The Rodney Hunt Rotovalve cone valve manufactured today is remarkably similar to the first designs introduced in 1934.

The Rotovalve cone valve was developed by the S. Morgan Smith Company, noted for its improved water wheel designs for grist mill operation in the 19th century. S. Morgan Smith Company rode the wave of rapidly expanding hydro power development well into the 20th century, providing hydraulic turbines and related equipment to meet the ever-increasing power needs of American industry.

When first introduced, the Rotovalve immediately filled an important niche in fluid control projects of all kinds. Practically maintenance-free, the Rotovalve can be installed where off-line servicing is logistically difficult or cost-prohibitive. The Rotovalve’s full waterway opening design means lower energy costs-head loss is no greater than through a pipe. Also, with no dynamic friction during operation, seat wear is negligible and a Rotovalve promises a long, uninterrupted service life.

S. Morgan Smith was purchased by Allis-Chalmers Corporation in 1959, and subsequently the Valve Division of Allis-Chalmers was purchased by AC Valve, Inc. in 1988. In 1990, Rodney Hunt Company acquired all product lines of AC Valve, continuing the legacy of S. Morgan Smith at its Orange, Massachusetts facility.

Rodney Hunt Company is an international leader in the design and manufacture of cast and fabricated gates, valves, and actuation equipment for liquid control applications. Rodney Hunt facilities include a modern foundry, complete fabrication and machining areas, continually updated CAD capabilities, and hydrostatic testing facilities. Interdisciplinary design engineering expertise, and a commitment to ongoing technological development help Rodney Hunt achieve outstanding levels of quality and value in every project.

Rotovalves™ Provide Reliable, Safe, Low-Maintenance Service in Any Application

A Rotovalve is effective in nearly all types of pressure and flow control applications.

For pump discharge, check service.
- Unobstructed flow, for minimal head loss and lower pumps cost.
- Limitless range of positive control for timing valve actuation to minimize "water hammer."
- Provides drip-tight shutoff check function to prevent backflow.

As a pressure regulating valve.
- For closely controlled pressure differentials and flow rates, the two orifices of the Rotovalve (influent and effluent) drop the unbalanced pressure in two stages, reducing the potential for cavitation and vibration.
- Can maintain constant downstream pressure with varying upstream pressure.

Isolation and shutoff service.
- Full operation and shutoff by one person in any stop application.
- Precisely machined metal-to-metal seats provide drip-tight shutoff.

As a level regulating valve.
- When actuated by a device that senses a predetermined set point, the Rotovalve holds the proper opening to maintain correct level with varying flow.

As a system shutoff valve or hydraulic turbine inlet or bypass valve.
- For key points in a distribution system, where high pressures or velocities are found.
- Ideal for higher pressures and velocities associated with turbine applications.
- Negligible head loss in full open position.

For emergency line check service.
- More leverage in the actuator (torque, unit) means the Rotovalve closes securely under the most adverse conditions. Rotovalves offer excellent protection from the potential dangers arising from service disruption, such as broken pipes, water line maintenance or extreme demand common during fire-fighting emergencies.

“Smaller than line size” valves.
- 100% full port design means the Rotovalve can be smaller than the line with little additional head loss.
- Substantial savings in total system cost.
- Achieves more precise flow control.
Unparalleled Dependability
Proven Design

The Rodney Hunt Rotovalve has a worldwide reputation for service in a variety of water and wastewater control applications. The Rotovalve is a rugged and highly dependable liquid control valve which can accurately modulate flows under extreme velocities, pressures, and temperatures.

Long-life, low-maintenance
• Many original Rotovalves still operational after 50 years of dependable service.
• Tolerates severe service conditions.
• Lift and turn operation eliminates seat wear.

Reduces Costs
• Full-ported for low head loss.
• Eliminates down-time for seat adjustment or replacement.
• “Smaller than line size” applications enable the reduction of valve size.

Rugged Construction
• Integrally cast trunnions and mounting pads assure proper alignment between body, plug and mechanism.
• Electrically fused Monel metal-to-metal seats handle sludge and grit.
• Fully skirted plug with integrally cast trunnions.
• Moving parts totally enclosed in a lubricated, quickly removed, cast iron housing.

Unique Seating
• Lift and turn operation.
  — Low torque for easy operation.
  — No seat wear.
• Self-purging, Monel-to-Monel seats assure tight closure.

Excellent Hydraulic Characteristics
• Drip-tight shutoff against pressure or vacuum.
• Easily controlled operating speed minimizes water hammer.
• Operates with ease and speed, regardless of pressure within the system.
• Two-stage pressure reduction minimizes vibration and cavitation.
• Straight-line flow modulation.

For all water and wastewater applications

Precise flow control in severe service
Actuator
Manual or Power (hydraulic or electric)

Shaft
Connects the mechanism to the plug.

Lift-nut
Lifts the plug.

Lifter Lever
Rotates the lift nut.

Operator Rod
Moves the cross head.

Rotator Lever
Turns the plug.

Roller
Contacts and turns the rotator lever after the plug has been raised.

Seating Adjuster
Limits crosshead travel.

Body
Rugged, integrally cast trunnions and mounting pads.

Bearing
Bronze or stainless steel. Assures long life, ease of operation.

Seats
Monel-to-Monel. Highly corrosion resistant. Drip tight shut off.

Plug
100% circular waterway opening, fully skirted. Integrally cast trunnions.

Crosshead
Carries the roller and transmits linear motion to the lifter lever.

Guide Rods (2)
Guarantee alignment and smooth crosshead travel.

Head
Aligns the plug and supports the mechanism.
The smooth and linear operating cycle of the Rotovalve is highly effective in controlling surge and water hammer while providing precise flow regulation.

Water hammer, a phenomenon occurring in pipelines carrying incompressible fluids, is the result of a sudden change in fluid velocity. Such a change in velocity could be caused by a sudden closing or opening of a valve, which creates a series of pressure pulsations in the line. The intensity of the initial pressure pulsation can sometimes break the pipe. Water hammer must be a consideration in any system design.

The magnitude of the increase in pressure from water hammer is a function of time and liquid velocity. It is generally accepted that the maximum pressure rise will occur in the first wave whenever the valve is closed completely within one period. One period is defined as the time it takes the shock wave to travel from the valve to the end of the pipe and return. Succeeding waves are progressively less in magnitude.

The complete closure of a valve in a time longer than one period limits the degree of pressure rise in the first wave. The longer the elapsed closing time, the lesser the magnitude of the first and succeeding waves. Controlled closing time is the key to reducing the intensity of water hammer.

A fully skirted Rotovalve is ideal for water hammer control because of its design and the ease by which the stroke time can be adjusted. The two orifices (influent and effluent) drop the unbalanced pressure in two stages, greatly reducing the potential for cavitation and vibration.
How does the cone valve operate?

The Rotovalve cone valve is different from other through-ported valves (like the ball valve) in its unique seating / unseating operation. The plug is raised along the axis of the shaft to initiate opening of the valve, and lowered to complete closing of the valve (See Figure 1). This action permits the plug to rotate freely on journal bearings during the entire opening/closing sequence which reduces torque and eliminates seat wear.

**Step 1: The closed position.** The Rotovalve seats drip tight with the machined monel faces on both sides of the plug seating against the machined monel surfaces on each side of the body.

**Step 2: Lift actuation:** The first movement of the actuator (manual, electric, or cylinder) moves the crosshead laterally toward the rotator lever. This initial lateral movement of the crosshead moves the lifter lever, which turns the lift nut and raises the plug away from the body seat. The plug has not turned.

**Step 3: Opening:** Once the crosshead contacts the rotator lever, further lateral movement of the crosshead then turns the plug.

**Step 4: Opening:** Close-to-open, and open-to-close sequence can be adjusted for water hammer control. The two orifices of the valve (influent and effluent) drop the unbalanced pressure in two stages, reducing the potential for cavitation and vibration.

**Step 5: Fully open:** Once the plug is fully rotated, continued movement of the crosshead turns the lift nut, reseating the plug.
Materials and Dimensions

Body, Plug and Head Castings ................. ASTM A126
Class C cast iron (for 150 psi service) or ASTM A536
Grade 65-45-12 ductile iron or A216 Grade WCB cast
steel (for 250 psi service)
Head and Body Bushing ......................... Bronze
Mechanism Housing ....................................... Cast iron
Cover .......................................................... Cast iron
Lift Nut .......................................................... Bronze
Crosshead ..................................................... Bronze
Thrust Ring .................................................... Steel

Roller .......................................................... Steel
Guide Rods .................................................. Stainless Steel
Seat Rings .................................................. Monel
Trunnion Bearings ......................... Bronze or Stainless Steel
Flanges ............................................. ANSI Class 125, 250, 300 or metric
Valve Shaft ..................................... Stainless Steel ASTM Type 630
O-Ring ................................................. Buna-N
Packing ................................................... Fiber and Graphite
Packing Gland .............................................. Bronze

Sizes ................. 6" - 84"

Cylinder Operator

Motor Operator

Manual Operator

Dimensions for all three methods of operation are identical, except for E and F, as shown in the drawings above.

* Valve can be mounted in a horizontal or vertical line. Shaft can be horizontal or vertical. Actuator can be oriented in any direction relative to the shaft.
### Characteristics

#### k Values vs. Plug Angle

<table>
<thead>
<tr>
<th>K Value</th>
<th>Flow Coefficients Smaller Than Line Size</th>
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</thead>
<tbody>
<tr>
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<tr>
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</table>

**Optional Cv Values**

- **LINE D**
  - **FLOW SIZE**
  - **APPROX.**
  - **CV STATION**

**Flow Coefficients Smaller Than Line Size**

- **REG. PATTERN**
  - **AWWA Long Pattern**
    - To 24" Line Size
  - **AWWA Short Pattern**
    - Above 24" Line Size

**Optional Cv Values**

- **LINE D**
  - **IN.**
  - **VALVE D**
  - **APPROX.**
  - **CV STATION**

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1. The maximum controllable valve position is determined by the dynamic characteristics (k) of the complete system, including the valve, the reducer and increaser sections.

2. Estimates for a regulating valve size, excluding the line, the reducer and the increaser losses, are based on maximum valve control at the 80 Deg. from closed position.

**Cv** = $29.8 \frac{D_v^2}{\sqrt{K}}$

**D_v** = Valve I.D. in inches

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Other size variations available upon request.
Manual or Power Actuation

**Manual**: Self-locking, threaded stem attached to a geared unit with handwheel, chain-wheel or operating nut input.

**Hydraulic**: Cylinder using line pressure or separate external power source.

**Electric Motor**: Available for open-close or throttling service, complete with limit switches and torque switches as required. Manual override is standard. Also available for modulating service with position feedback for continuously adjustable automatic controls. Complete accessories are available and include indicator lights, integral reversing starters, push buttons, potentiometers, space heaters, sensors, transmitters, transducers and other control features.

Depending upon the application, Rodney Hunt hydraulic systems for valve control offer specific advantages and economies over manual and electric actuation. Where several valves are operated by a single hydraulic operating system, for example, considerable cost savings can result.

Rodney Hunt has the capability to design, manufacture, and test hydraulic systems complete with associated electrical control panels. Start-up assistance is also available. These capabilities offer the consulting engineer, contractor, and end-user single-source responsibility for both the valve equipment and hydraulic actuation.

Advantages of Hydraulic Actuation

**Economical**. Hydraulic actuation is the most cost-effective type of power actuation currently available.

**Increased control**. Valve can be designed to open and close at different speeds, and to permit easy field adjustment of speed.

**Less wear**. Hydraulic cylinders provide long, trouble-free service especially where valve cycles frequently, or is used for modulating service.

**Flexible functions**. Systems can vary from a simple pushbutton station to sophisticated programmable positioning.

**Emergency “fail-safe” operation**. Can be easily configured to open or close valve in the event of power failure, line breakage, or other emergency.

Hydraulic actuation system engineering includes development of hydraulic power units that respond to computer instructions for exact valve positions, continuous monitoring, and emergency operation.
Cone Valve Specifications

**General:** The cone valve shall be the Rotovalve™ as manufactured by Rodney Hunt Company. It shall be a full ported valve and shall be complete with actuator and accessories as specified herein.

**Operation:** Operation of the cone valve shall employ an axial motion to lift the valve plug from its seat, followed by a 90° rotary motion of the plug to open the valve and axial motion to reseat it in the open position. Closing movement of the valve plug shall be in reverse order. It shall be designed to operate satisfactorily at the flow conditions specified.

**Valve Construction:** The valve body shall be provided with seat rings of Monel metal electrically fused to the body waterway and sufficiently raised above the internal surface of the body to assure free operation. The valve shall be complete with ANSI Class flanges to mate with adjacent equipment.

The valve plug shall be fully skirted with integrally cast trunnions. It shall have a set of Monel seat rings electrically fused to the plug waterway and sufficiently raised above the extended surface of the plug to assure free operation. If sealing in the open position is required to prevent flow around the plug, a second set of seats shall be furnished. Trunnion bearings on the plug shall be bronze or stainless steel and shall mate with bronze or stainless steel bearings in the body and head.

The head shall make a registered connection with the valve body to assure proper bearing alignment. It shall be designed to support the cone valve mechanism and operating forces.

All valve castings shall be ASTM A126 Class C cast iron, ASTM A536 Grade 65-45-12 ductile iron, or ASTM A216 Grade WCB cast steel.

The valve shaft shall be stainless steel Type 630 with 125,000 psi minimum yield strength, and shall be pinned to the plug. The packing shall be fiber and graphite with a bronze adjustable packing gland.

**Mechanism Construction:** The operating mechanism shall be totally enclosed in a cast iron housing with an integrally cast mounting bracket to assure proper alignment. The housing shall be designed for either right of left hand actuator mounting.

The mechanism cover shall be cast iron and make a registered connection to the mechanism housing. The cover shall be bronze bushed where the valve shaft extends through it. The bronze lift nut shall be contained completely within the mechanism housing with provision for external lubrication. The crosshead shall be of bronze B584 C86200 and shall travel on stainless steel guide rods. Two covered access holes shall be provided for access to the tube fittings on the crosshead. An indicator shall be mounted on the end of the valve shaft for local position indication.

**Actuator:** Actuator will be sized to operate the valve from full open to full closed at rated pressure with a maximum of 80 ft./lb. of input torque on a manual actuator. The valve manufacturer shall be responsible for sizing electrical or cylinder actuators based on the flow conditions.

**Testing:** Cone valve body and head shall be hydrostatically tested for 10 minutes at a test pressure of one and one-half times maximum working pressure for which the valve is intended. Under test, parts shall show no evidence of distress and shall be free from any leaks.

When fully shop assembled, each cone valve shall be leak tested at the rated pressure. Leakage shall not exceed 0.4 oz/min/inch of diameter.

**Pump Check Controls:** The pump check controls shall be supplied, mounted and tested by the valve manufacturer. They shall consist of a 4-way solenoid valve with manual override, speed control valves, open/close limit switches, pump shutdown limit switch and a pressure switch positioned on the upstream side of the valve. When the pump reaches the designated pressure, the pressure switch is activated, energizing the solenoid control valve causing the cone valve to open at a predetermined rate. To shutdown pump operation, the solenoid control valve is de-energized causing the cone valve to close. When the cone valve is approximately 95% closed the pump shutdown limit switch shall be activated, shutting down the pump. The opening and closing speeds shall be independently adjusted from __ seconds to __ seconds.