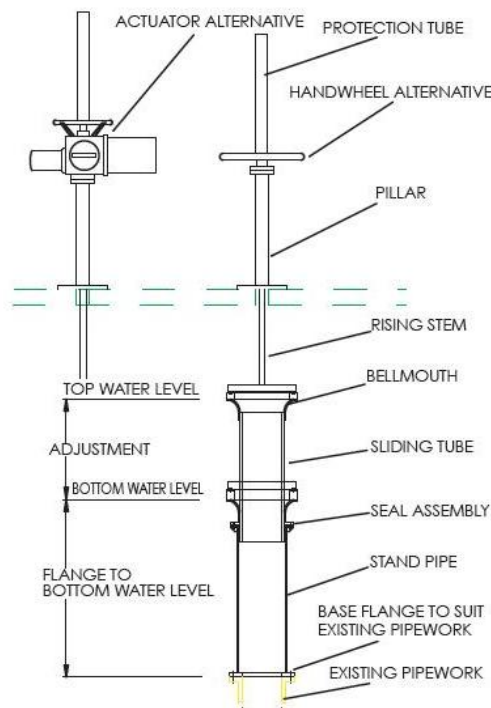


# INSTALLATION, OPERATION AND MAINTENANCE MANUAL



## HYDROSTATIC BELLMOUTH

# WATERFRONT

We are a Glasgow based company providing water engineering solutions in fluid control for both the UK and International markets.



Waterfront Engineering Services Ltd was formed in 1988 specialising in the installation and commissioning of Penstocks for Treatment Plants.

We offer a service to supply refurbish and install valves, penstocks and ancillary equipment.

We have extended our range to incorporate a wide range of products for controlling Water Flows. These products cover all types of valves, penstocks and ancillary products.

Waterfront Engineering Services LTD provides consistent high quality products and services.

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## INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS HYDROSTATIC BELLMOUTH VALVES

### INSTALLATION RECOMMENDATIONS

#### HANDLING AND STORAGE

If chains or slings are used for handling purposes, the body should be protected with cloth sacking or similar material.

#### **NEVER USE HOOKS UNLESS EYEBOLTS ARE FITTED**

Hydrostatic Valves should be stored in the horizontal position whenever possible.

#### INSTALLATION

The Installation of adjustable Hydrostatic valves is not difficult providing the following recommendations are followed.

1. CHECK the flange face of the pipe work, set in the civil works/structure, with an Engineer's spirit level. It is ESSENTIAL that the pipe flange is true and level before commencing installation.
2. Present the Hydrostatic standpipe assembly to the flange of the civil pipe work by lowering into position. Line up the bolt holes, to make sure that the gasket is correctly positioned, then insert the fixing bolts and tighten. The standpipe assembly MUST be vertical for the unit to operate efficiently.
3. If the unit has been dismantled, for any reason, the next stage is to insert the sliding Hydrostatic draw-off pipe into the fixed standpipe. Make sure that the ring seal/greasy hemp packing is installed around the uPVC sliding pipe and retained in the lower fixed standpipe. Approximately 2 to 4 strips will be required with joints being opposite each other. Pull the gland into position to compress the gland packing to create a seal, do not over compress. When installed operate the valve a few times and re-tighten the gland.
4. Lower the operating spindle into position and bolt the spindle on to the Hydrostatic valve lifting bridge.
5. Fit the key plate over the spindle and bolt the pillar base into position. This key prevents the spindle from rotating during operation. This key plate is positioned between the operating gear pillar/pedestal base plate and the floor, position the anchor bolts through the pedestal base plate and the key plate. DO NOT tighten fully until perfect alignment has been achieved. Where applicable, use grout under the pedestal base plate if the concrete is not perfectly flat.
6. Assemble the operator to the spindle. Operator could be hand wheel and yoke sleeve, gearbox, electric actuator, hydraulic or pneumatic. Finally where applicable fit the spindle protection tube.

### OPERATING AND MAINTENANCE HYDROSTATIC VALVES

The Hydrostatic should give years of trouble-free operation, providing the following simple instruction procedures are adopted.

#### OPERATING EQUIPMENT

1. Whenever possible, units are dispatched completely assembled with their operating gear. However, if units have to be dispatched in separate section, each section will be labelled with the Tag Reference Number.
2. Separate 'Installation, Operation and Maintenance Recommendations' are provided for the electric actuators (refer to manufactures own web sites:- Auma Actuators @ [www.auma.com](http://www.auma.com) and Rotork Actuators @ [www.rotork.com](http://www.rotork.com))
3. When required, coping brackets or guide brackets for extension spindles, or floor pillars for operating gear, should also be bolted and or grouted to the wall, coping floor or flooring, in the manner previously described for the type of anchor bolts specified. Refer to the appropriate Arrangement Drawing as necessary.
4. When fitting extension spindles on sludge valves, it is essential that the lower cylinder and the remote operating equipment, through the spindles, are in perfect vertical alignment.

### INSTALLATION RECOMMENDATIONS FOR MANUAL GEARBOXES

#### HANDLING

If chains or slings are used for handling purposes, the unit should be protected with cloth, sacking or similar material.

**NEVER USE HOOKS UNLESS EYEBOLTS ARE FITTED**

#### STORAGE

1. If gearboxes are supplied separately they should be stored in a clean, dry, warehouse. If supplied unpacked, the gearboxes should be stored on a shelf or wooden pallet. Other materials must not be stored on top of the gearboxes.
2. If gearboxes must be stored outside (because they are fitted direct on a penstock frame), they should be covered by a suitable waterproof sheet.
3. Input shafts should be rotated every three months to mix the lubricant.
4. Most standard gearboxes are weatherproof to IP67 after correct installation and are capable of operating within a temperature range of at least minus 20 degrees Centigrade to plus 70 degrees Centigrade.  
If gearboxes are required for submerged use in a liquid or, for use outside the quoted temperature range, they must be specifically ordered for that purpose. The installation of gearboxes is not difficult providing these recommendations are followed.
  1. CHECK that you have the correct gearbox with the correct ratio to fit the unit, which is being installed.
  2. CHECK that the gearbox is properly lubricated. Most gearboxes are factory lubricated 'for life' with grease. If the unit has been dismantled, the

base plate must be resealed, with a silicone sealant, or other gasket compound, on reassembly and any thrust elements or bearing cavities must be greased.

3. If the gearbox drive nut is supplied separately, on the spindle, care must be taken when fitting it into the gearbox to make sure that the thrust bearings are also fitted correctly.

4. If the gearbox has been supplied with a hand wheel it is recommended that this be fitted to the gearbox before trying to mount the unit; this will make it easier to rotate the gearing to pick up the start of the thread or key location.

5. On a KEYED NON-RISING SPINDLE, once the key and keyway are lined up, the gearbox can be rotated until a positive engagement occurs. Rotate the gearbox to the correct orientation and align fixings. Bolt gearbox to mounting flange.

NOTE: - With gearboxes designed to be thrust taking with non-rising stems, the drive sleeve will be fitted to the stem. Insert the stem through the bottom bearing set and the thrust plate and lower into position. You may have to screw the stem into the door nut or fit to muff coupling. Either way screw stem down to lightly grip and locate the lower bearing set (pre-greased) and plate. Position the top bearing set on to the drive sleeve (pre-greased) and lower the gearbox over the top, the gearbox will need rotating until it engages on the drive sleeve splines. Rotate the gearbox to the correct orientation and align fixings. On a SCREWED RISING SPINDLE, once the threaded nut and spindle are lined up, the gearbox can be rotated until a positive engagement occurs. Rotating the hand wheel will then screw the gearbox down the spindle and when in the correct position, the gearbox can be bolted down on to the mounting flange. With this arrangement the gearbox may well have the drive sleeve fitted, if not repeat as for non-rising for the assembly of drive sleeve, bearings (1 set either side of the drive sleeve collar/shoulder) to gearbox and screw onto stem. (Rarely used for the operation of hydrostatic valves)

6. On a SCREWED RISING SPINDLE, once the threaded nut and spindle are lined up, the gearbox can be rotated until a positive engagement occurs. Rotating the hand wheel will then screw the gearbox down the spindle and when in the correct position, the gearbox can be bolted down on to the mounting flange. With this arrangement the gearbox may well have the drive sleeve fitted, if not repeat as for non-rising for the assembly of drive sleeve, bearings (1 set either side of the drive sleeve collar/shoulder) to gearbox and screw onto stem.

7. Refer to Manufacturers Instruction Manual for Installation Procedure.

### HANDLING

If chains or slings are used for handling purposes, the unit should be protected with Cloth sacking or similar material. NEVER USE HOOKS UNLESS EYEBOLTS ARE FITTED. Combined units, i.e. Penstock with an electric Actuator fitted direct on the frame should NEVER be slung from the actuator.

### STORAGE

1. If electric actuators are supplied separately, they should be stored in a clean, dry warehouse. The internal heaters (if supplied) should be connected to the power supply. If necessary, a suitable desiccant can be placed in the switch compartment.
2. Plastic plugs or caps, fitted for transportation, should be replaced with metal pipe plugs or caps and all covers fastened tight.
3. Drive shafts should be rotated at least every three months to mix the lubricant.
4. If actuators must be stored outside (because they are fitted direct on a penstock frame), the penstock unit must be stored vertically, so that the actuator motor and switch compartment is horizontal and well off the ground. The actuator unit should be covered by a suitable waterproof sheet. Paragraphs 1, 2 and 3 above also apply.
5. Most standard actuators are weatherproof to at least IP67 BUT ONLY AFTER correct installation. They are usually capable of operating within a temperature range of at least minus 20oC to plus 70oC.

### INSTALLATION SEQUENCE

The installation sequence is not difficult providing these recommendations are followed:

1. READ these instructions AND the actuator manufacturers instruction book, which has either been supplied to you separately, or may be found attached to, or inside the switch compartment.
2. CHECK that you have the correct actuator to fit the unit which is being installed.
3. It is recommended that all the actuators be inspected for proper lubrication, in accordance with the manufacturer's instructions, before being operated, especially if they have been in storage for a long time.
4. If the actuator drive nut is supplied separately, on the spindle, care must be taken when fitting it into the actuator, to make sure that the thrust bearings are also fitted correctly.
5. With the DETACHABLE actuator thrust base and a KEYED NON-RISING spindle, when the key and keyway are lined up the thrust base can be lowered onto the mounting flange and bolted down. The actuator can then be easily

located onto the thrust base and bolted down.

6. With a DETACHABLE actuator thrust base and a SCREWED RISING spindle the thrust base must be rotated until a positive engagement occurs. The thrust base can be rotated down the spindle onto the mounting flange and bolted down.

7. With an INTEGRAL actuator thrust base and a KEYED NON-RISING spindle; the actuator must be supported during the engagement operation. Engage "HAND OPERATION" and offer up the actuator to the spindle, and then turn the hand wheel until the key and keyway are lined up. Finally, bolt down onto the mounting flange. (Rarely used for the operation of hydrostatic valves).

8. With an INTEGRAL actuator thrust base and a SCREWED RISING spindle; the actuator must be supported during the engagement operation. Engage "HAND OPERATION" and rotate until a positive engagement occurs. Rotating the hand wheel will then screw the actuator down the spindle, and when in the correct position, the actuator can be bolted down onto the mounting flange.

9. After the actuator has been fixed into position engage "HAND OPERATION" and check for freedom of movement and correct operation BEFORE connecting up all electrics.

10. The 'torque cut out switch', designed to protect the unit, is normally set by the actuator manufacturer based on information previously supplied. If adjustment is necessary, please refer the actuators manufacturers' instruction book.

11. The 'geared limit cut out switch', designed to protect the unit, is normally set by the penstock manufacturer in the factory, for actuators which are fitted direct on the frame. Actuators which are supplied separately will have to set on site after installation. Please refer to the manufacturer's instruction book.

### **COMMISSIONING**

1. BEFORE switching on power to the actuator, engage "HAND OPERATION" and move the penstock door well away from its end of travel position.

2. AFTER switching on power, check the results using the local open and close switches, and make sure that you have the correct rotation of the spindle. Finally check the cut-out switches by fully opening and closing the unit. Be prepared to stop the unit quickly, if it does not stop automatically at the end of travel position.

3. CHECK any remote operation of the unit to make sure that it is also correct.

### **HYDROSTATIC VALVE OPERATING EQUIPMENT - GEARBOX**



### OPERATION OF THE GEARBOX

Operation of the gearbox is simple and straightforward providing the installation recommendations have been carried out correctly.

1. For ease of operation, the input effort is usually limited to about 250N on the crank handle, hand wheel.
2. If the gearbox is stiff to operate, find out the cause. DO NOT apply any additional leverage to create a higher input torque, or you may damage the unit or the equipment it is operating.

### OPERATION RECOMMENDATIONS

#### OPERATING EQUIPMENT - ELECTRIC ACTUATORS

##### OPERATION

Operation of the electric actuator is simple and straightforward providing the installation and commissioning recommendations have been carried out correctly.

1. An electric actuator can be operated locally either manually or by power. Remote operation can be either by direct power connection or by a control signal.
2. Standard electric actuators are normally supplied fitted with a 15 minute rated motor, unless otherwise specified at the time of ordering.
3. If the actuator proves difficult, or fails to operate, check that there is a power supply and that it is at the correct voltage on a continuous basis. If the power supply is alright, check the individual local and/or remote control systems and the fuses on the internal circuit board and the "cut-out" switches. Finally, check that the motor has not overheated.
4. If there is no apparent electrical or "cut-out" fault, engage "hand operation" and check for freedom of movement. If there is free movement by manual operation, then there is still a fault in the power supply or in the actuator, and you should refer to the actuator manufacturer's instruction book.
5. If the unit is difficult to operate manually, refer to the manufacturer's recommendations for checking the unit which is being operated.

### HYDROSTATIC VALVES - MAINTENANCE OF GEARBOXES

The gearbox should give years of trouble-free operation providing the following simple inspection procedures are adopted.

THE FREQUENCY OF INSPECTION SHOULD BE BASED ON THE PARTICULAR REQUIREMENTS OF THE INSTALLATION.

1. Under normal operating conditions no maintenance is required other than to

keep the unit clean.

2. Check the tightness of all bolts and nuts.
3. If the equipment which is being operated is taken out of service for an overhaul, the gearbox base/thrust plate may be removed and the grease changed, using one of the recommended lubricants. The base/thrust plate must be sealed on re-assembly.
4. Refer to the gearbox manufacturers recommendations.

### LUBRICANTS

MANUFACTURER	NAME OF GREASE	COMMENT
Century Oils	Lacerta CL2X	Never mix one type of oil or grease with another.
Shell	Alvania EP1	As above.
Esso	Beacon EP2	As above.

### MAINTENANCE RECOMMENDATIONS OPERATING EQUIPMENT WITH ELECTRIC ACTUATORS

#### MAINTENANCE

The electric actuator should give years of trouble free operation, providing the following simple inspection procedures are adopted. THE FREQUENCY OF INSPECTION SHOULD BE BASED ON THE PARTICULAR REQUIREMENTS OF THE INSTALLATION/OPERATION.

1. Clean the actuator and CHECK for oil leaks. If oil leaks are present, take out of service, flush out, renew seals and refill with fresh oil to the actuator manufacturers recommendation. NEVER mix one type of oil or grease with another.
2. Check the tightness of all bolts and nuts.
3. If the actuator is normally only used very occasionally, a routine operation plan should be established.
4. Refer to the actuator manufacturers recommendations.
5. DO NOT CARRY OUT ANY MAINTENANCE WORK WITH THE POWER CONNECTED.

Whilst every care is taken that the information given herein is reliable Waterfront Engineering Services Ltd cannot accept responsibility for any damage resulting from the application of these recommendations intended for guidance only.

#### HYDROSTATIC VALVES - MAINTENANCE

THE FREQUENCY OF INSPECTION SHOULD BE BASED ON THE PARTICULAR REQUIREMENT OF THE INSTALLATION.

1. Clean the unit by hosing down to remove any grit or debris.

2. Check for leakages at the sliding joint.
3. Check also for leakage at all the joints of the fixed pipe work.
4. Check the tightness of all bolts and nuts.
5. Check the gland packing and replace if necessary, then re-fit the retaining ring and bolt into position.
6. Ensure that the spindle threads are free from debris.
7. Check the operating gear for correct alignment, freedom of movement, correct function, and there are no damaged or worn parts.
8. The screwed operating nut should be checked frequently to ensure that there is no excessive wear caused by foreign matter being carried up the spindle.
9. When carrying out any maintenance work with the Hydrostatic in the top position, ALWAYS ENSURE that the sliding Hydrostatic draw-off pipe is securely, and independently, supported from beneath.
10. Always check the actuator and gearboxes for any abnormal noises during operation, damage, or oil leaks.

### **INSPECTION**

A thorough inspection should be carried out every six (6) months. The gland seal between the cylinder and the tube is effected by greasy hemp, manufactured by James Walker & Company Limited. The packing will harden over a period of time and must be replaced completely.

### **LUBRICATION**

Lubricate all sliding and rotating surfaces with BP Energrease LZIM or equivalent.

### **GLAND PACKING**

When re-packing, the ring joints should be staggered so that they are not all on the same side, in order to avoid a particular source of leakage. When tightening the gland nuts, care should be taken to ensure even pressure is used on the packing to maintain alignment of the gland.

### **HEALTH AND SAFETY - SAFE OPERATION**

The equipment supplied by Waterfront Engineering Services Ltd has been designed to ensure safe operation when the equipment is used for the purpose for which it is intended.

To ensure safety in operation these Instructions should be read by those who will operate and maintain the equipment.

Good maintenance practice should be followed and only the appropriate packing and lubricants should be used.

When equipment is repaired, spare parts should be correctly fitted and the

equipment tested before being returned to normal operation. Advice on the use and operation of the equipment supplied is given in this Manual, and further assistance is readily available from our Engineering Department.

This information complies with the requirements of the British Management of Health and Safety at Work Regulations 1992, and the 'Provision and Use of Work Equipment' Regulations 1992.