



# Our Company

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## Blackhall Engineering





# Water Industry Valves

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# Blackhall Engineering



Blackhall Engineering's experience and qualification to participate in this area is extensive. Hydro-electric and Dam installations call on the services of some of the largest valves in the World and Blackhall Engineering have played a part in many of these systems.

We can trace our history back to the early pioneering days of Larner-Johnson®. In addition to carrying on the tradition of designing and manufacturing these giant valves, Blackhall is one of the very few companies in the world equipped and capable to maintain the original equipment, some of which dates back to the early 1900's.



# Water Industry Valves

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## Fixed Cone Valve



This valve is typically used for Free Discharging Control at a Terminal Point of a pipe or culvert at the base of a Dam or Reservoir basin.

The valve was developed to offer the user an economic solution for this type of application.



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# Water Industry Valves

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## Fixed Cone Valve



### Application

This type of valve has other names commonly used to describe it:

- Howell - Bunger Valve
- Hollow Cone Valve
- Sleeve Regulating Valve

### Features and Benefits

- Kinetic Energy Dissipation using Air Cushioning of the Discharge Jet
- High Discharge Capacity ( $K= 1.5$ )
- High Velocity Discharge (up to 25 m/sec)
- Low Maintenance (all operating gear external)
- Drop Tight Closure
- Balanced During Operation (Low Operating Power Requirements)
- Pressure - Typically up to 10 Bar
- Size Range - 200mm - 1800mm (Larger Available)
- Materials - Steel and Stainless Steel (also available in Cast Forms)



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# Water Industry Valves

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## Fixed Cone Valve



### Fixed Cone Valves Projects:

- Bengoh Dam – Malaysia 2010
- Northumbrian Water - Cow Green Reservoir 2008
- Gerugu Dam - Kudat Water supply Malaysia 2007
- Kinta Dam Malaysia 2006



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# Water Industry Valves

## Submerged Discharge Valves



Duty - Terminal End Control , Submerged Discharge



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# Water Industry Valves

## Submerged Discharge Valves



### Application

When Low discharge noise is a requirement and / or when space is at a premium The Blackhall Submerged Discharge valve is an ideal choice. The valve is design so that the discharge occurs under water into a Stilling Well reducing both noise and space required (i.e. No stilling basin). Details of the sizing for the Valve and Stilling Wells are available from the factory.



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# Water Industry Valves

## Submerged Discharge Valves



### Features and Benefits

- Low Discharge Noise Levels
- High Discharge Capacity ( $K= 1.62$ )
- Minimum Space Required for Discharging Flow (No Stilling Basin)
- Low Maintenance and Long Life
- Medium Velocity Discharge Capability (up to 6 m/sec)
- Balanced During Operation (Low Operating Power Requirements)
- Capable of High Pressure Discharge
- Various Discharge Port (Characteristic) Options Available
- Highly Stable Flow Control
- Heavy Duty Design and Construction
- Pressure - Typically Up To 20Bar
- Size range - 200mm - 1800mm (normally larger inlet than outlet)
- Material - Cast Iron and Cast Steel



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## Submerged Discharge Valves



- WDA – Australia 2010
- Thames Water - King George V Reservoir 2008
- Thames Water - Queen Mary Reservoir 2007
- Scottish Water - Glendoe 2007



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# Water Industry Valves

## Angle Pattern Float Control valve, Larner Johnson®



•Rand Water Board - South Africa 2009



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# Water Industry Valves

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## Larner-Johnson® Valves



- The Larner-Johnson® valve was originally designed and developed in 1920's for use on hydro-electric power plants in the U.S.A., where it pioneered the application of the needle valve principal.
- J. Blakeborough & Son Ltd's interest in the Larner-Johnson® valve was consummated 1937 when the company obtained manufacturing and selling rights of the patents.
- Extensive development work was carried out at this point laying down sound technical foundations, which were to prove the product time and again.
- Blackhall Engineering Ltd purchased the global intellectual property rights in 1989 from Hopkins (the Blakeborough holding company)
- The Larner-Johnson® valve design has been applied to almost all the principal valve duties, resulting in a series of manual, power-operated and self-acting types.
- Thousands of installations have been carried out, covering the widest range of sizes, duties and conditions. Providing evidence of a capacity for sustained high level performance.

# Water Industry Valves

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## Larner-Johnson® Valves



- The principle application of the Larner-Johnson® valve is the control of fluids, notably the water supply industry, where the pressure and control requirements utilise its advantages to the full. The power and oil refinery industries are also regular users of this type of valve.
- The Larner-Johnson® valve consists of a circular body surround by an internal cylinder, closed at one end and connected to the body by radial ribs, in which a plunger operates, making contact with a seat in the neck of the body to close the valve.
- The force used to move the plunger is the pipeline pressure in the body of the valve itself. The flow through the valve at all positions of the plunger is smooth and free from turbulence.



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# Water Industry Valves

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## Larner-Johnson® Valves



### Strengths

- The Larner-Johnson® valve has unique and superior features which distinguish the valve from others currently available on the market.
- All parts of the valve are circular and hence free from distortion under high pressures. The stresses can be accurately determined, thus eliminating all empirical and experimental factors of design.
- Simplicity of design and freedom from distortion make it possible to build this valve in sizes larger than could be attempted with any other type. They are presently in use up to 4000mm (12ft diameter). Some valves operate under heads up to 915mm (300ft).

# Water Industry Valves

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## Larner-Johnson® Valves



### Durability

- This valve is unquestionably the most durable type on the market. Historically, installed valves have never required replacement parts to compensate for operational wear for the first 25 years service. There are no sliding contacts under pressure. The plunger in operation is unbalanced only enough to move it.
- Subjected only to compressive stress the internal cylinder in which the plunger operates is usually made from cast iron. Experience has shown that valves which are operated occasionally require no lining. Only small sizes and valves which are seldom operated are protected with a full bronze lining. There is no flow in the internal cylinder except while the plunger is moving.

# Water Industry Valves

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## Larner-Johnson® Valves



### Tight Shut Off

- No matter how large the size or how high the pressure, these valves are always tight when closed. The plunger has a renewable seat ring which is machined to a perfect fit against the neck of the valve body. The higher the pressure in the valve the greater the sealing force of the plunger against the seat, but with no rubbing of one seat on the other, and hence there is no wear. Once tight, the valve will always remain so.
- Distortion, which is a common cause of leakage in other valves, is entirely absent from Larner-Johnson® valves on account of their circular shape.

# Water Industry Valves

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## Larner-Johnson® Valves



### Reliability

- The valve requires no outside auxiliary force for operation, which is achieved by means of the pressure within the valve. (Ordinarily the force required to move the plunger is only sufficient to overcome the friction of the plunger sliding in the internal cylinder, but if the movement of the plunger is obstructed a relatively enormous force is automatically applied which is sufficient to overcome almost any obstacle).
- The rate of opening and closing may be adjusted to suit the conditions of operation.
- These valves do not require a by-pass. They are ready to operate instantly and will work just as easily when fluid is flowing through them as when conditions are static.
- **Valves are in service for over 90 years - A testament to the reliability of the Larner-Johnson®**



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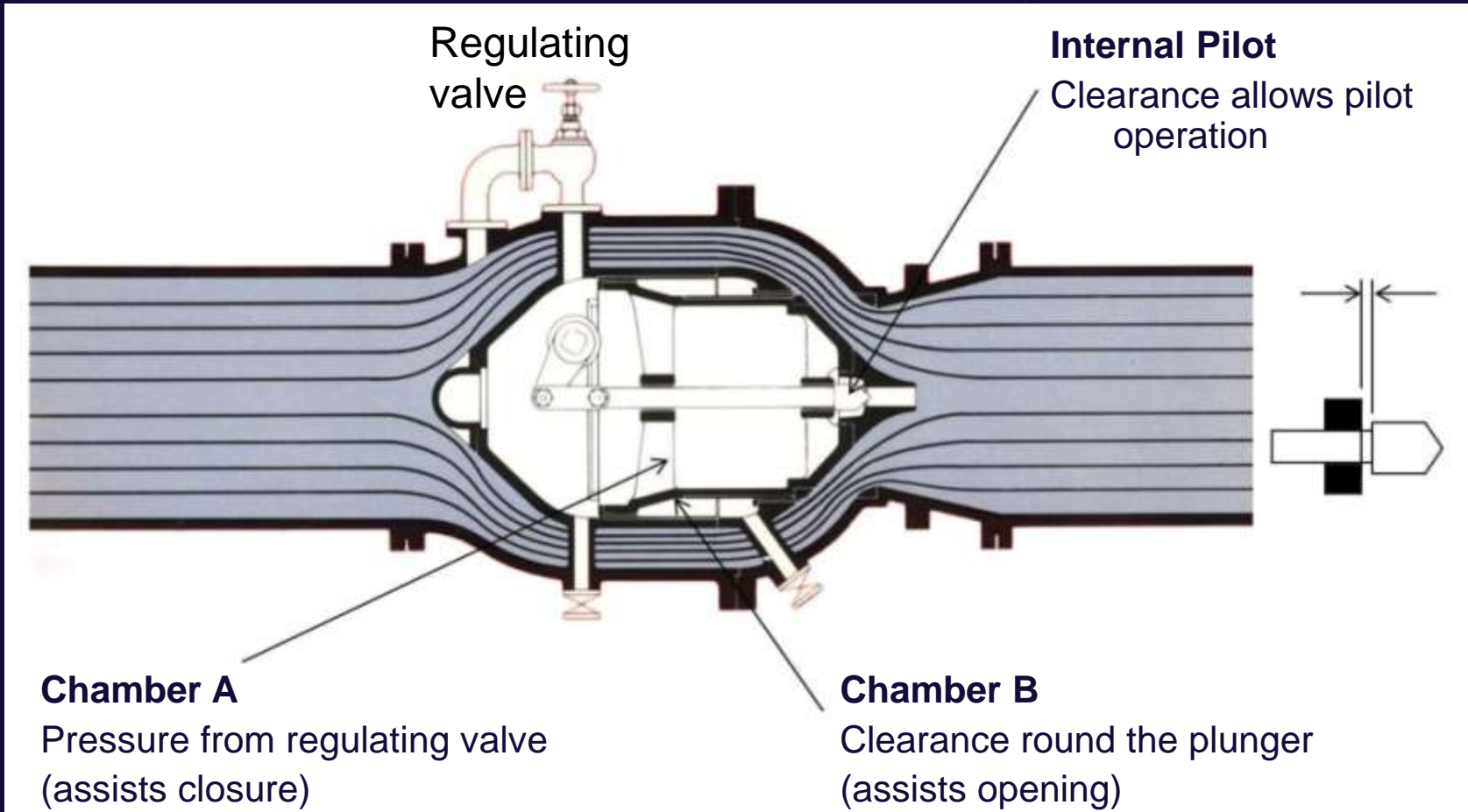


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# Water Industry Valves

## Larner-Johnson® Valves

Operation



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# Water Industry Valves

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## Larner-Johnson® Valves



### Operation

True pressure balance - low torque operation (pilot valve assists with valve closure)

NOTE: The valve position is mechanically operated by a gearbox and or actuator, closure is pressure assisted and therefore the valve cannot slam shut.

(closure of greater than 10 minutes is determined by the manufacturer subject to the application and selected gearbox ratios).

Rule of thumb closure is equal to 2 minutes per 30 cm of bore

i.e. 100cm bore + 6.6 minutes

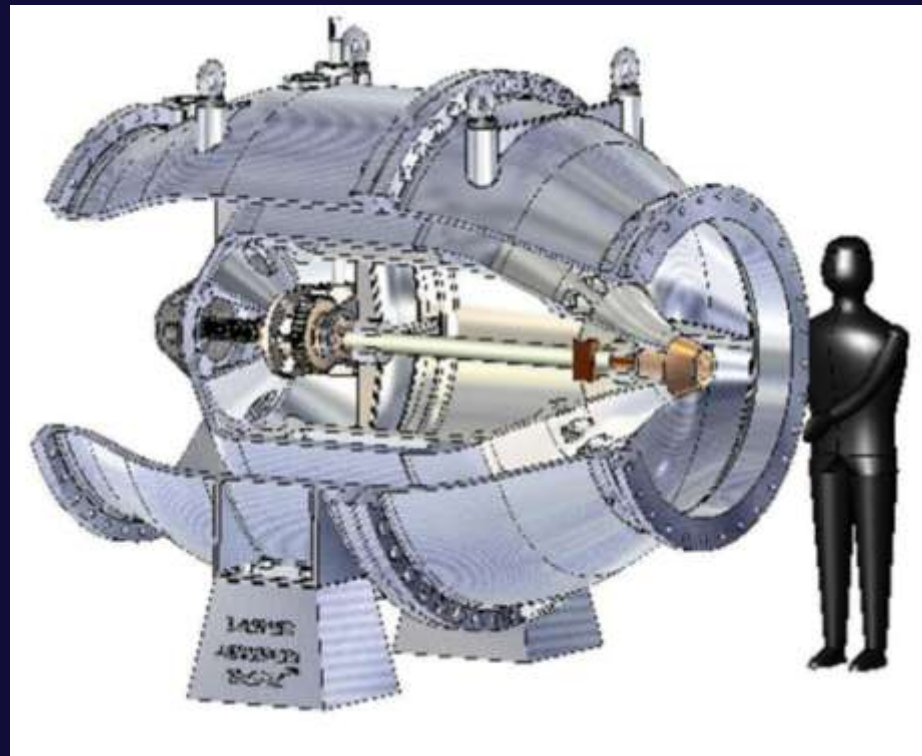
# Water Industry Valves

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## Larner-Johnson® Valves



Technical Ability



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# Water Industry Valves

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## Larner-Johnson® Valves



### Modes of Operation

The Larner-Johnson® valve requires minimal torque for actuation in comparison to other valve configurations, this advantage being due to its pressure balanced design.

The valve may be operated by the following:

- Gearbox
- Electric Actuator
- Basic features include - reversing motor, precision reduction gearing, limit switches, automatic torque limiting control, local travel indication, weatherproof, explosion proof, enclosures, provision for manual operation with safety interlock. Integral starter, additional switches for interlocking etc.
- Hydraulic or Pneumatic Cylinder

### Associated controls

- Float Operated - Angle Pattern & Inline design

Optional stilling tanks with ball cock and syphon configurations



# Water Industry Valves

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## Larner-Johnson® Valves



### Applications

The Larner-Johnson® valve is essentially for liquid service, its principle application is the control of water, however there is a demand for industrial applications.

Although available in certain sizes and adaptations on a standardised basis, the valve is obviously not an off the shelf item. The valve is employed selectively, where enhanced durability, safety and smoothness of control are important.

Examples include:

- Pipeline stop and regulation
- Free discharge regulators
- Angle type regulator
- Solid plunger
- Pressure Reducing
- Submerged Discharge



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# Water Industry Valves

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## Larner-Johnson® Valves



### Target Applications

The Larner-Johnson® valve is competitive in the applications as described in this slide, essentially the large medium to high pressure applications are best suited.

#### **Bore Sizes DN80+**

#### **Pressure ratings PN10, 16, 25, 40**

#### **Terminal Discharge**

#### **Inline Control**

Free discharge regulators Type E

Pipeline stop and regulating Type E Fig 3137

Jet disperser Type

Angle Type regulator Type E Fig 3078

Submerged Discharge Type Fig 3200

Inline Float Type E Fig 3165

Fixed Cone Type Fig 3300

High Pressure Type Fig 3199

# Water Industry Valves

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## Service and Repair



### Field Operations

- Qualified refurbishment valve engineers. Retrofit and refurbishment of gearbox, actuators and other associated valve systems.
- International Experience
- Confined spaces trained and qualified personnel.
- Internal valve examination using specialist endoscopic video equipment.
- Independent valve inspection specialists.
- Ultrasonic testing / examination.
- Valve Consultancy.
- Troubleshooting.



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# Water Industry Valves

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## Service and Repair



United Utilities Llwyn-On Reservoir 2007 & 2008



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