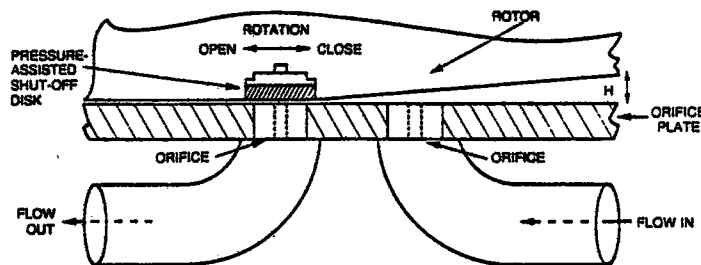
**DESCRIPTION:**

The Series 730 valves utilize a rotating disc with a precision helix machined onto the face. This disc rotates over an orifice to meter flow. The motor used to rotate the disc is typically a Pittman DC gear motor. Limit switches stop the motor when the valve is full open or full close. The motor is used only when the valve must move to a new position during flow control, thus the motor operates only for brief periods and is usually idle. Thus the motor should enjoy an extremely long life in this application. No motor maintenance requirements, such as brush replacement, are anticipated due to the light duty intermittent use of the motor in this application.

Drawings illustrating valve positions follow immediately below.



**CROSS SECTION OF VALVE  
SHOWING SLIGHTLY OPENED POSITION**



**CROSS SECTION OF VALVE  
SHOWING SHUT-OFF POSITION**

**Cv:**

Cv is the coefficient of flow of a flow control valve. Kurz Series 730 valves are available in Cv's ranging from .001 to 10.0 . Cv may be derived as follows:

$$C_v = .044 \dot{m} \sqrt{\frac{460 + T}{P_i \times \Delta P}}$$

- Where Cv = Flow coefficient  
 $\dot{m}$  = Full scale mass flow rate (SCFM)  
 Pi = Absolute pressure upstream of valve (PSIA)  
 $\Delta P$  = Maximum allowable pressure drop through valve at full scale mass flow rate. (PSIA)  
 T = Temperature (°F)

## HOUSING:

The Series 730 valves are contained in either a heavy duty stainless steel or aluminum motor cover housing with a 1/2" conduit fitting. The cover may be removed for valve servicing or hookup by removing the 4 socket cap screws circumferentially mounted to the base of the valve motor cover housing.

## MOTOR:

As described above the valve motor is used to rotate the rotary ramp disc that does the actual flow metering. This is typically a Pittman DC gearmotor. This motor drives the valve towards open when a +15 Vdc signal is applied to it and towards closed when a -15 Vdc signal is applied. The + or - 15 Vdc goes to the motor over the same two wires. The black wire is ground, the white wire sees the + or - voltage. The motor shaft has a machined thru hole which mounts a shear pin. The shaft is then loosely fitted to the rotary disc motor coupling. The motor may be removed by unscrewing 3 socket cap screws that mount the motor mounting base plate to the valve body. If by some chance the flow control valve does not seem to be operating, checking the condition of this shear pin might be indicated. Note that the motor would turn freely if the shear pin was sheared away. If the shear pin condition is good and still the valve rotary disc does not seem to be turning and doing its job, remove the motor and check for stripped gears in the motor itself. Check that the motor shaft cannot be held stationary while the motor is turning. If it can, either you've overpowered the torque rating of the motor ( unlikely on a gearmotor) or the gear train contains one or more stripped gears.

## LIMIT SWITCHES:

Limit switches mentioned above stop the valve motor when it reaches either full open or full close. A small pin on the rotary disc actuates the limit switches. The switches break the voltage supply ( the white wire motor lead ) to the motor. Diodes wired across the poles on the switches allow reverse current flow to move the valve motor in the opposite direction and off the limit switch.

## MAINTENANCE AND VALVE DISASSEMBLY:

It is conceivable that your valve might require disassembly at some time to allow for cleaning , primarily the orifices. Smaller valves with smaller orifices would be expected to require cleaning sooner than larger valves. Likewise, gas flows with some contamination would be expected to create a valve cleaning requirement sooner than a clean pure gas.

To disassemble the valve remove the motor cover housing as described above. Remove the motor lead wires. Next remove the motor by removing the base plate the motor is mounted to as described above. Finally remove the 4 or more socket cap screws that hold the motor coupling / limit switch / bearing block and

rotary ramp disc assembly. Be careful not to lose the pressure assisted shutoff plug that fits into a machined opening in the face of the rotary ramp disc. The valve orifices may be cleaned with any solvent indicated for use with the contaminant. Assembly is the reverse of the above. The valve may be tested with the MANUAL VALVE function of the flow controller.

Larger Series 730 Valves can be disassembled by removing the socket head cap screws that are circumferentially positioned around the largest diameter of the valve. This allows the valve rotor housing halves to be separated. With these type valves this should normally be all the disassembly required to allow access for maintenance and cleaning. If your Series 730 valve does not have an alignment mark or internal alignment pin be sure to mark the position before disassembly in order that the valve rotor housing halves may be properly realigned upon reassembly.

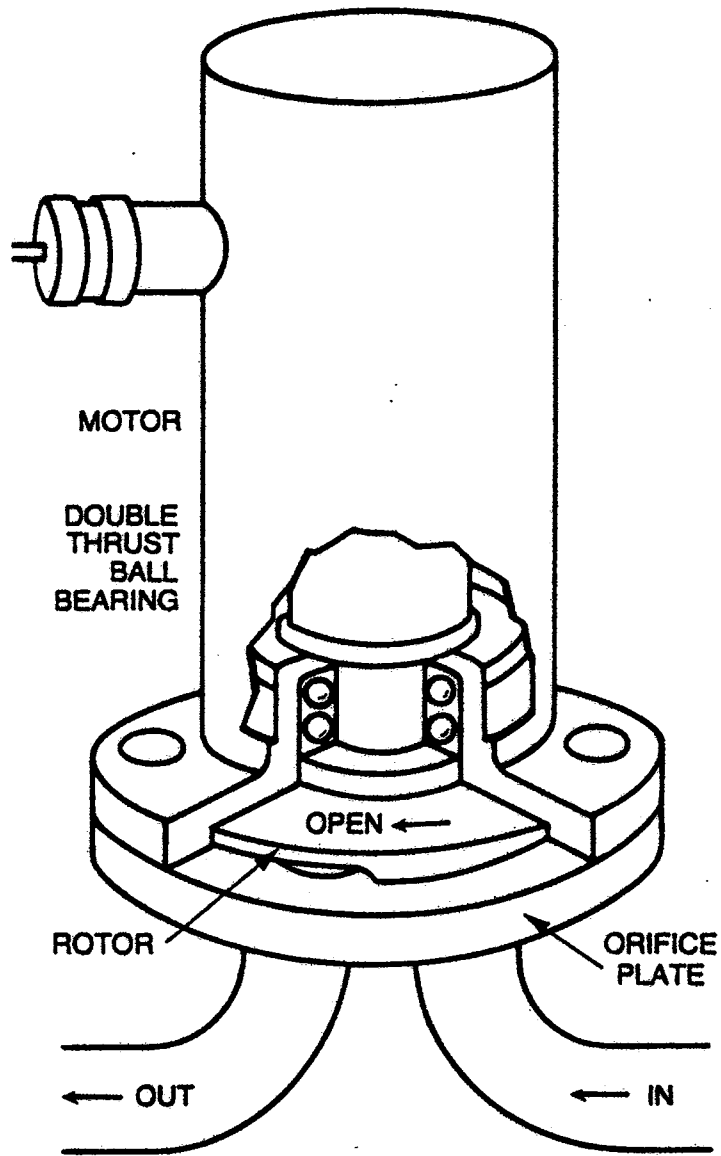
#### SEALS:

The valve is sealed with an O-Ring on the rotary ramp disc rotor. The O-Ring is placed in order to minimize its size on the rotary ramp disc rotor (shaft). See the valve cutaway drawing to view O-Ring and bearing positions.

#### LEAKAGE:

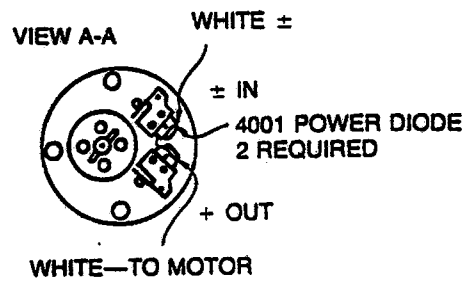
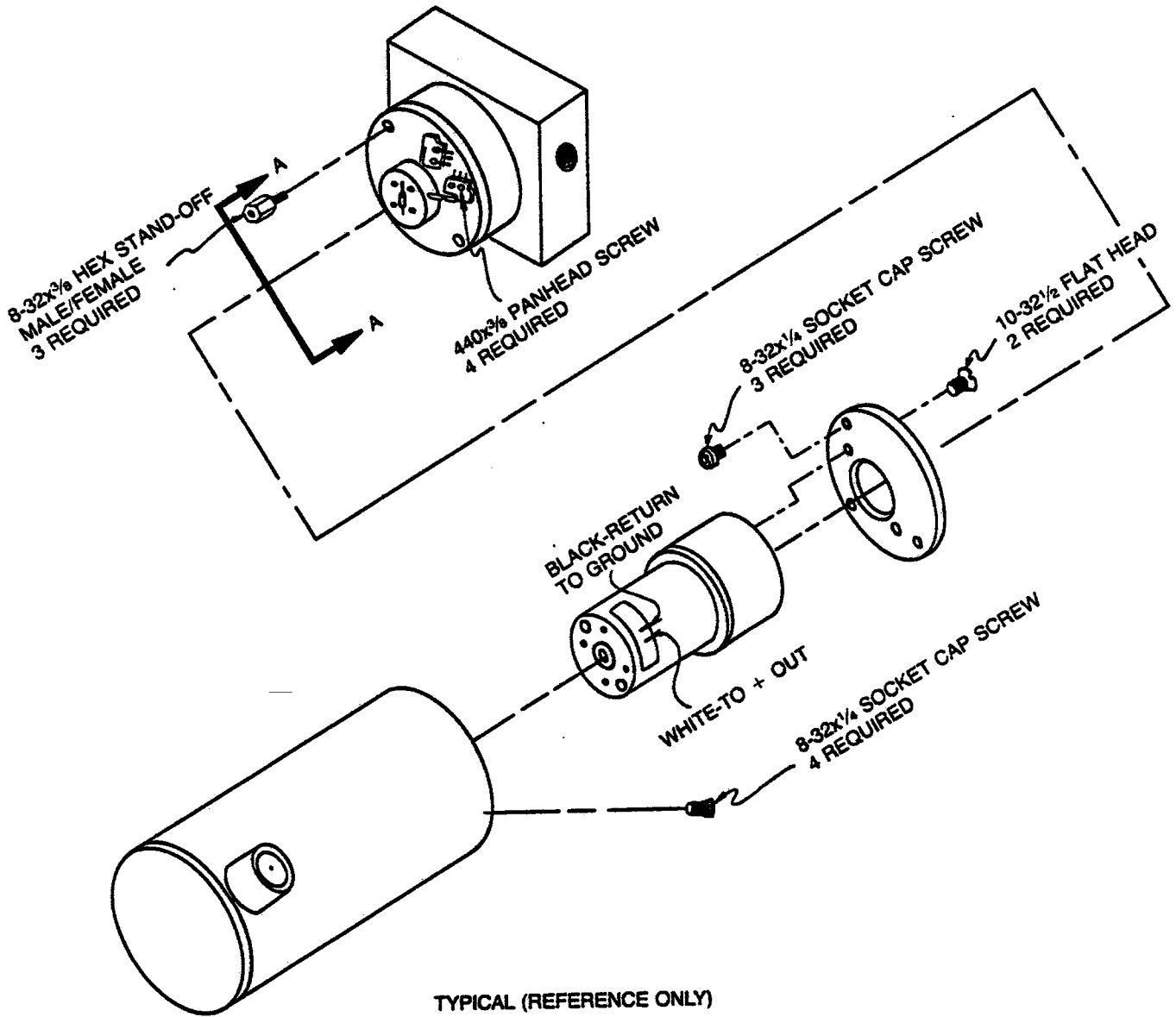
There are several situations that can cause leakage or the failure of the valve to obtain complete shutoff. Leakage is a factor only regarding complete shutoff, and would not interfere with the otherwise normal operation of the valve. Dirt can interfere with the seating of the shutoff plug on the orifice. Thus the first course of action to remedy shutoff leakage will be to disassemble and clean the valve. Secondly, although the dimensional tolerances are as close as can reasonably and economically be machined, an imperfect fit can occur between the shutoff plug and the orifice. This type of leakage can occur during shutoff even if the valve is well within tolerances. Further, this type of leakage is aggravated by high pressures. At several hundred pounds of pressure a 1/1000" misfit can cause significant leakage. For users who require absolute shutoff and are operating at an elevated pressure we recommend the installation of a simple open/close solenoid valve downstream of the Kurz 730 Series flow control valve. Be sure to obtain a solenoid valve which guarantees no leakage at the pressure rating you require. A normally closed solenoid valve can be operated by the shutoff limit microswitch that is closed when the 730 valve rotor is in the shutoff position. Wire your solenoid valve so that power is applied to it when the Kurz 730 valve closed position limit switch is closed. If your solenoid valve uses substantial current, it may be necessary to use a relay to avoid exceeding the power rating of the microswitch. See the limit switch layout on the Series 730 Valve Assembly Drawing that follows.

SERIES 730 VALVE CUTAWAY ILLUSTRATION



Typical (Reference Only)

SERIES 730 VALVE ASSEMBLY DRAWING



Typical ( Reference Only )