

## OPERATING AND MAINTENANCE

# Gear pump manual for foam pelton wheel driven pumps

**THIS MANUAL SHOULD BE USED ALONGSIDE THE ALBANY STANDARD  
INSTALLATION, OPERATION AND MAINTENANCE MANUAL**

Albany's 24-page brochure is  
available as a download at  
[www.albany-pumps.co.uk](http://www.albany-pumps.co.uk)



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### **WARNINGS**

Testing rotary gear foam pumps with water is **NOT ADVISED**, Severe internal damage **WILL OCCUR**. Using this pump on viscosities lower than that stated for the pump (see quotation) will reduce its life. This type of pump is not designed for use on fluids that do not have lubricating properties.

Pumps should be run at regular intervals.

All Pelton Wheel units are supplied with lip seals and **MUST NOT BE PRESSURE TESTED WITH THE LIPSEALS FITTED** or damage will result. Isolate the pump unit before pressure testing the system.

This manual is a supplement to the standard Albany operating & maintenance manual and contains general instructions for the storage, installation, operation and maintenance of the following Albany gear pumps.

- Extended Bearing Pumps
- Pelton Wheel Driven Pumps

To get the best from the pump, carefully read and understand this manual before installation and start-up. Albany cannot anticipate all of the situations a user may encounter while installing and using Albany products. Therefore, the user of an Albany product **MUST** know and follow all applicable industry specifications on the safe installation and use of these products.

Albany Engineering Company Limited will not be held responsible for any consequence due to the improper installation and use of the pump.

### *USING THIS MANUAL*

- Read and understand the manual. Contact us if anything is not clear.
- Keep the manual for the life of the pump.
- If pump maintenance is necessary use this manual for safety and technical information.
- For safe working, observe the operating and maintenance instructions for associated motors, engines, couplings and relief valves.

The following are general safety precautions not related to any specific procedure, however, the United Kingdom Health and Safety At Work Act 1974 Section 6(a) requires manufacturers to advise their customers on the safety and the handling precautions to be observed when installing, operating, maintaining and servicing their products.

Personnel must understand and apply these precautions during both operating and maintenance of the pump. The user's attention is therefore drawn to the following:

1. The appropriate sections of this manual must be read before working on the equipment.
2. Installation and servicing must only be carried out by suitably trained or qualified personnel.
3. Normal safety precautions must be taken and appropriate procedures observed to avoid accidents

The following symbols are used throughout this manual to draw attention



*Warning – non compliance with this point could result in injury/harm*

---



*Refers to electrical safety points which can cause injury/harm*

---



*Cautions, Safe operation of pump*

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### LIMITS OF USE



*The pump/pump sets must not be subjected to pressures and temperatures in excess of those for which it was originally quoted and supplied. It must not be subjected to extremes of temperature and/or humidity for which it was not designed.*

---

- Never use heat to disassemble the pumps due to risk of explosion from trapped liquid.
- Never operate the pump without all guards correctly installed.
- Never operate the pump beyond the rated conditions for which the pump was originally sold.
- Never run the pump when dry.
- Always lock out and post a permit on the power to the driver before performing any pump maintenance.
- Never operate the pump with discharge valve closed.
- Never operate the pump with suction valve closed.

### NOISE

On certain installations, pump models and at certain operation points shown on the pump curves a noise level of 80 dB, can be exceeded.

When working in a pump house check the noise.

Above 70 dBA, wear ear defenders.

Above 85 dBA, wear ear defenders and limit your time working in this area.

Remove the pump to somewhere quieter to carry out any maintenance.

**PUMP INSTALLATION / MAINTENANCE**

Please install your pump in accordance with the latest National Safety Regulations.

Before working on an installed pump:

- 1) Hazardous liquid – drain and clean the system
- 2) Depressurise the pump and all lines
- 3) Disconnect the power supply. Lock it off, post a permit
- 4) Disconnect the shaft coupling

It is hazardous to:

- 1) Run the pump without the coupling guard fitted
- 2) Change the use of the pump or modify it without Albany approval
- 3) Fail to maintain the pump, as this can cause injury or fire

The pump user is responsible for the safe use of the pump.

Alterations to your pump are not allowed.



*Pumps can be dangerous if they are:*

- *incorrectly installed*
- *incorrectly used*
- *not serviced*



*Restrict access to the pump to competent people.*



*Use the correct tools for maintenance.*



*Lock off the electric starter; post a permit to prevent unauthorised starting. Switch off and isolate any electrical heating system.*



*Do not touch rotating parts.*



*Wear your PPE and goggles.*



*Assume that the pump is hot, check; allow to cool before starting work.*



*In the case of pumps for hot liquids allow to cool. Shut off all oil or steam heating systems, vent them when cool.*



*Consider whether the pump or its parts may topple over. Take care to avoid injury from falling parts, especially if the pump is large or heavy.*

### **WORK ON ELECTRICAL EQUIPMENT**

Take extra care when working with any electrical equipment associated with the operation of the pump; check that the motor terminals are not live even after switching off the supply. Earthing - ensure the pump has a proper ground connection.



*Do not attempt any inspection or repair before disconnecting the pump set from the electric supply.*

*Where possible lock off the switch gear and post a permit on it, yourself. Test that the motor terminals are not live before starting work.*

---



*Do not work on wet equipment*

---



*Only use a qualified electrician*

---

Refer to original manufacturer of motor / engine for maker's installation manual.

### **WORKING ON PRESSURISED SYSTEMS**

Check and observe the system pressure regularly.



*Liquids under pressure can cause injury, wear goggles and PPE*

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*Vent all pressure containing parts to atmosphere, taking care in case the system is under pressure.*

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First close all valves.

Bleed the pump and system; this includes any thermal oil heating system.

Take great care with toxic/hazardous liquids.

### **COSHH**



**Control Of Substances Hazardous To Health**

As far as we are aware there are no hazardous substances present in this Albany pump when it leaves our works. However, we cannot confirm that product to be handled by the pump, or any reaction of those products that are pumped and any adjacent materials are not hazardous.



**TECHNICAL / DESCRIPTION**

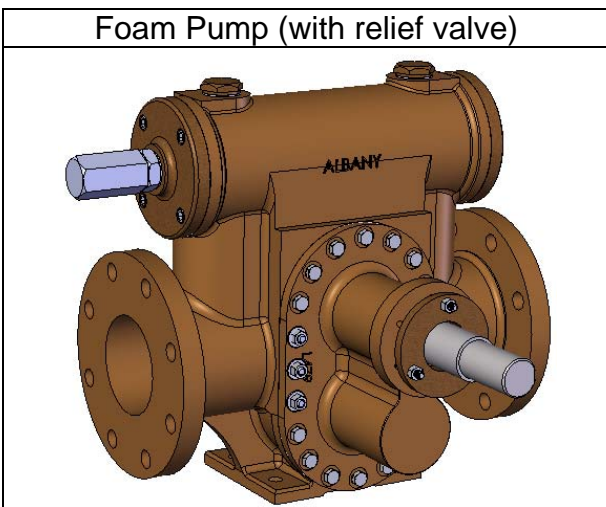
The Albany gear pump is an external gear positive displacement pump which consists of two counter-rotating shafts. The gears (rotors) which are attached to these shafts mesh together and rotate freely inside the pump casing bores.

The pumping rotors are contained within a rigid housing which is securely fixed together with mating faces being sealed by the use of a gasket to prevent leakage of fluid under pressure.

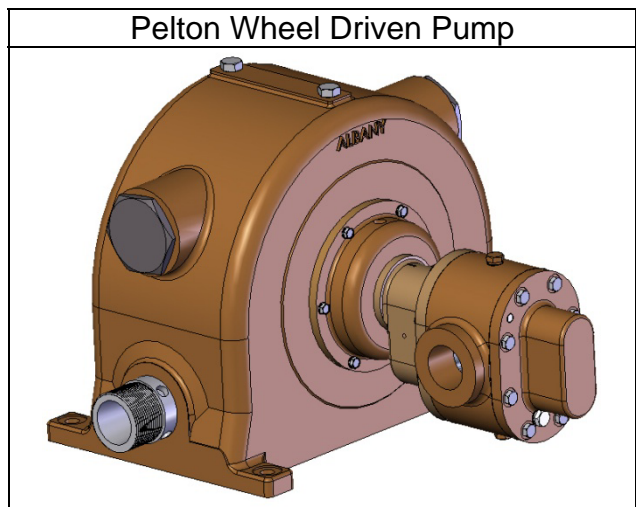
The driving shaft of the pump which protrudes from the pump casing is sealed to prevent leakage of the pumped fluid by means of either a packed gland or lip seal (pressure relieved) or mechanical seal.

Drive to the pump is achieved via a prime mover (electric motor, engine etc.) being connected to the pumps drive shaft using a coupling. This unit is normally mounted on a combination base plate. Alternatively the pump can be driven via Pelton wheel (water wheel) unit.

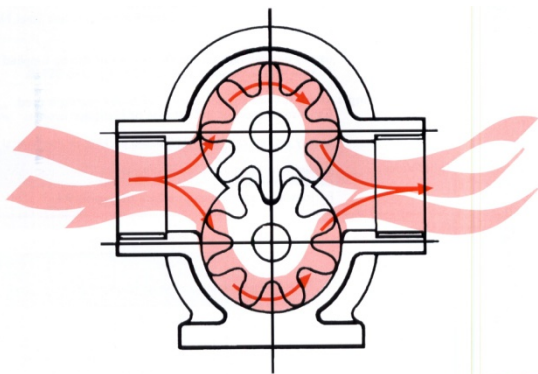
Foam Pump (with relief valve)



Pelton Wheel Driven Pump



**OPERATING PRINCIPLE: PUMP**



Liquid flows into the pump through the inlet (suction) branch (screwed or flanged connection); is carried round by the rotating rotors and pumped out of the outlet (delivery) port (screwed or flanged connection). Contact between the gear teeth separates and seals the suction side from the delivery side of the pump. This creates the vacuum which allows atmospheric pressure or a positive suction head to get the liquid into the pump. All the time the pump is rotating, liquid will be moved from the suction side to the discharge side.

**OPERATING PRINCIPAL: PELTON WHEEL( WATER MOTOR)**

The Albany designed Water Motor employs a one piece casting for the main wheel housing. The casing also incorporates the bearing support for the main drive shaft. The drive shaft is an integral unit running from the motor, directly into the pump. Onto this shaft is mounted the driving rotor of the pump. The Water Motor has the same features whatever the pump size. After rotating the wheel, the water is discharged to atmosphere. The bearings provide axial alignment for the whole pump/motor assembly and, therefore, great care is essential in any maintenance work associated with the unit.

**RECEIVING THE PUMP**



Read this manual before installing, operating or working on the pump.

Before reaching you, Albany will have run in, tested and recorded the pump performance in accordance with your enquiry and order.

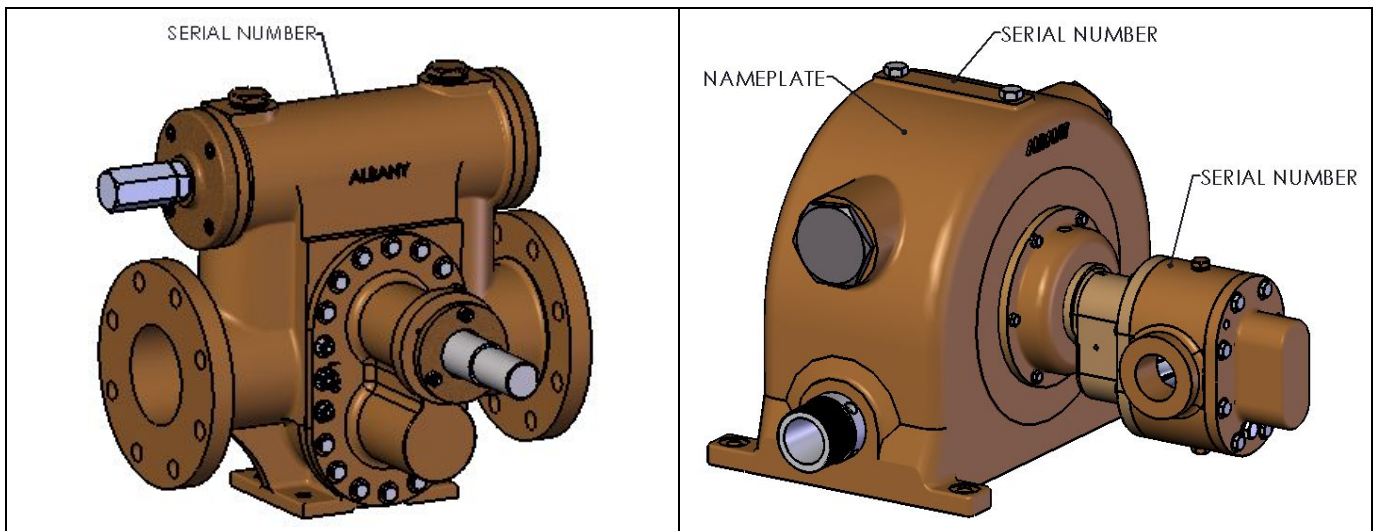
Albany has over 100 years of history in gear pumps. This means that the design, materials, and workmanship incorporated in the construction of Albany pumps make them capable of giving, trouble-free service. The life and reliability of any pump, however, is enhanced by:

- correct application
- proper installation
- periodic inspection, condition monitoring
- careful maintenance/servicing

Should any problems occur with the pump in its lifetime we have a spares and repair service. The use of genuine Albany parts will provide the safest and most reliable operation of your pump. ISO certification and quality control procedures ensure the parts are manufactured to the highest quality and safety levels. Please contact Albany for details on genuine pump parts.

Please e-mail: [sales@albany-pumps.co.uk](mailto:sales@albany-pumps.co.uk)

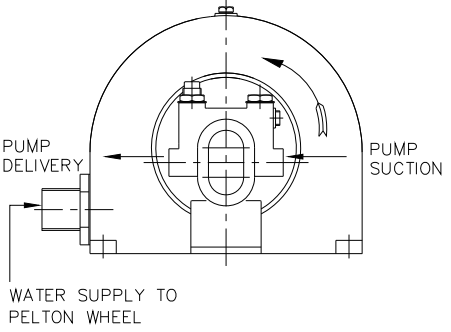
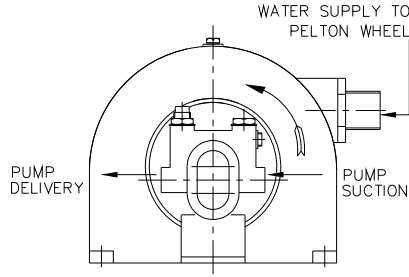
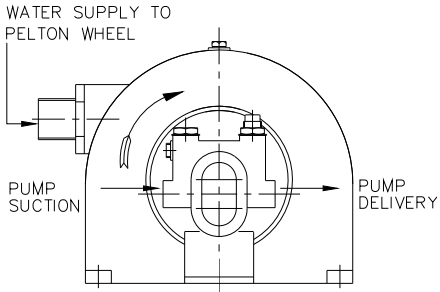
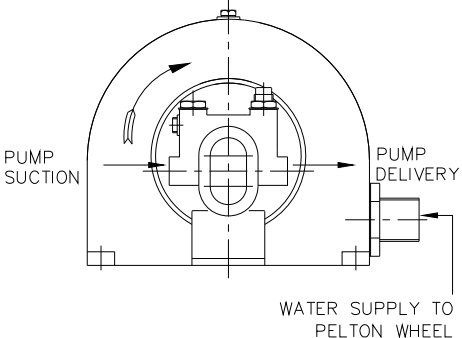
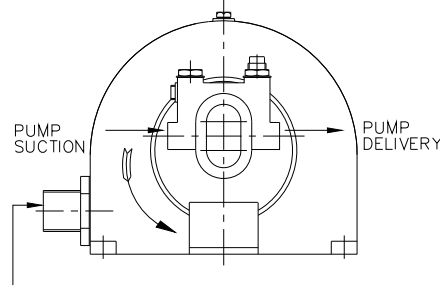
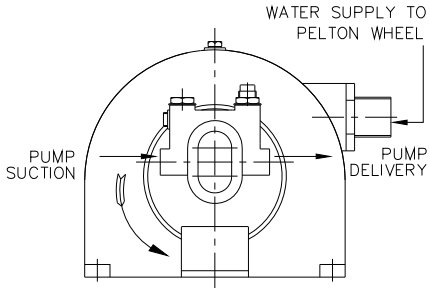
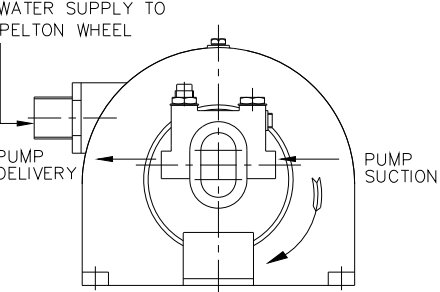
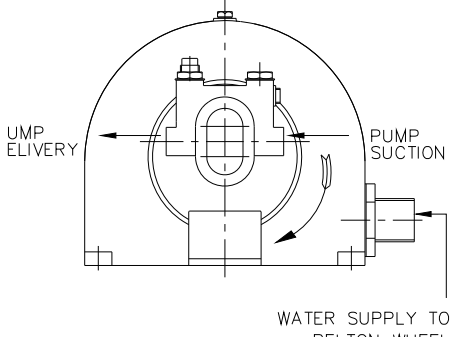
To help us identify the pump Albany will need to know the pump serial number which is stamped into the pump casing. Typical positions for serial number are shown below.





***DIRECTION OF ROTATION- SINGLE NOZZLE PELTON WHEEL***

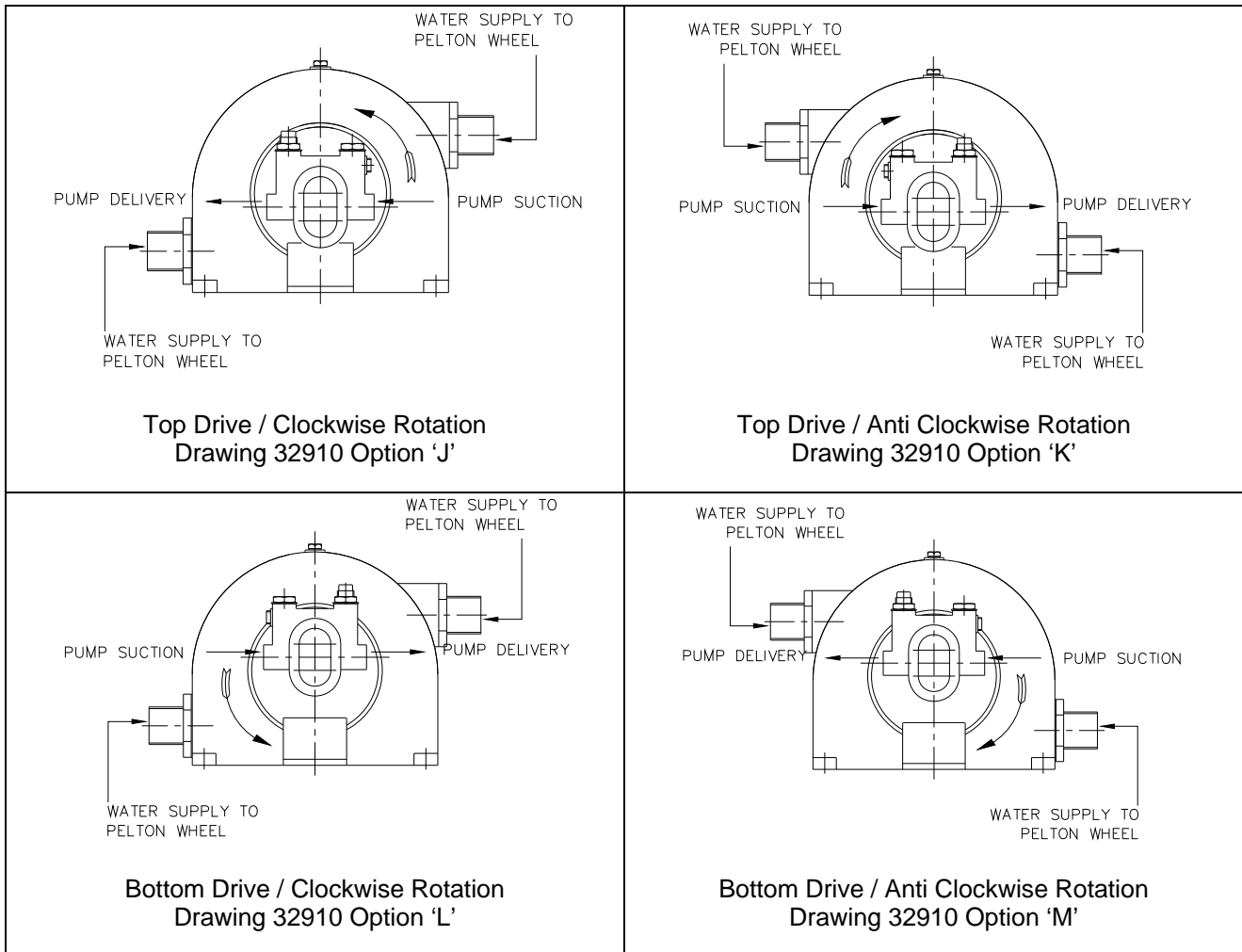
Build configuration detail showing rotation of pump when coupled to a Pelton wheel unit with a single nozzle. All views are looking on the pump end and show a relief valve pump (these views will apply equally to a non relief valve pump).

|  |  |   |
|--|--|---|
| <p>Top Drive/<br/>Clockwise Rotation</p>         |  <p><b>Drawing 29818 Option 'A'</b></p>   |  <p><b>Drawing 29818 Option 'C'</b></p>   |
| <p>Top Drive/<br/>Anti Clockwise Rotation</p>    |  <p><b>Drawing 29818 Option 'B'</b></p>  |  <p><b>Drawing 29818 Option 'D'</b></p>  |
| <p>Bottom Drive/<br/>Clockwise Rotation</p>      |  <p><b>Drawing 29818 Option 'E'</b></p> |  <p><b>Drawing 29818 Option 'G'</b></p> |
| <p>Bottom Drive/<br/>Anti Clockwise Rotation</p> |  <p><b>Drawing 29818 Option 'F'</b></p> |  <p><b>Drawing 29818 Option 'H'</b></p> |

***DIRECTION OF ROTATION- TWIN NOZZLE PELTON WHEEL***

Build configuration detail showing rotation of pump when coupled to a Pelton wheel unit with two nozzles.

All views are looking on the pump end and show a relief valve pump (these views will apply equally to a non relief valve pump).



For rotation of bare shaft and bed plate mounted pumps use the standard Albany Installation, Operation, Maintenance manual.

### *INSTALLATION OF PELTON WHEEL UNIT*

Installation of Albany supplied equipment must be carried out in accordance with the standard instructions issued with the equipment. The following points must be observed:-

- a) Fitting pipework, either to flanged or screwed branches, must be carefully carried out to ensure the pump assembly is not strained. If undue pressures are applied by the piping system, the internal pump clearances will be affected.
- b) All pump sets must be checked for alignment. This check must take place on installation and re-checked after fitting all pipework to the pump. Any discrepancy between the first and second alignment recordings signify pump displacement due to pipework fitting.



*The water inlet pressure must not exceed 14 bar.*

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*The exhaust water must be allowed to discharge without any restrictions.*

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As the unit employs a one piece shaft, it is essential to align the set on prepared and level foundations. The inlet pipe work to the water nozzle and the pump pipework must be supported and fitted to ensure no distortion, or mal-alignment takes place to the set. Any internal rubbing can prevent the duty being achieved. All fixing screws or bolts should be suitably secured with tab washers or similar to prevent the screws/bolts from working loose.

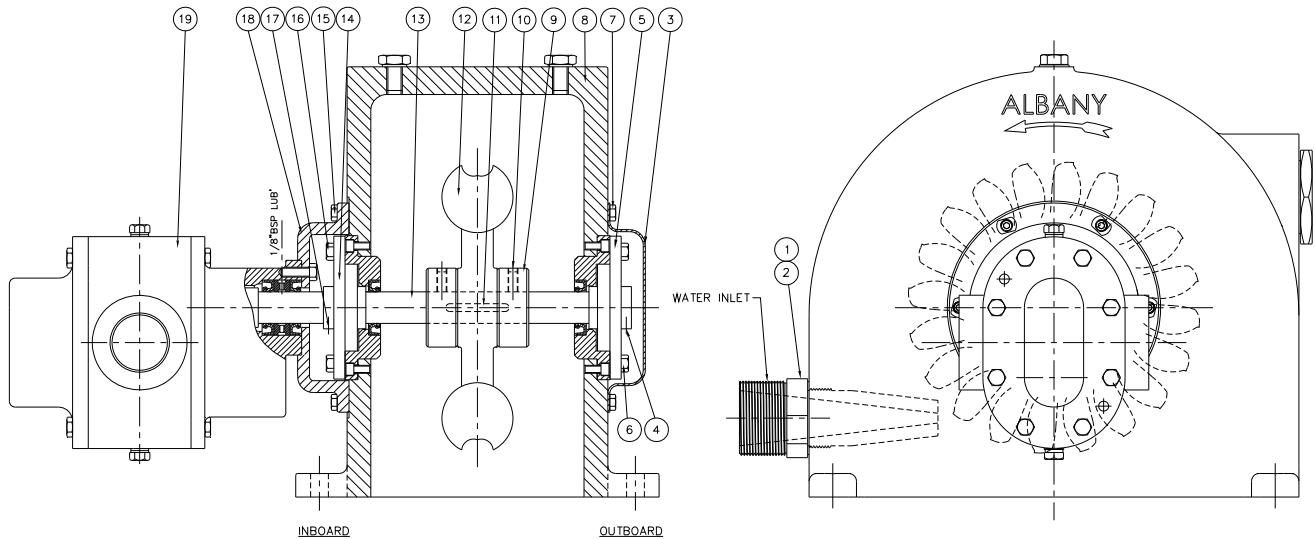
#### **IMPORTANT NOTE**

When installing, the pump drain plug must be accessible. On completion of any testing of pump/system, the pump internals must be drained via the drain plug. It is recommended that clean fresh water is then applied via the priming plug to the internal cavity of the pump. **BOTH PLUGS MUST BE REPLACED TO ENSURE THEY ARE AIRTIGHT.**

**MAINTENANCE**

The degree of maintenance required is dependent on operating hours and the quality of the water entering the motor. Should the water contain sand or other abrasive matter, then the life expectancy of parts in contact with high pressure water will be affected accordingly.

**Bearings (Double Bearing Pumps)**



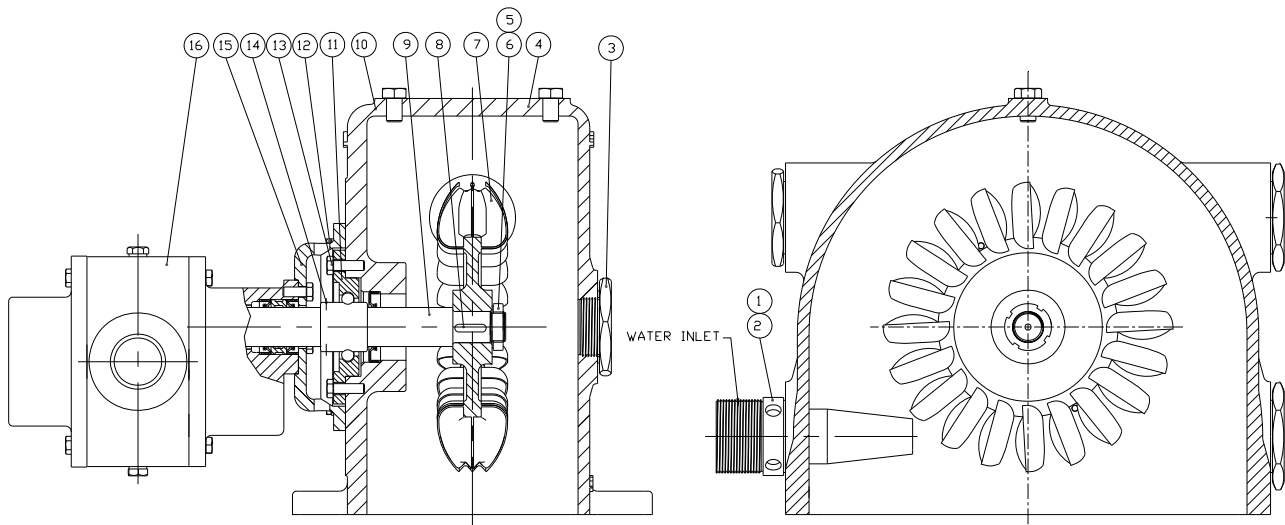
**Outboard Bearing Removal**

1. Remove the setscrews (item 7) holding the outboard bearing cover (item 3), access can be gained to the bearing unit (Item 5).
2. The setscrews (item 6) holding the bearing unit can then be removed.
3. Undo the locating screw (item 4) holding the bearing member onto the shaft to release the unit from the shaft (item 13).
4. The bearing unit can then be slid along the shaft, away from the wheel housing (item 8)

**Inboard Bearing Removal**

1. To begin follow the steps to remove the outboard bearing.
2. Undo the 2 grubscrews (item 10) to release the pelton wheel retaining collars (item 9). Slide the collars and Pelton wheel (item 12) outboard along the shaft (item 13) and remove key (item 11).
3. Loosen the grubscrews (item 17) holding the inboard bearing (item 14) to the shaft (access the grubscrews via the side window in the bearing cover (item 18))
4. Remove the setscrews (item 15) holding the inboard bearing cover (item 14) to the wheel housing.
5. Pull the pump unit (item 19) to slide the shaft through the bearing. At the same time, care must be taken not to drop the Pelton wheel & collars when extracting the shaft.
6. The setscrews (item 16) holding the bearing unit can then be removed & the bearing released.

**Bearings (Single Bearing Pumps) AP060 – AP090**



**Inboard Bearing Removal**

1. Remove plug (item 3). AP040 & AP050 pumps have a perspex viewing panel, which does not need to be removed.
2. From the underside of the Pelton wheel housing (item 10), undo the grub screw (item 5) holding the locknut (item 6) to the shaft. Undo the locknut and remove.
3. The Pelton Wheel can be removed from the shaft from under the bracket. Pull the Pelton wheel (item 7) outboard along the shaft (item 9) and remove key (item 8).
4. Loosen the grub screws (item 14) holding the bearing (item 11) to the shaft (access the grub screws via the side window in the bearing cover (item 15))
5. Remove the setscrews (item 12) holding the bearing cover (item 15) to the wheel housing.
6. The complete pump unit (item 16) and shaft may now be withdrawn through the bearing, which may then in turn be removed from the Pelton wheel housing (item 10) and inspected.
7. The setscrews (item 13) holding the bearing unit can then be removed & the bearing released.

If any wear is present, all bearings should be replaced as sets.

Ensure that all parts are thoroughly cleaned and dry.

Re-assembly takes place in reverse order to dismantling. Special care is necessary when fixing the bearings to the shaft. Axial alignment is attained by measuring the axial movement of the shaft within the pump whilst disconnected from the motor. This will be in the region of 0.004" - 0.008". The bearings **MUST** be located onto the shaft so that the Pelton Wheel is located in the exact centre of the above measurement.

On completion check wheel rotates freely. Follow installation instructions and ensure pump/motor set is aligned correctly.



### **Nozzle**

Removal of the nozzle (item 1) is affected by unscrewing the assembly from the housing unit. To replace, the assembly should be screwed into position, with a new fibre washer (item 2) fitted. A suitable sealant should be applied to the threads.

## **INSPECTION**

### **Bearings**

The bearings are sealed type units. Bearings should be checked after 2000 hours operation. After 8000 hours operating it may be necessary to replace bearings (see under Major Overhauls). Shell Alvina 2 grease or similar may be used to re-pack bearings.

### **Nozzle**

The nozzle should be examined for wear periodically and at least after every 2000 hours of operation.

### **Pelton Wheel**

Check periodically and at least after every 2000 hours running, for signs of wear.

### **Motor Casing**

Check periodically for signs of wear or damage internally.

## **PRESSURE TESTING**

All Pelton Wheel units are supplied with lip seals and **MUST NOT BE PRESSURE TESTED WITH THE LIPSEALS FITTED** or damage will result. Isolate the pump unit before pressure testing the system.

## **OPERATION OF PELTON WHEEL UNIT**

Initial starting of the motor should be gradual to allow the speed of the motor to increase smoothly. The inlet valve should, therefore, be opened smoothly on start-up and closed smoothly when shutting down.

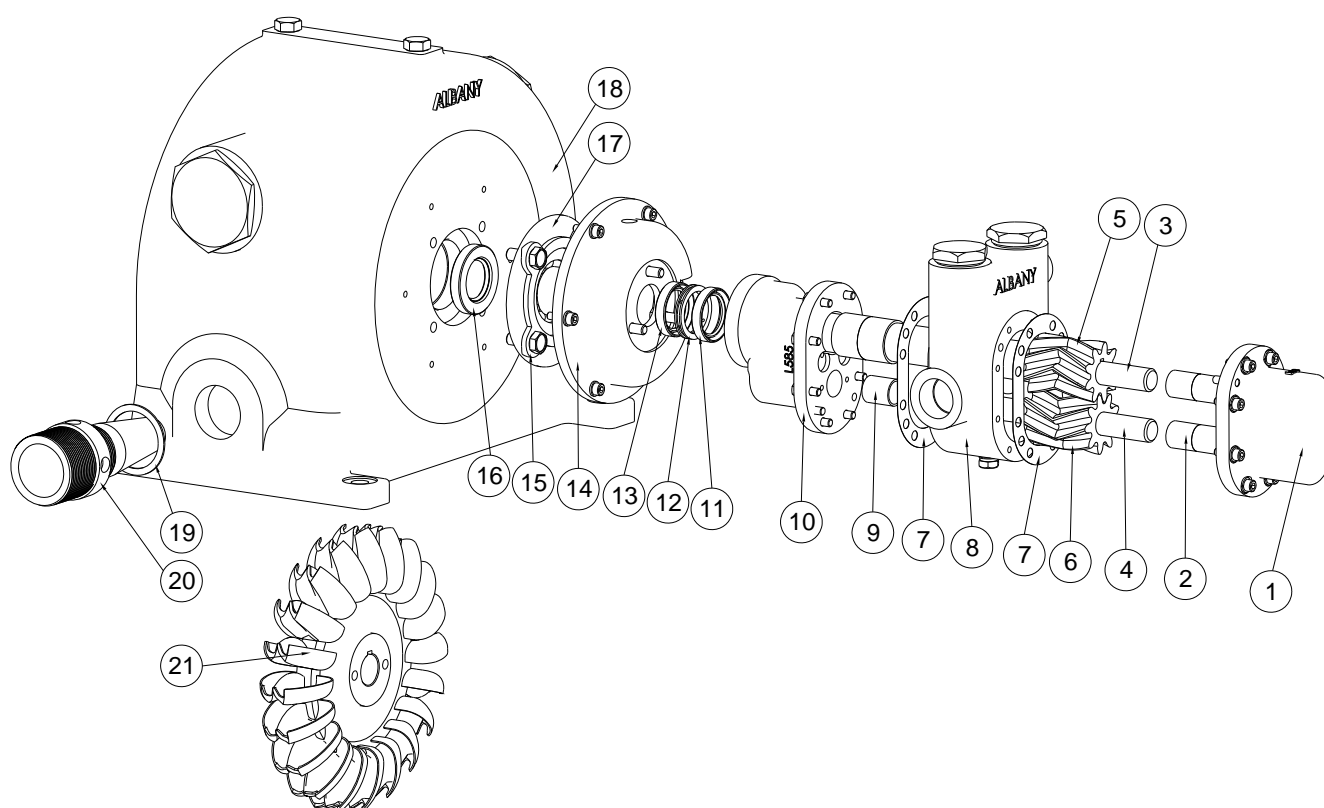
At constant pressure the speed of the Water Motor depends on the power absorbed by the pump. Any change in pump duty will affect motor speed. Without any power demand the motor may well increase its speed to a value beyond its best efficiency speed. It is, therefore, essential to control the speed within the maximum speed level of the pump. Failure to observe this could cause serious damage to the pump.

To ensure the correct spares are supplied we need to know the pump serial number which is stamped into the metal of the pump body, or cover, in a prominent position on the top area of the pump (not motor).

Make sure that the correct spares are to hand before starting work on the pump.  
Contact our works if you need assistance before starting the job.

Recommended spares (\*)

- |    |                     |    |                      |
|----|---------------------|----|----------------------|
| 1  | Back Cover          | 12 | Lantern Ring         |
| 2  | Bush – Back Cover * | 13 | OilSeal *            |
| 3  | Drive Shaft *       | 14 | Bearing Cover        |
| 4  | Driven Shaft *      | 15 | Bearing *            |
| 5  | Drive Rotor *       | 16 | OilSeal *            |
| 6  | Driven Rotor *      | 17 | Bearing Gasket *     |
| 7  | Gasket – Body *     | 18 | Pelton Wheel Housing |
| 8  | Body                | 19 | Sealing Washer       |
| 9  | Bush – Front Cover* | 20 | Water Inlet Nozzle   |
| 10 | Front Cover         | 21 | Pelton Wheel         |
| 11 | OilSeal *           |    |                      |



For bare shaft pump spares, please view the Installation, Operation & Maintenance manual for gear pumps.

- 1 No drive evident:
  - (a) ensure inlet supply present
  - (b) ensure inlet valve open
  - (C) make sure shaft is complete and not broken
  
- 2 Lack of power – check:
  - (a) differential water pressure in adequate
  - (b) that the nozzle is not partially blocked
  - (C) unit is correctly aligned and not distorted by pipe forces
  
- 3 Assembly noisy - check:
  - (a) bearings for wear
  - (b) bearings are tightened correctly
  - (C) water supply pressure is constant and not contaminated with debris
  - (d) alignment or pipe distortion
  
- 4 Excessive wear on nozzle and wheel - check:
  - (a) supply water is at correct pressure
  - (b) supply water is not contaminated with abrasive debris

For additional trouble shooting help, please view the Installation, Operation & Maintenance manual for gear pumps.