

D75 BODY UNIT OPERATOR'S MANUAL



Original Instruction

Part No.	Description
7596092000	D75 Body Unit 2000 RPM. Delivery flange rotated 90°.
7596092100	D75 Body Unit 2000 RPM. Delivery flange

SELWOOD
www.selwood.co.uk

Table of Contents

1	Contact Details	2	12.6.2	Suction Line.....	21
2	Amendment Record	2	12.6.3	Strainer.....	22
3	Associated Documentation	2	12.7	Understanding the Pump's Curve.....	23
4	Glossary	3	12.7.1	Pump's Curve, Efficiency and BEP.....	23
5	Ordering Spares	3	12.8	Operating away from BEP.....	23
5.1	Body Unit Service Tool Kits.....	3	12.8.1	The Correct Pump for the System.....	24
5.2	Spares Kits.....	3	12.8.2	NPSH Explained.....	25
6	Introduction	4	13	Body Unit Pre-operation	26
6.1	Upon Receipt.....	4	14	Checks Whilst Operating	27
6.2	Scope.....	4	14.2	Blockages.....	28
6.3	Disclaimer.....	4	14.3	Running Dry.....	29
6.4	Conditions of Warranty.....	4	15	Periodic Maintenance	30
6.5	Conformity.....	4	15.1	Serviceable Components.....	32
6.6	Environmental Conformity.....	4	15.2	Fastening Torques.....	33
6.6.1	Spillages.....	4	16	Trouble Shooting	34
6.7	Intended Use.....	5	16.1	Internal Component Recognition.....	34
6.8	Foreseeable Misuse.....	5	16.2	Performance Drop.....	34
6.9	Manual Symbols.....	6	16.3	Air Handling Performance & Lubricant Leaks or Contamination.....	35
7	Health & Safety	7	17	End of Life	37
7.1	Health & Safety at Work Act 1974.....	7	18	Vacuum Test	38
7.2	Viton Material.....	7	19	Major Servicing	39
7.3	California (USA) Proposition 65 Warning Act.....	7	19.1	Servicing Prerequisites.....	39
7.4	Workstation.....	7	19.2	Air Pump Assembly.....	40
7.5	Personal Protective Equipment (PPE).....	8	19.2.1	Air Pump Suction Valve.....	40
8	Pump Components	9	19.2.2	Air Pump Discharge Valve.....	43
8.1	Component overview.....	9	19.2.3	Neck Seal.....	44
8.2	Separator System.....	10	19.2.4	Air Pump Drive Rod Assy & Bearing.....	45
8.3	Unique Selprime System.....	10	19.2.5	Refitment of Air Pump.....	48
8.4	Non-return Valve (NRV).....	11	19.3	Volute Removal & Refitting.....	50
8.5	Body Unit Label.....	11	19.3.1	Removal.....	50
9	Performance	11	19.3.2	Refitting of the Volute.....	51
10	Draining Body Unit Compartments	12	19.4	Wear Plates.....	52
10.1	Draining the Body Unit of Worked Fluid.....	12	19.4.1	Rear Wear Plate.....	52
10.2	Draining the Body Unit of Oils.....	12	19.4.2	Fron Wear Plate.....	54
11	Lifting/Storage/Transportation	13	19.5	Impeller & Mechanical Seal.....	55
11.1	Lifting.....	13	19.5.1	Removal.....	55
11.1.1	Pump Dimensions.....	13	19.5.2	Fitment.....	56
11.1.2	Recommended Lifting Technique.....	14	19.6	Impeller End Lip Seals.....	59
11.2	Upon Receipt of the Body Unit.....	15	19.6.1	Remove of Lip seals.....	59
11.3	Storage.....	15	19.7	Separator Assembly.....	61
11.4	Shelf Life.....	16	19.7.1	Float.....	61
12	Installation and Commissioning	17	19.7.2	Peel Valve.....	63
12.1	Pump Lubrication.....	17	19.8	Delivery Valve Assembly.....	67
12.2	Commissioning Period.....	17	20	Assembly Tools	68
12.3	Post Commissioning Period.....	17	20.1	Tooling.....	68
12.4	Installation Example.....	18	21	Declaration of Incorporation	69
12.5	Maximum Allowable Flange Loads.....	20	22	Notes	70
12.6	Pipelines.....	21			
12.6.1	Pipeline Installation.....	21			

4 Glossary

Term	Description
MSDS	Material safety data sheet
BU	Body unit
PPE	Personal protective equipment
NRV	Non-return valve
Running dry	The pump is running with no fluid moving through.
Head	The height in meters the unit will pump from the delivery valve when pumping clean water.
NPSH	Net positive suction head is a measurement of pressure in head on the suction side of the pump, less the vapour pressure. This measurement is taken at the centre line of the impeller.
RPM	Rotations per minute
dB	Decibel – a relative unit of measurement for sound.
SWL	Safe working load
ATEX	Atmospheres explosive: the risk of combustible gases within the ambient air.
Cavitation	A phenomenon where vapour bubbles form in a liquid when the pressure drops. Once the pressure increases again, the bubbles collapse sending shock waves that may damage the machinery or its components.
Driver	A power source that rotates the body unit shaft via a coupling. Internal combustion engines or electrically powered motors are the most common.
C of G	Centre of gravity: this is a hypothetical centre point in a body of matter that dictates the behaviour of the object, when acted upon by gravity.
IC engine	Internal combustion engine
NEMA	National Electrical Manufacturers Association
IEC	International Electro-technical Commission
Nominal pressure (PN)	This specifies the maximum pressure a flange can withstand at a reference temperature of 20°C.
RPM	Revolutions per minute – the number of times the drive shaft completes a full revolution within a minute.

5 Ordering Spares

Only the manufacturer's or factory approved parts should be used when servicing the pump. It is advisable to hold a small stock of spare parts to cover breakdown circumstance, these can be viewed in the body unit's parts list and purchased from Selwood's sales team:

Telephone: +44 (0) 2380 250137

Enquiries: PumpSalesOffice@Selwood.co.uk

When ordering spare parts:

1. Always quote the pump serial number or machine serial number located on the plate fastened to the pump.
2. Always quote the ten-digit part number for the component, not the item reference number.
3. Always quote the description of the component.

5.1 Body Unit Service Tool Kits

For correct fitment of serviceable components, it is recommended to use special service tools. See servicing sections for correct application of the tools and section 19.2 for a complete list.

5.2 Spares Kits

Visit the body unit's parts list for spares kits that contain the necessary parts when performing a body of work.

6 Introduction

Selwood has a full product range for all applications, including solids handling, high volume drainers, high head, hydraulic submersible, chopper and positive displacement pumps. Please visit our website for a full range of products.

Selwood products are extremely robust and reliable. Pumps are manufactured with quality, longevity and reliability in mind to meet the needs of the most challenging environments. Accessible, removable and replaceable parts allow easy maintenance, resulting in a longer life of the pump.

6.1 Upon Receipt

All Selwood products undergo a strict inspection process before leaving the workshop. Upon receipt of your product, fully inspect the condition to ensure there has been no damage in transit.

6.2 Scope

This manual is for installing and maintaining Selwood's D75 body unit only. This manual is written for units received without a power source, which typically would be an IC (internal combustion) engine or an electrical motor.

Procedures within this manual and associated literature must be carried out by a competent and trained person only. Read and fully understand this manual before commencing the work.

6.3 Disclaimer

Although every effort has been put into the creation of this publication, Selwood cannot be held liable for any injuries consequential of errors in this publication; Selwood's manufactured products and associated parts are of a hazardous nature.

This manual was originally written in English and should be referred to as the original source of information in the event of any discrepancies between the original instruction and translated copies. Selwood reserves the right to alter specifications and information given in this manual without prior notice.

The products of Selwood are designed, developed and produced in Selwood's Chandler's Ford facility. Many features are covered by world-wide patents.

6.4 Conditions of Warranty

Selwood pumps are built for the rigours of rental and world-renowned for their quality, robustness and longevity. Breakdowns are rare but if things do go wrong, we are committed to putting them right as quickly and efficiently as possible.

If there are any issues regarding the pump's warranty, refer to the website to complete a warranty form.

6.5 Conformity

This partly completed machinery must not be put into service until the final machinery or installation into which it is to be incorporated has been declared in conformity with the provisions of Directive 2006/42/EC, where appropriate.

6.6 Environmental Conformity

Oils, fuels and liquids captive to Selwood pumps may be hazardous to the environment and must be contained and disposed of according to local laws. Failure to comply can incur substantial financial penalties, it is good practice to:

- Place the pump on a drip tray to further protect against fluids escaping the pump.
- Constantly maintain all equipment and rectify any leaks immediately.

6.6.1 Spillages

Should a spillage occur, use absorbent material to clear the spillage as quickly as possible. Ideally use a dedicated spillage kit to retain and remove such a spillage. Do not hose the area down or use any detergents and do not allow the spilled liquid to enter drainage or water systems. Spillages must be reported to the local authorities. Dispose of all absorbent materials in accordance with local laws.

6.7 Intended Use

These highly efficient Selprime pumps are easy to couple, maintain and are highly robust. Perfect for use within the following applications:

- Clean water with fine solids
- Screened sewage

Only operate the pump outdoors - modifying exhaust extraction for indoor use is not permitted.

The unit will be expected to operate continuously but be subject to general checks and maintenance as defined within this manual.

6.8 Foreseeable Misuse

- This pump is not suitable for explosive environments (ATEX) where fuels can be found in the ambient air. If our pumps are used in explosive environments without the correct measures, the engine could overspeed or cause an explosive hazard. However, parts are available as an option to minimise the risk of overspeed, including engine overspeed shutdown valves and spark arrestors. Please contact your Selwood representative.
- Only deploy the pump on fluids within the pump's capabilities. The pump's specifications are listed within the data sheets, located on our website.
- Running the pump off curve can cause cavitation, bearing damage or recirculation of the flow. All of these affect the pump's efficiency and may lead to a premature breakdown.
- Adhere to local environmental law when dealing with any liquid captive to the pump. Check the type of liquid that the pump has been employed on before commencing the work, residues could be hazardous to health. If in doubt, flush thoroughly with clean water before operation. Pumps deployed on sewage must be thoroughly cleaned and sterilised after use.
- Never run the pump against a closed valve, this does not include the body unit non-return valve (NRV).
- Working with liquids exceeding 40 °C in temperature is not recommended as this may shorten the life of internal components.
- Liquid pressure may still be present even after shutdown of the pump. Attention should be paid to delivery lines that are long or rise through any height, as these can contain large volumes of liquid. These lines must be isolated and drained down before commencing work. Sudden release of this liquid can cause serious injury to the operator; either directly or indirectly through the rotational motion it can induce.
- Never insert anything into a running pump while the suction or delivery lines are disconnected.
- Before starting any work, ensure the body unit is isolated from the electrical power supply either by the isolator switch or, by disconnecting the pump at the battery and placing a sign in clear view: 'DO NOT SWITCH ON, MAINTENANCE IN PROGRESS!'. Selwood pumps have auto start facilities and may receive a start signal at any time.
- Operators must be skilled, competent and familiar with the product before use.

6.9 Manual Symbols

	Comply with literature.		Warning: hot surface with risk of burns.
	Relevant information.		Warning: heavy loads. This symbol draws attention to items or work which carry higher risks of injury from lifting. Adhere to local legislation involving lifting in these instances.
	Warning: personal injury.		Warning: explosive potential.
	Warning: toxic exhaust gases.		Warning: environmental damage.
	Warning: flammable substances.		Warning: corrosive substances.
	Warning: risks from electricity that may result in shock, burns or death.		Warning: To proceed with any work, the pump must be disconnected from the power supply. If an isolator switch is in use, this must be locked in the closed position.

7 Health & Safety

DANGER	
	Non-compliance with this section could result in injury or loss of life.

It is the responsibility of the employer to ensure correct PPE and safe working procedures are in place. Full PPE is always recommended, and steel toe cap boots, eye protection (safety glasses), coveralls & high visibility vests are essential. Certain tasks throughout this manual will reiterate additional items of PPE by attaching symbols within Table 2.

7.1 Health & Safety at Work Act 1974

As manufacturers of pumps and associated equipment we wish to inform you that in compliance with section 6 of the Health and Safety Act 1974, safety precautions should be taken when using our products.

Our aim is to ensure our products are safe and without risk to health when correctly used. Nevertheless, appropriate health and safety precautions must be taken, and you are requested to have special regard to the operational and safety requirements.

7.2 Viton Material

Components of this product may be fitted with seals or 'O'-rings that are manufactured from Viton (synthetic rubber and fluoropolymer elastomer) or similar materials.

Temperatures exceeding 400°C (720°F) produce a corrosive acid that cannot be removed from the skin. If signs of material decomposition are evident, or if in doubt, wear chemical resistant gloves.

7.3 California (USA) Proposition 65 Warning Act

Diesel engine exhausts and some of its constituents are known in the state of California to cause cancer, birth defects and other reproductive harms.

7.4 Workstation

Where possible, carry out maintenance and servicing work in a clean workshop that considers all local safe working procedure and local legislations. When work is to be carried out on site, it is essential that all onsite risk assessments are filled out, and work is carried out in a clean and safe space.

7.5 Personal Protective Equipment (PPE)

	<p><u>Ear Defence</u></p> <p>Noise level at operator position is over 80 decibels when running, always wear ear defence within the vicinity of running pumps. Failure to comply could result in hearing damage or loss. Ear defence must be worn when operating powered tools.</p>		<p><u>High Visibility Vest</u></p> <p>Working around large machinery, vehicles and moving plant can lead to crush and traffic related injuries when people make unintended contact with vehicles. High visibility clothing improves visibility of pedestrians and is essential.</p>
	<p><u>Safety Footwear</u></p> <p>Dropped objects including tools can cause impact injuries, especially to feet and toes. Working in certain environments also introduces slip and fall risks. Slip resistant safety footwear with steel toe caps is essential.</p>		<p><u>Respiratory Protective Equipment (RPE)</u></p> <p>Diesel exhaust fumes are hazardous to health and can cause harm to the respiratory system. Wear RPE when in contact with diesel exhausts, paints, solvents and other COSHH items that contain hazardous air born chemicals detrimental to human health.</p>
	<p><u>Thick Disposable Gloves</u></p> <p>Protection against cuts, skin irritations, dermatitis and toxic or corrosive substances captive to Selwood pumps and substances hazardous to health.</p>		<p><u>Protective Clothing</u></p> <p>Full body protection from skin irritations, dermatitis, and toxic or corrosive substances. Ensure that coveralls are clean before use.</p>
	<p><u>Safety Glasses</u></p> <p>Eyes must be protected from debris, dust, smoke and corrosive chemicals.</p>		<p><u>Head Protection</u></p> <p>To protect the head from falling objects or striking against fixed objects.</p>

Table 2: Health and safety symbols.

8 Pump Components

8.1 Component overview

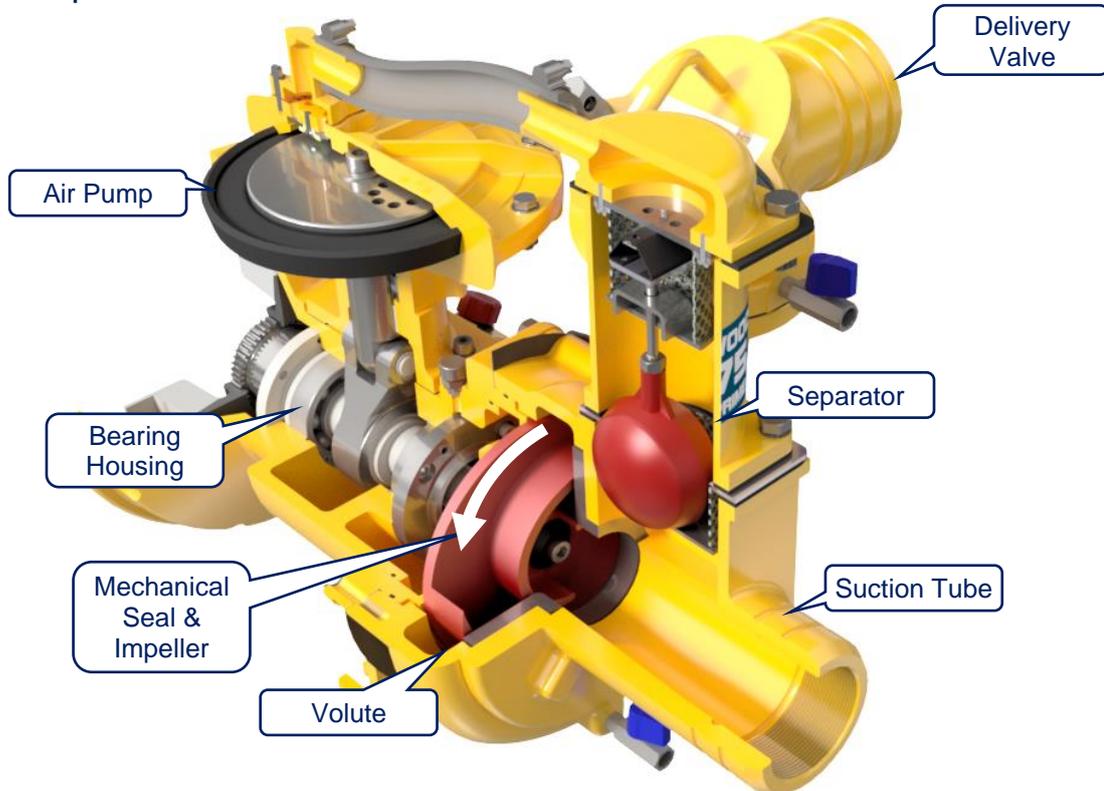


Figure 1: Body unit components. Direction of Rotation (DoR) indicated by white arrow.

Component	Description
Shaft end	The location where the driver is connected via a coupling; the coupling used is dependent on the application and can be found in the pump's parts list, if applicable. Contact Selwood for further assistance.
Mechanical seal	An almost perfect seal between the worked liquid and pump oils that allows a rotating component and stationary component to operate together without overheating.
Impeller	Selwood's D75 body units utilise the semi-open impeller which allows small solids to pass freely between the curved vanes, whilst offering high efficiency capable of producing high heads and flow.
Volute	The volute houses the impeller and assists with the flow of the liquid which is expelled through the casing's nozzle.
Separator	This controls the amount of air to liquid ratio within the pump and is explained later in this chapter.
Delivery valve	Within is an NRV (non-return valve) in the form of a weighted flap or mechanical hinge, this is detailed later in this chapter.
Air pump	Driven by the main pump shaft via a reciprocating drive rod, its task is to draw air from the suction tube. This is detailed later within this chapter.
Suction tube	An intermediate component allowing the fitment of the separator and the connection of the pipework.
Bearing housing	As the name suggests, a housing to support the bearings, flushing chamber and associated components, providing protection and a means to lubricate.

Table 3: Components relating to Figure 1

8.2 Separator System

Step	Stage	Image
1	The air pump drawers air from the suction tube (white arrows).	
2	The worked fluid displaces the removed air.	
3	Rising water pushes the ball into the seat.	
4	The ball is attached to a peel valve via a connecting rod, which stops worked fluid from passing the air pump (carryover). The pump is now primed.	

8.3 Unique Selprime System

Step	Stage	Image
1	Rotary motion from the engine/motor drives the body unit main shaft.	
2	Rotary motion is transformed to reciprocating motion via the main shaft's eccentric and air pump connecting rod.	
3	The actuator piston moves up and down within the casting. A rubber seal encased in the casting and secured to the actuator peripherals creates the differences in pressure (with assistance from 3 inlet/outlet valves) needed to remove air from the suction chamber.	

8.4 Non-return Valve (NRV)

The NRV can be found within the delivery chamber, although designs may slightly vary throughout the range, the principles are the same. Suction lift can be affected by a dis-functional NRV, see servicing sections in this manual to address.

Step	Stage	Image
1	Once the driver is running and the volute is primed, liquid pressure builds.	
2	The rise in pressure within the volute causes the NRV to open.	
3	Throughout operation the NRV will stay open, providing the suction tube strainer is fully submerged and there is no loss of liquid pressure.	
4	Once the driver ceases to run, liquid pressure will decrease and the NRV will close, stopping the worked liquid within the pipework returning to the suction side.	

8.5 Body Unit Label

Each body unit is clearly identified with a body unit label such as that depicted below. The location of the label may vary depending on the body unit variant.

SELWOOD Chandlers Ford, SO53 3ZL
Tel: +44 (0) 2380 266311

P/N:

YEAR: S/N:

MAX PRESSURE: bar MAX RPM:

Term	Description
P/N	The top level 10-digit part number of the pump variant.
S/N	A unique number specific to each pump.
Year	The year of manufacture.
MAX RPM	The maximum running speed of the pump; this must not be exceeded.
Max pressure	The maximum pressure of the delivery in bar.

9 Performance

Specification	Value
Max speed	2000 rpm
Max head	23 m
self-priming lift	8.8 m
Max pressure	See body unit label
Max flow	See body unit label
Suction connection type	Solid spigot with 2.5 inch thread
Discharge connection type	Solid spigot with 2.5 inch thread
Max solid capacity	16 mm



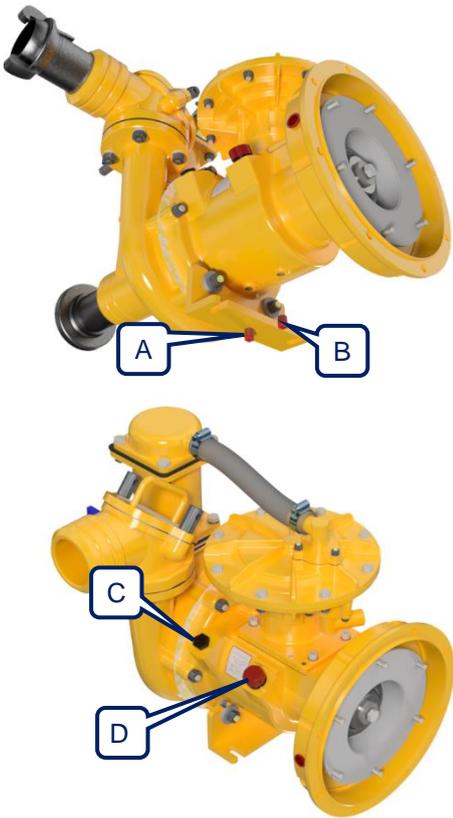
10 Draining Body Unit Compartments

CAUTION	
	Liquids captive to the pump can be damaging to the environment and must be disposed of in accordance with local law. Drip trays are always recommended when operating & maintaining Selwood pumps.
	Failure to drain the body unit and delivery pipework in freezing conditions could result in damage to the pump's casting.

10.1 Draining the Body Unit of Worked Fluid

Step	Action	Image
1	Stop and isolate the body unit from its power supply.	
2	Shut off the delivery and suction lines as close to the body unit as possible.	
3	Use a container to capture the escaping fluids from all the drain points.	
4	Release all drain valves to evacuate work liquid.	
5	Close all drain taps once the pump is drained.	

10.2 Draining the Body Unit of Oils

Step	Action	Image
1	Place a suitable container in position under the respective drain plug (A, flushing chamber. B, bearing housing).	
2	Remove respective chamber filler cap (C, flushing chamber. D, bearing housing), failure to do this may create an air lock and stop the oil from draining.	
3	Remove drain plug (A/B) respectively and allow the oil to drain.	
4	Closely inspect the oils for contamination or miscolouring which may indicate faulty components, please see troubleshooting sections for further assistance. It may be necessary to flush the chambers to remove all debris.	
5	Once ready to refit drain plug, clean and apply 'Loctite 572' or equivalent (pipe sealer).	

11 Lifting/Storage/Transportation

11.1 Lifting

CAUTION	
	Do not compromise safety when performing any manual lifting task. Selwood pumps are designed so that manual lifting is to a minimum. However, where necessary, reference local legislation and guidance. Any parts or assemblies with a notable mass are stated within the servicing sections of this manual.
	When lifting any Selwood products, refer to local legislation and guidance. If in doubt, contact Selwood or a local lifting specialist. All lifting equipment including forklifts must be fully serviced and inspected in accordance with local legislation.

11.1.1 Pump Dimensions

Note that dimensions are approximate. View the supplied installation drawing for exact dimensions.

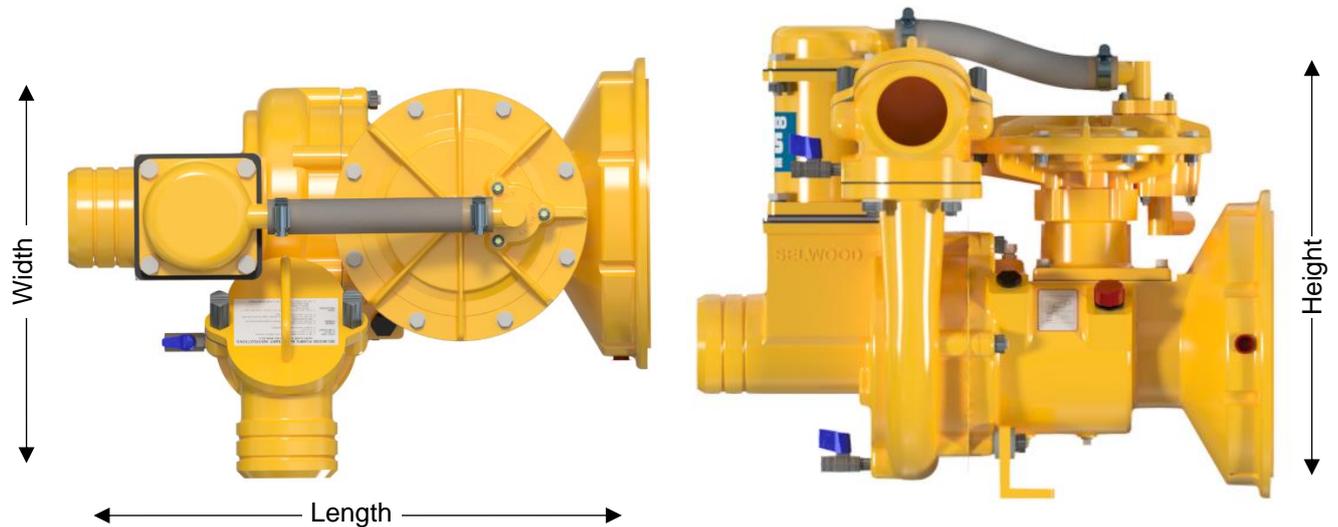


Figure 2: Left, body unit top view and dimensions. Right, body unit side view and dimensions.

Length (mm)	Width (mm)	Height (mm)	Mass (Kg) - no oil
571	358	490	84

11.1.2 Recommended Lifting Technique

CAUTION	
	<p>Adhere to following guidelines when lifting the body unit:</p> <ul style="list-style-type: none">▪ Never in any circumstances allow personnel under suspended loads.▪ Ensure that lifting equipment can lift the gross weight of the pump.▪ Ensure all lifting equipment has been inspected and is compliant with local legislation.▪ Visually inspect lifting equipment for deformed material, corrosion, scoring & cracks. Check components such as rivets, springs and latches are intact and functioning correctly. If equipment is found to be defect, do not proceed with lift.▪ Ensure the correct PPE is worn in accordance with workshop/on-site regulations.▪ Pay attention to dimensions such as height, width, length, mass and C of G found within the pump's installation drawing.

Adhere to the following instructions when using strops to lift the body unit:

1. Three strops are required: two of equal length and one of sufficient length to secure the delivery valve neck.
2. Ensure lifting strops and corresponding body unit surfaces are dry so friction is increased.
3. Secure strops as seen in below image. Strop securing delivery valve neck must be taut to stop the unit rotating.
4. Before committing to the lift, raise the unit slightly to ensure a level lift. If uneven, lower the unit and adjust strops. Repeat until the unit lifts level.

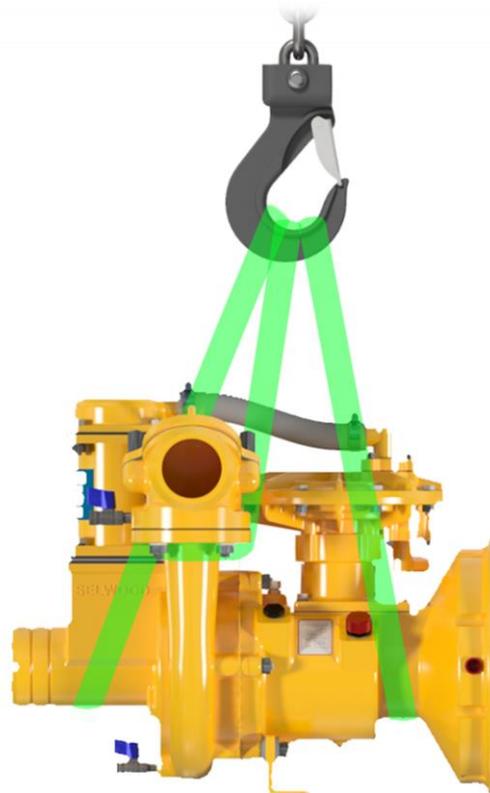


Figure 3: Strop positions when lifting the body unit.

11.2 Upon Receipt of the Body Unit

Although great care is taken to ensure the quality of our product, it is advisable to check the following upon receipt.

- Check the body unit for any obvious physical damage to the castings and components.
- Check all pipework between the air pump and separator is present and secure.
- Check the delivery valve operates and correctly seats.
- Check the oil levels as seen in section 13.
- Follow section 0 to rotate the shaft, it is normal that the shaft is harder to rotate in certain positions due to the eccentric.

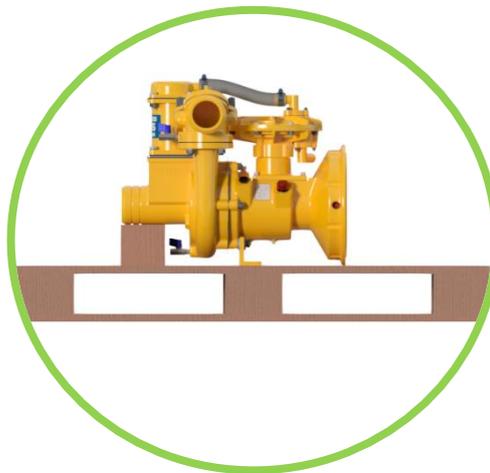
11.3 Storage

When storing the body unit, adhere to the following:

- Temperatures must be above -10°C and below +40°C. The relative humidity must be below 60%.
- Do not store outside.
- Protect the pump from mechanical shocks and vibrations, as this can cause brinelling (the permanent indentation of a hard surface) to the components such as bearings. This may also cause damage to seal faces.
- Suction and discharge must be sealed to prevent dirt, debris and moisture build-ups. The body unit is supplied with protective caps.
- Bare shaft ends and any bare metal surfaces must be coated with an anti-corrosion treatment.
- Secure shaft keys in place with a grip tie or similar.



- To stop the build-up of dust and dirt, use a dust sheet. Do not use plastic coverings as this will create a build-up of moisture underneath. If shrink wrap is used, cut holes to ventilate the product.
- Do not store the unit on concrete flooring or directly on the ground, it must be stored on a wooden frame or pallet, bolted in position with holes in the body unit feet and supported under the suction tube where necessary to prevent the unit toppling over.



11.4 Shelf Life

MUST READ



The body unit has a recommended storage limitation of two years before a service is necessary, this is due to the internal parts life expectancy.

It is good practice to rotate the body unit's drive shaft 4 ½ turns every two weeks to stop the seizure of internal components. Proceed as follows:

1. Assemble a nut and bolt as specified in the below table (the amount of thread revealed must be a minimum of the bolts diameter).
2. Coat the bolt threads with an anti-seize paste.
3. Tighten the bolt to the shaft thread until the nut bottoms out, then tighten the nut.
4. Rotate the shaft at least four and a half revolutions, ensure the shaft rests in a different position.
5. Loosen the nut and remove the bolt.



Body unit	Bolt size
D75	M10 X 1.5 - 6H



Figure 4: Left, shaft rotation. Right, nut attached to bolt with correct amount of thread revealed.

12 Installation and Commissioning

CAUTION	
	Before commissioning the body unit for operation, completely read, understand and adhere to section 6.7: 'Foreseeable Misuse'.
	If there is a risk of accidental contact by the operator, the exhaust system should be lagged or screeded and the outlet directed away from the operator or nearby personnel. Engines should not be run in hazardous explosive environments. All rotating parts that cause a hazard to the operator or personnel must be guarded in accordance with local legislation.
	The body unit is not supplied with control systems, electrical connections or an emergency stop, this is the responsibility of the manufacturer when building the complete pumping unit in accordance with local legislation. Note that it is essential It is essential that earth terminals are connected to an earth point and care should be taken to ensure that the correct sized conductors are selected to suit the current and distance to be carried.
	Noise emissions when this unit is installed to the driver: <ul style="list-style-type: none"> ▪ The A-weighted emission sound pressure level, where this exceeds 70dB(A) at workstation. ▪ The peak C weighted instantaneous sound pressure value, where this exceeds 63 Pa (130 dB in relation to 20 µPa) at workstation. ▪ The A-weighted sound power level emitted by the machinery, where the A-weighted emission sound pressure level at workstation exceeds 80 dB(A). When these noise levels are required, the uncertainties surrounding these values shall be specified.
	The body unit does not require any utility e.g., electrical/water supplies. When selecting a power source for the body unit, for example, an IC engine or electric motor, refer to the body unit data sheet on the Selwood website and installation drawing supplied with the pump. For further instruction, please contact your Selwood representative.

12.1 Pump Lubrication

It is most important to maintain the correct levels of oil in the flushing chamber and bearing housing (see section 13 for correct oil level), and to ensure that the oil is of the recommended quality and free from contamination. Selwood recommend the use of the following products, which should be applied as per the following table. In some territories, the following grades may be known under different trade names, please contact Selwood if problems occur in identifying the correct product.

Component	Lubricant
Bearing housing	15W-40 oil
Flushing chamber	15W-40 oil
Actuator bore	Morris EP K2 grease
Impeller bore	Morris EP K2 grease
Paper gaskets	Morris EP K2 grease

Table 4: Body Unit lubrication.

12.2 Commissioning Period

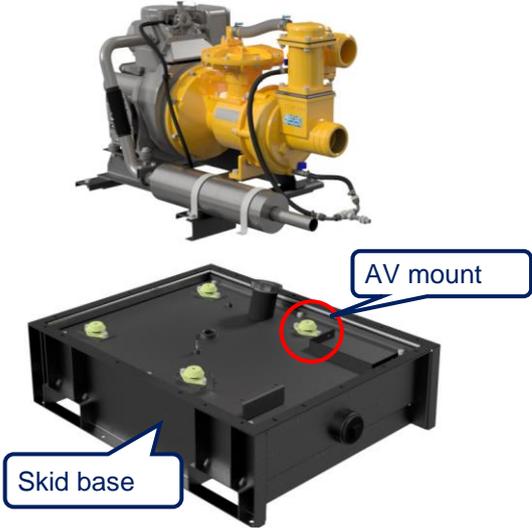
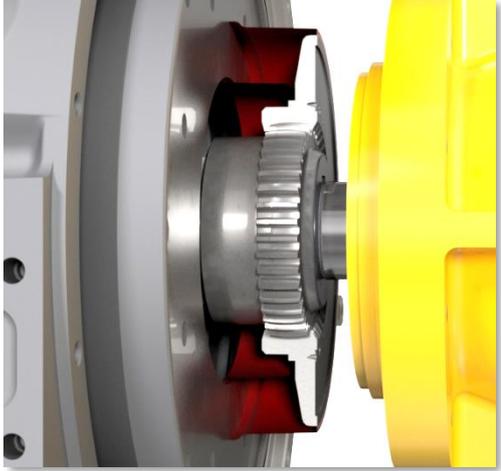
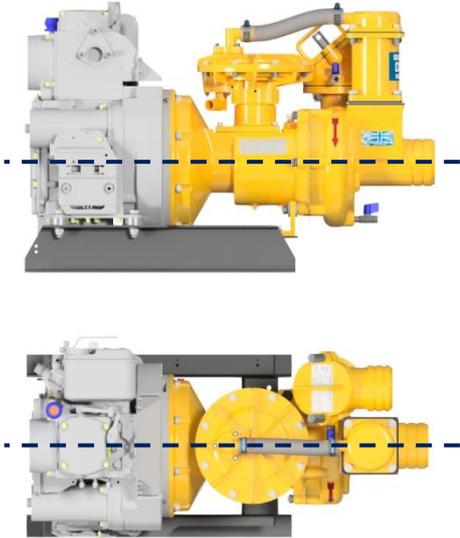
Drain both pump chambers within 100 running hours of commissioning either a new or rebuilt pump and refill with new oil. For the engine sump, refer to handbook.

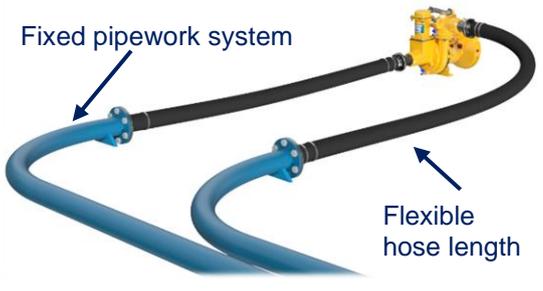
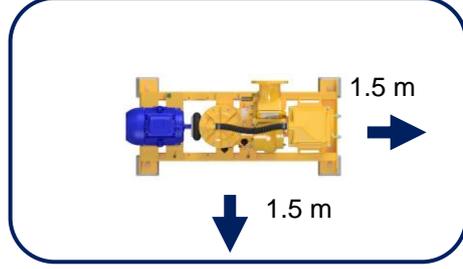
12.3 Post Commissioning Period

If the pump is driven by a diesel engine, the oil in both pump chambers should be drained and renewed simultaneously with the time schedule laid down by the engine manufacturer. This will usually require the oil to be drained and replaced every 250 running hours. Under no circumstances should the period for the body unit exceed 500 running hours without oil being replaced in both chambers.

12.4 Installation Example

If the body unit has been purchased as a single item, this section details some of the necessary installation requirements when coupled with a motor/engine.

Step	Action	Image
1	<p>The skid base is a standard part for supporting the pump's components, as well as absorbing and dissipating vibrations & forces to the ground. The base is necessary for securing the unit components in position once aligned. Place the base to firm level ground capable of supporting the weight. Use anti-vibration (AV) mounts where appropriate, these are required when coupling the pump to an IC engine.</p>	
2	<p>When installing a diesel engine, a flywheel mounted coupling can be used. The coupling must be selected with consideration to the engine & body unit torque, speed and torsional vibrations.</p> <p> Couplings are selected for their performance qualities unique to the pump in hand, these are not interchangeable between variants of pumps. Doing so, will drastically shorten the life of the pump.</p>	
3	<p>Both the body unit and driver must be aligned on two planes and rigidly mounted onto a chassis, failure to do this will shorten the life of the coupling. Refer to the fitment instructions supplied with the selected coupling for further information.</p>	

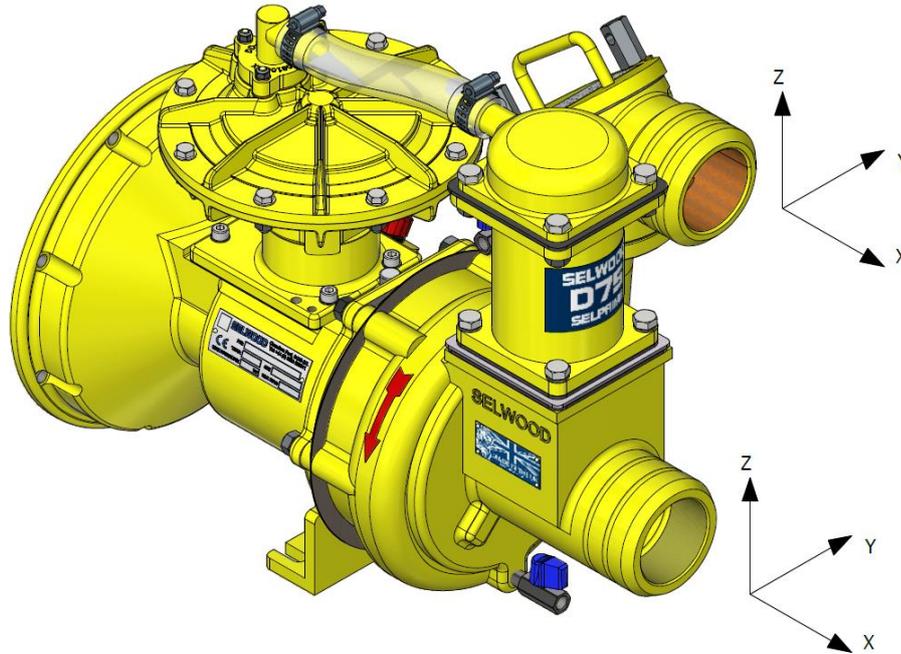
Step	Action	Image
4	When installing the body unit to a rigid pipework system, at least 2m of flexible armoured pipe should be used on both suction and delivery connections.	 <p>The diagram illustrates the connection of a yellow pump unit to a blue fixed pipework system. Two flexible hoses are used for the suction and delivery connections. Labels with arrows point to the 'Fixed pipework system' and the 'Flexible hose length'.</p>
5	A space requirement of 1.5 m surrounding the unit for operation and maintenance is recommended.	 <p>The diagram shows a yellow pump unit with a blue motor. Two arrows indicate a recommended clearance of 1.5 m: one pointing horizontally to the right and one pointing vertically downwards.</p>

12.5 Maximum Allowable Flange Loads

This section is written in accordance with Annex B, BS ES ISO 5199: 2002, Technical specifications for centrifugal pumps – Class 2.

The values given within this section are for pumps with baseplates for standard construction and installation.

Excessive forces and moments acting on the pipe flanges can cause misalignment of the body unit and driver shafts, stress upon the body unit's castings and wear of securing fixings between the base and body unit.



Maximum permissible forces on delivery spigot.		
Axis	Force (N)	Moment (Nm)
X	425	215
Y	425	215
Z	425	215
Minimum permissible forces on suction spigot.		
Axis	Force (N)	Moment (Nm)
X	425	215
Y	425	215
Z	425	215

12.6 Pipelines

12.6.1 Pipeline Installation

When installing pipelines in general, ensure that:

- Pipes are drained before lifting and where practical, mechanical lifting aids are used to minimise manual handling risks.
- Delivery hose and any associated pipe work should be capable of withstanding the maximum system operating pressure. Selwood recommend the minimum pressure rating of 6 Bar hose. Suction hose should be of the non-collapsible type.
- The pipe bore diameter must minimally exceed that of the pump connection and the transition between various pipe sizes must be kept to a minimum.
- It is recommended to support the pipes directly in front of the pump and wherever else necessary to keep bends to a minimum and subsequently, minimise friction loss.
- Shut-off valves must be in-line and the diameter of the shut off valve must be the same as the pipe.
- Where there is a risk of the flow reversing (backflow), a non-return valve (NRV) or shut off valve must be assembled to the pipeline.
- Use air valves to admit air into the system at a peak, this limits low pressure which may cause pipes to collapse.
- To monitor the flow, flowmeters and pressure gauge/sensors can be added, please contact your Selwood representative.
- Inspect and lubricate coupling O-Rings regularly, loss of liquid can decrease pressure and affect the pump's efficiency.
- Use correct fixings to secure the couplings to the pump. All fixings should be present, the correct size, the correct grade and tightened in accordance with the torque table found in section 0.
- Where applicable, gaskets are to be used between fixings capable of resisting the flange's nominal pressure.

12.6.2 Suction Line

When installing suction lines, ensure that:

- Collapsible hoses must never be used on the suction side of the pump.
- The correct strainer is fitted and secured in place with heavy duty clamps at the end of the suction line.
- Place the pump as close to the worked liquid as possible to minimise friction loss and increase the suction lift.
- Ensure that the suction line exceeds the minimum required depth of the worked liquid.
- Slope pipework upwards towards the pump to prevent the formation of air pockets.
- Minimise the use of bends and do not use short radius bends close to the pump suction. Increased friction loss can cause hoses to collapse under vacuum. Use large radiuses where bends are unavoidable.
- Ensure that the first bend of the pipeline is at least four times the diameter of the pipe from the pump suction, this is to ensure a smooth flow of fluid impacts the impeller.
- Ensure clamps to the Bauer, strainer and adjoining pipework are correctly secured and the correct clamps are used. Pay particular attention to the admission of air into the suction side pipework, this is not permissible.

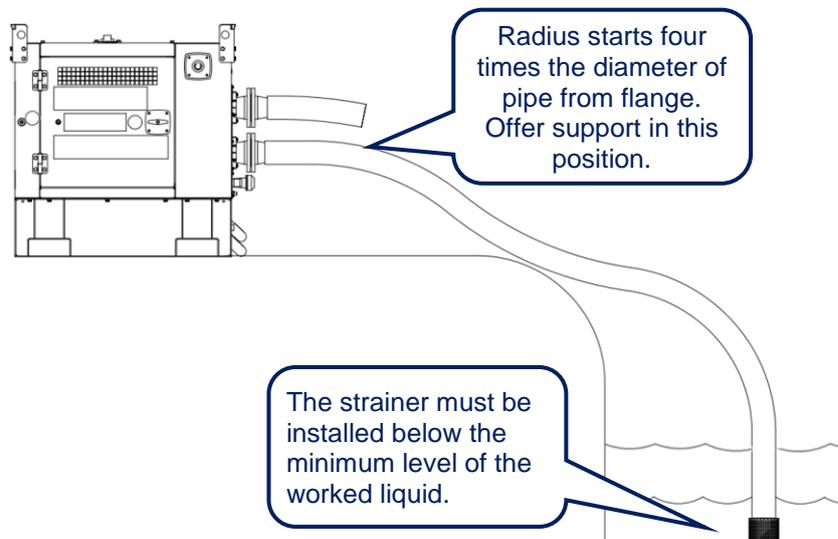


Figure 5: Correct suction line installation.

To reduce excessive wear of the pump, it is recommended the vertical distance from the unit's suction flange centre and the suction lines highest point does not exceed 10 meters.

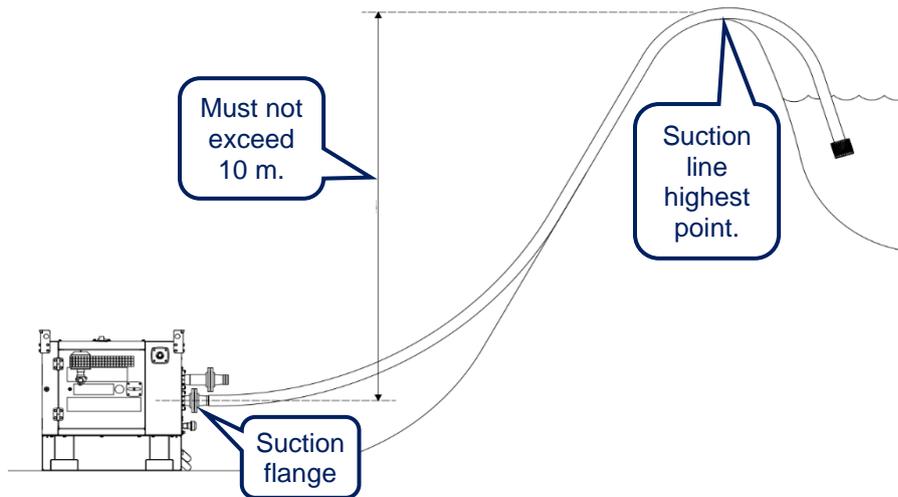


Figure 6: Suction line rise.

12.6.3 Strainer

When installing a strainer ensure that:

- The strainer holes are smaller than the maximum permissible solid sizes for the pump.
- The suction strainer must be installed to allow for cleaning and maintenance.
- The strainer should be fully submerged at all times, this means if automatic mode is used the strainer must be below the low float depth.

12.7 Understanding the Pump's Curve

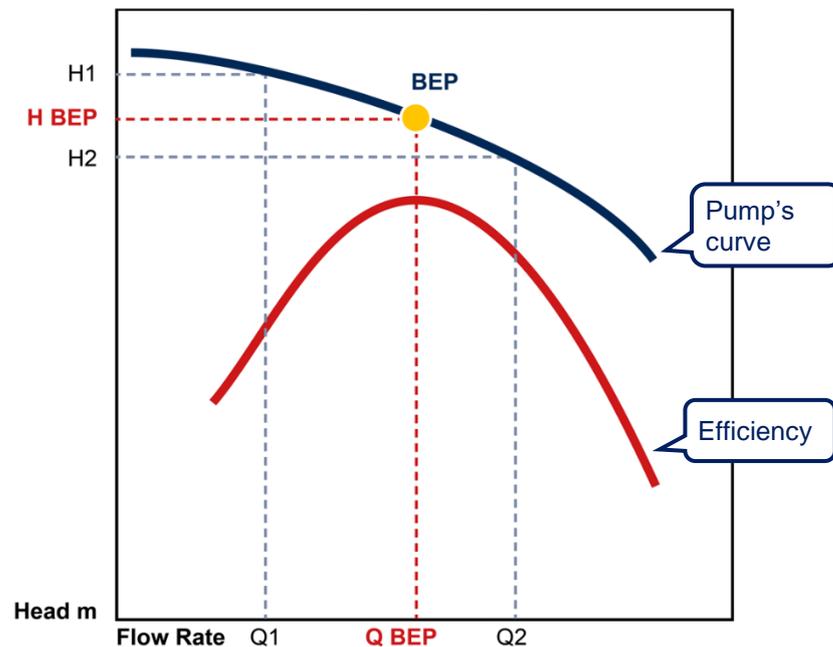
Selwood have a wide range of pumps for all applications and liquids, please speak to a Selwood representative for more information.

This section gives a brief overview of the pump's curve, be aware that the below curves are arbitrary and do not reflect any specific pump; data sheets can be found on the Selwood website.

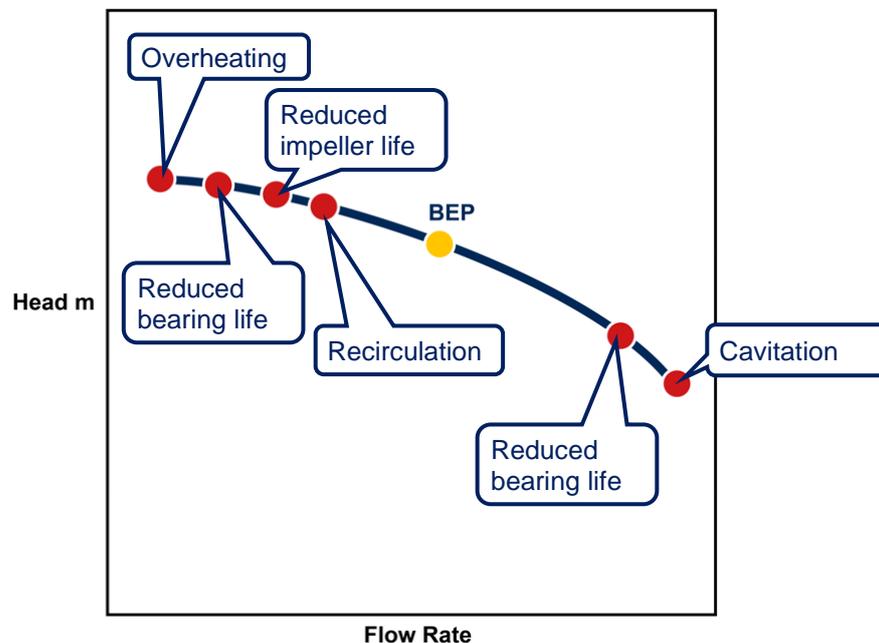
12.7.1 Pump's Curve, Efficiency and BEP

When run at a fixed RPM, the pump produces a fixed range of performances. This means the head, which is the height in meters the unit can pump, can be plotted against the flow rate (Q) at any point. These figures of head against flow rate give the pump's curve and are recorded when clean cold water is being pumped.

The BEP can be plotted on the pump's curve where the pump's efficiency (which is a ratio of input power against output power) is at a maximum. This is shown by the vertical broken red line at 'Q BEP'.



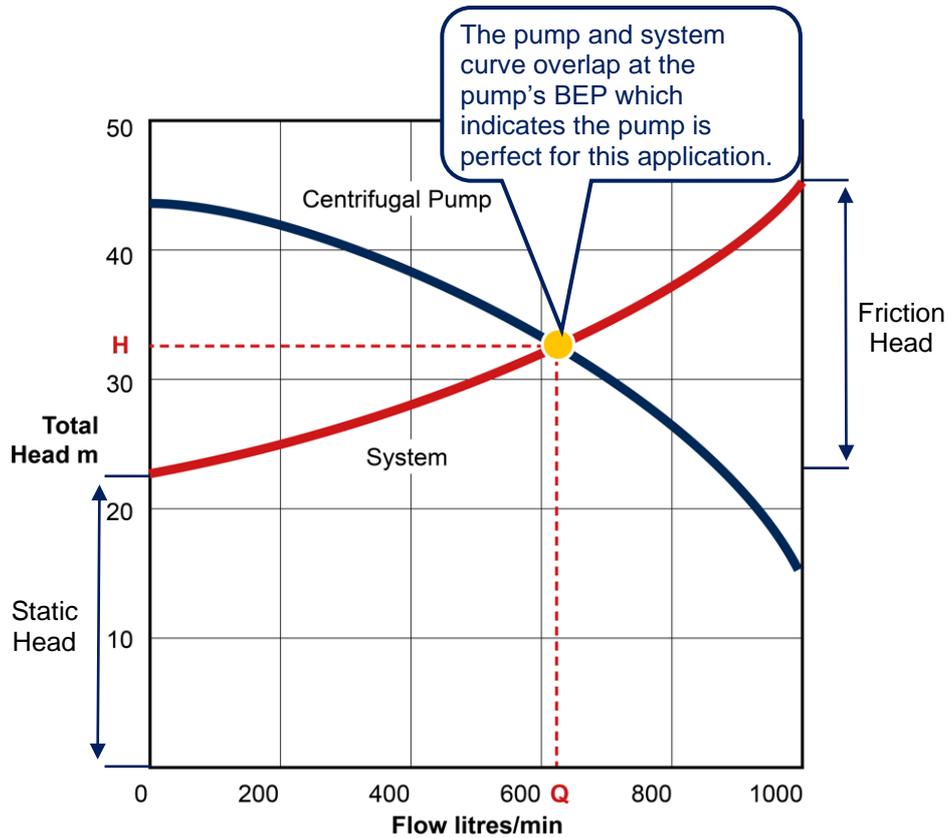
12.8 Operating away from BEP



12.8.1 The Correct Pump for the System

A system curve considers the resistance in head between the delivery valve and the end point that the unit must overcome before pumping the fluid. This includes any height rises, friction losses in the pipelines and ancillaries in the system, which can be seen when the flow rate is at zero in the below system curve, this is known as static head. The system curve is not a constant and the resistance within the system increases when the flow rate increases, this is known as friction head.

The pump chosen should be one that operates as close to BEP when operating within the parameters of the system, overlapping the pump's curve to the system curve shows how close to BEP the pump will operate.



12.8.2 NPSH Explained

NPSH may fall below the required NPSH (NPSHR), causing cavitation (a popping sound or what sounds like marbles or gravel moving through the pump) if the following occurs:

- Increased temperatures of pumped liquids
- Pumping with the wrong diameter of pipeline
- A blocked hose strainer
- An excessively long suction line
- Incorrect pump for the application in hand

NPSH (Net Positive Suction Head) is a measurement of pressure on the suction side at the centre line of the impeller eye, measured in head. The purpose of this measurement is to avoid the vaporisation of fluid as it enters the pump, which causes cavitation. Cavitation can lead to excessive noise and vibration, adding strain to the shaft as well as damaging the impeller and casting from the shockwaves induced.

NPSH-R (Net Positive Suction Head Required) is the result of extensive testing of the pump at Selwood's facilities, this is the minimum suction pressure for the pump to operate correctly.

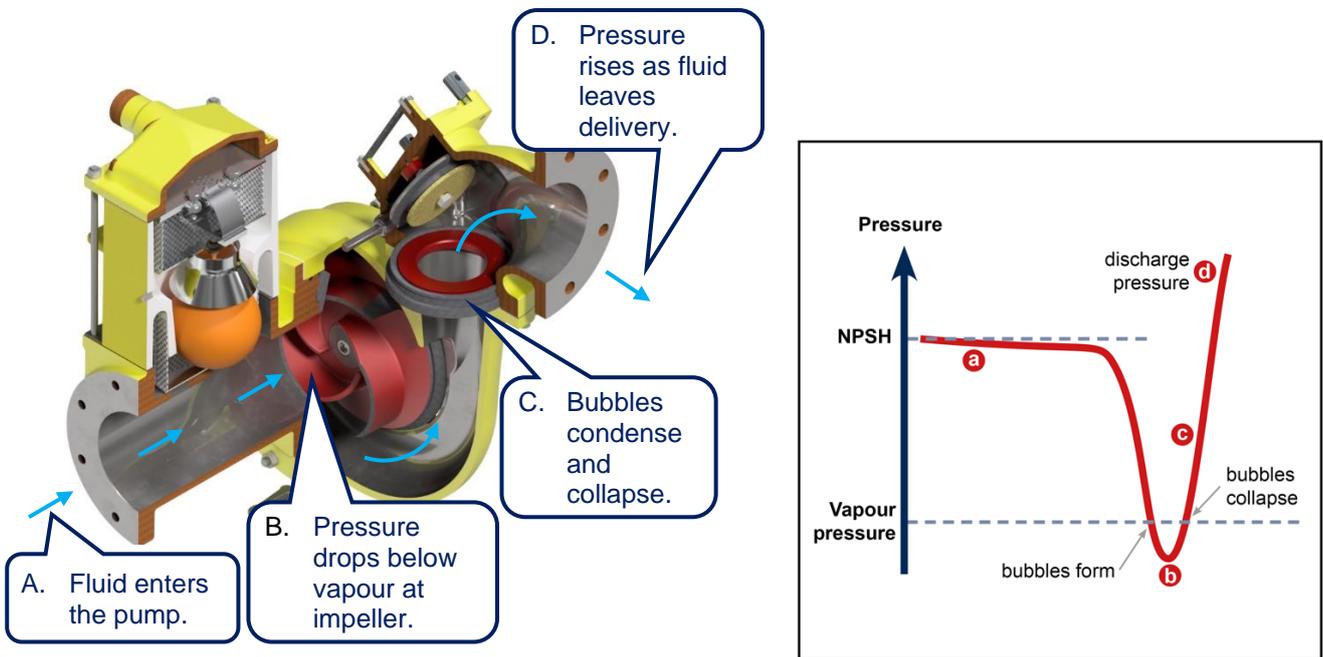


Figure 7: In this situation, the pressure at the impeller has dropped below that of the liquid, causing bubbles and subsequently cavitation to occur. This is not an ideal circumstance.

13 Body Unit Pre-operation

CAUTION



If safety equipment such as protective guards or heat blankets are missing, do not start the pump until replaced.

MUST READ

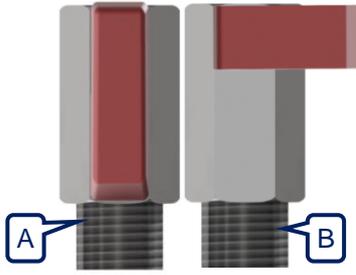


Body unit oils should be changed every 250 hours. In no circumstances should this time exceed 500 hours.

Low oil levels in the flushing chamber could cause the mechanical seal to overheat. Low oil levels in the air pump bearing housing may cause bearings to wear and decrease in life.



Step	Action	Image
1	<p>As a rule, oil levels should be filled to either the middle threads of the filler hole, or just below the higher marking of the dipstick.</p> <p>Bearing housing oil:15W-40. Flushing chamber oil: 15W-40.</p>	
2	<p>Inspect the body unit pipework for pooling due to a damaged float or a faulty peel valve. See later service sections to rectify.</p> <p>Be aware pipework should fall continuously from the separator to the air pump.</p>	
3	<p>As loss of prime or loss of on-stream performance can easily arise as the result of leaking pipework joint. Check all fittings regularly for tightness.</p>	
4	<p>Ensure the delivery valve cover is correctly fitted and secure.</p>	

Step	Action	Image
5	Ensure drain valves are closed (B) before operation. Open (A).	

14 Checks Whilst Operating

CAUTION	
	In the event of an emergency, a stopping mechanism must be in place to completely shut the driver down and subsequently the body unit.
	The pump should only be operated within the speed and pressure limits detailed within section 9. Do not exceed the pump's maximum speed.
	<p>Remove threaded protection plug whilst the pump is operating to read the body unit's speed with a tachometer. The unit's speed must not exceed 2000 RPM.</p> <p>For a reading to be taken, tachometer tape must be fitted to the driver's flywheel.</p>
	Visit trouble shooting sections of this manual to identify and solve issues that arise whilst operational.



Adhere to the following points while operating the pump:

- Always ensure that the pump is operating as close to its best efficiency point (BEP) as possible.
- Avoid the body unit running dry where possible.
- Check the pipework and connections for any leaks that may cause a loss of performance or hazard to the environment.
- Check for any leaks from the pump including body unit/engine oils that may affect the pump's performance, efficiency or have a negative input on the environment.
- Check for any signs of high or low pressures within the pipework that may cause a hazard. If defect, stop the pump immediately and rectify.
- Ensure the air flow to the driver is not impeded at any time.

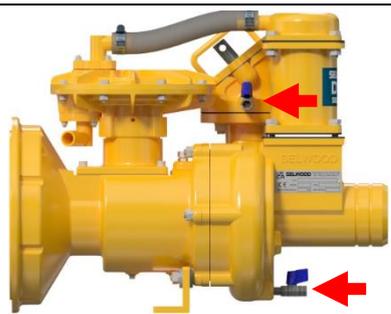
14.2 Blockages

DANGER



Blockages in the delivery line cause high pressures in the system that can become extremely dangerous to personnel and the pump. Immediately engage the Emergency Stop (which must be installed for the complete pump to be CE compliant) if pipelines are moving erratically or are hot to touch.



Step	Action	Image
1	Hit the E-Stop if blockages could cause potential harm to personnel. If the pump is still running and the blockage is not considered an emergency, stop the pump in the normal way.	
2	Release Body Unit drain taps and allow captive fluids to drain, ensure to capture any hazardous fluids. Dispose of in accordance with local law.	
3	If the suspected blockage is due to a faulty non return valve (NRV), then remove the Body Unit inspection plate and investigate.	
4	Clear any blockages within the pipework before restarting the pump. If the NRV is damaged or incorrectly functioning, refer to the Body Unit service manual.	

14.3 Running Dry

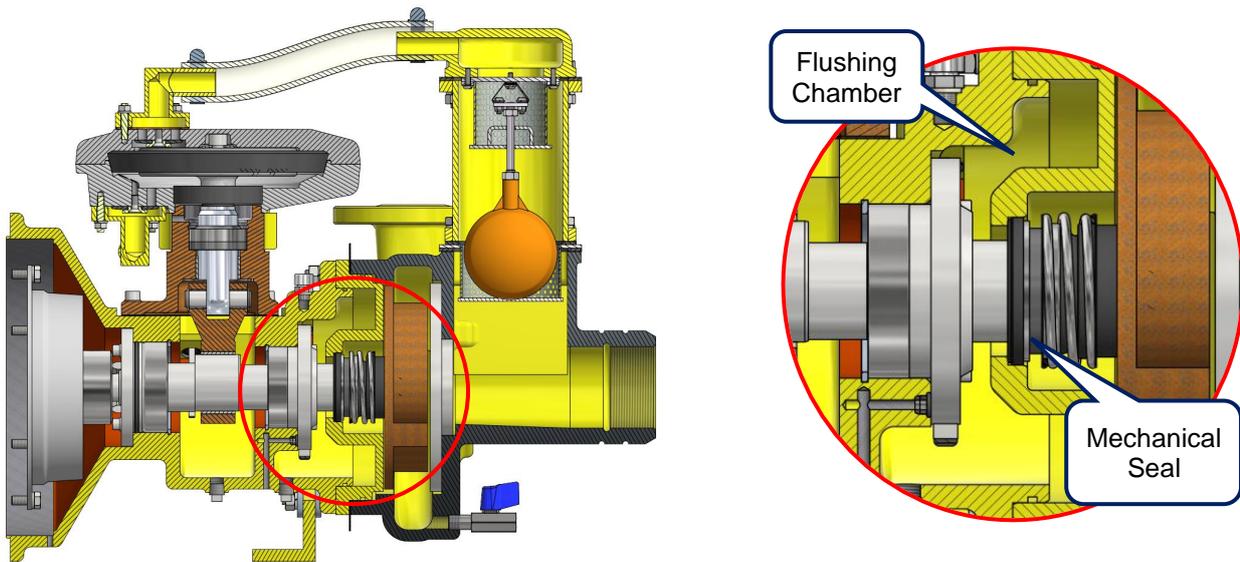


Figure 8: A mechanical seal comprising of two components; a stationary seat pressed into the casting and a rotating spring-loaded actuator that pushes against the seat. Both have highly polished silicon carbide surfaces which are in constant contact, this creates a seal between the worked liquid and the oil filled chambers of the body unit. In normal operation, the worked fluid helps to cool the mechanical seal. However, if there is no worked liquid within the pump and the pump is still operating (otherwise known as running dry), the oil filled flushing chamber dissipates heat generated by the mechanical seal. If the body unit has been running dry for periods of 5 minutes and over, then stop the pump and allow the unit to cool for a minimum of 15 minutes. This is to stop any cracking of the casting.

15 Periodic Maintenance

CAUTION	
	If any servicing is required, follow precautions set out in section 19. Body unit oils should be changed every 250 hours. In no circumstances should this time exceed 500 hours.
	Liquids captive to the pump can be damaging to the environment and must be disposed of in accordance with local law. Drip trays are always recommended when operating Selwood pumps.

MUST READ	
	Engine periodic maintenance must be carried out in accordance with instructions given in the manufacturer's manual.

Lack of Routine Maintenance

Lack of routine maintenance is the most frequent reason for pump breakdowns. Regular flushing with clean water after use and periodic stripping and inspection will help maintain the pump.

The Importance of Daily Checks

Time scales laid down in this manual and the driver's operator manual relating to periodic maintenance, assume that daily checks of this pump and driver have been carried out. Failure to do so will dramatically decrease the pump's life.

Logging Pump Hours

It is good practice to keep a log of the pump's operational hours.

Periodic Maintenance Schedule

The below table gives a checklist of tasks required upon the yearly inspection, correct maintenance of the pump increases the longevity and performance.

Tasks	Reference section	Daily / Before use	Monthly inspection	Every 500 hours (max)
General visual inspection of body unit components for damage.		✓		
Secure any loose body unit fixings.		✓		
All safety equipment is in place, including heat blankets and guards.		✓		
Inspect for lubrication leaks.		✓		
Inspect pump pipework condition and correct fitment, including suction and delivery lines.		✓		
Prior to the pump running, remove the strainer and check for blockages.		✓		
Inspect pump fuel and lubrication levels.		✓		
Inspect nothing inhibits the driver's operation and that it is sufficiently ventilated.		✓		
If lifting eyes are assembled to the unit, ensure these are inspected and in good condition. For further assistance, contact a lifting specialist or Selwood pumps. Selwood recommend the use of die penetrant to identify any stress cracks or weak points that may cause lifting components to fail.		✓		
Complete inspection of body unit fastening torques.			✓	

Tasks	Reference section	Daily / Before use	Monthly inspection	Every 500 hours (max)
Physical inspection of all pump pipework for damage and secure fitting, including suction and delivery lines.			✓	
Heat blanket is present and correctly secure.			✓	
Inspect the condition of all AV mounts, if used.				
Correct function of all valves, including, but not limited to the body unit drain valves and pump drain kit.			✓	
Inspection all pump labels and health and safety warnings are in place, visit the pump's parts list for replacement parts.			✓	
Inspect the isolator switch stops power to the pump.			✓	
Coupling inspection for damage and correct function.			✓	
Send pump / engine oils to a local fluid analysis.			✓	
Cleaning the pump.			✓	
Inspect impeller clearance.				✓
Change engine oil and oil filter.				✓
Body unit oil change.				✓

15.1 Serviceable Components

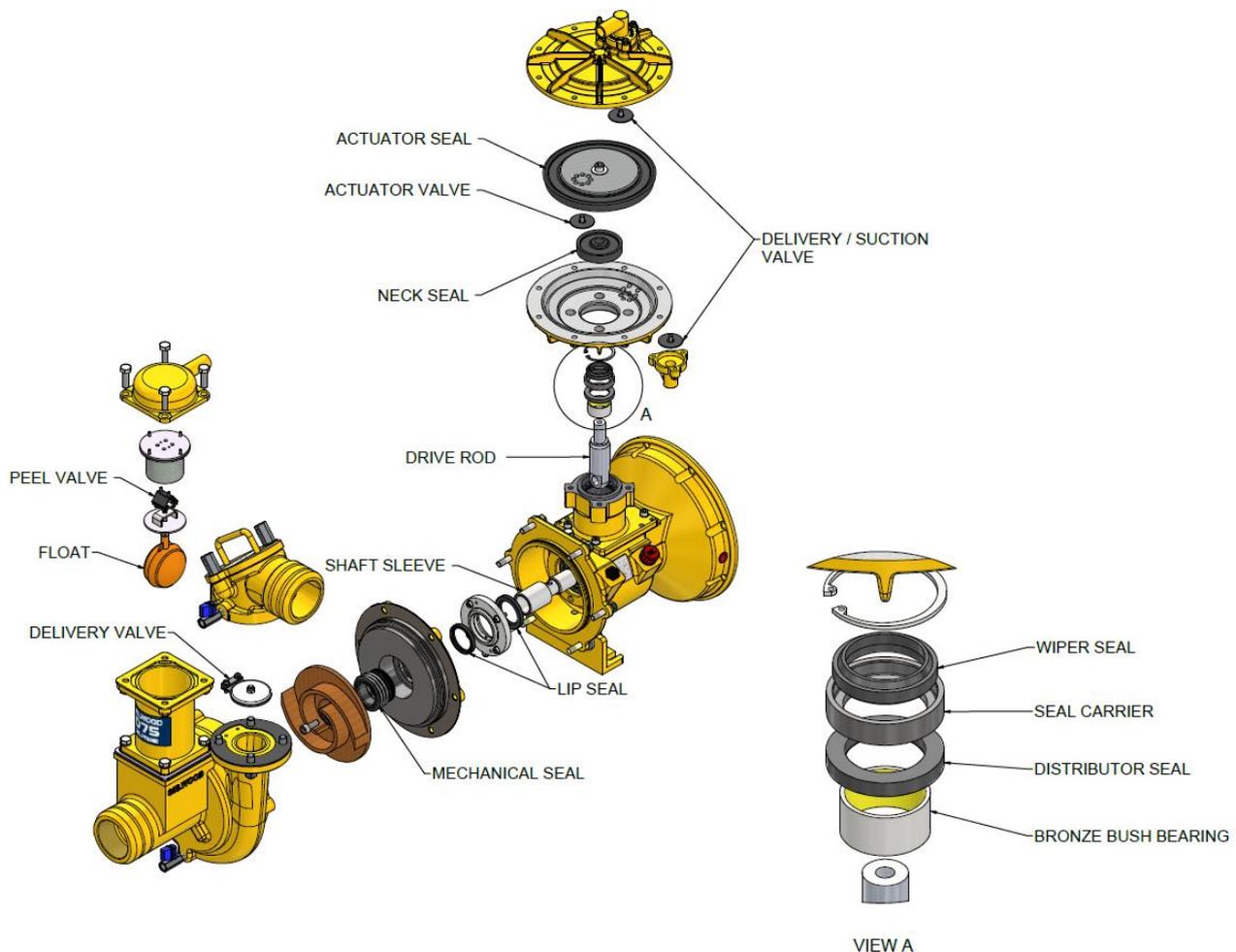
MUST READ



This section highlights wearable components within the pump which are to be replaced in accordance with the time schedule laid down in the table below. Failure to do so may cause breakdown and considerably shorten the life of the pump. Be aware if your pump's deployment is extremely arduous or running for higher number of hours than usual, then serviceable components must be replaced at shorter time intervals.

Item and kit part numbers are not specified, refer to the body unit's part's list found on the Selwood website. Be aware, using inferior parts will shorten the life of the pump.

Component	Time scale
Seal carrier	1 year
Air pump suction/delivery valves.	1 year
Actuator seal	1 year
Neck seal	1 year
Peel valve	1 year
Mechanical seal	1 year
Float	1 year
Delivery valve	1 year
Wiper seal	1 year
Distributor seal	1 year
Lip seals	2 years
Linear bearing	2 years
Drive rod	2 years



15.2 Fastening Torques

MUST READ	
	<p>All securing fixings including nuts, bolts and washers must be to a minimum standard of 8.8 grade steel. When replacing these fixings, do not use inferior grades or aluminium equivalents.</p> <p>Annual inspections/maintenance must include a complete check of all fixings. All fixings, including lifting eyes that are lift critical must be torque tightened regularly, especially prior to a lift.</p> <p>Do not adhere to the below tables if lubrication is applied to the fixing.</p> <p>If the joint contains an elastic material such as a gasket, overcome the relaxation by tightening in two stages, ensure a short time gap between each tightening.</p>

Steel Grade 8.8	
Fixing Size	Torque (Nm)
M6	11
M8	26
M10	50
M12	88
M16	219
M20	441
M24	762
Stainless Steel A2 & A4	
Fixing Size	Torque (Nm)
M6	8
M8	19
M10	39
M12	68
M16	170
M20	330
M24	570

16 Trouble Shooting

16.1 Internal Component Recognition

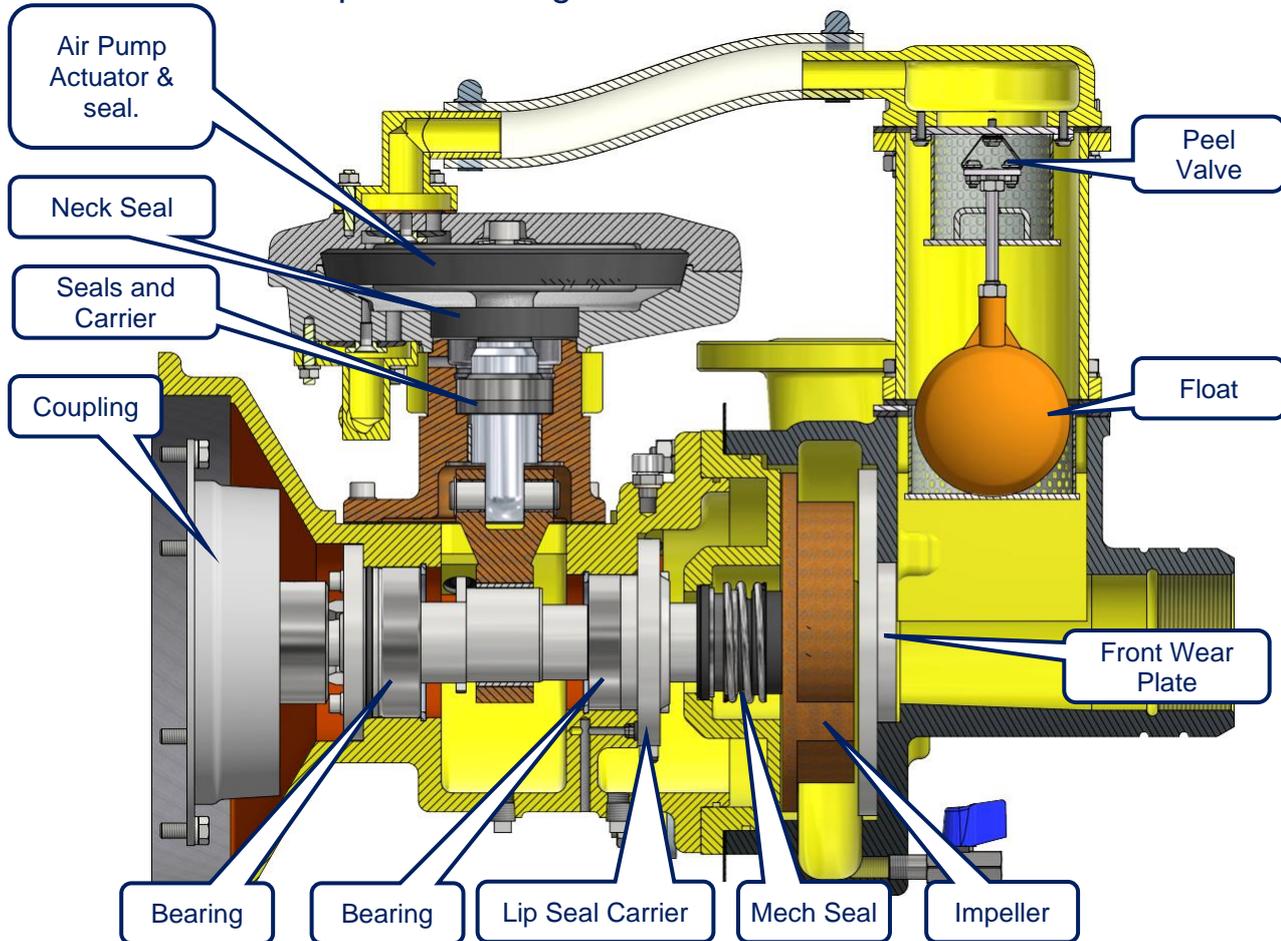


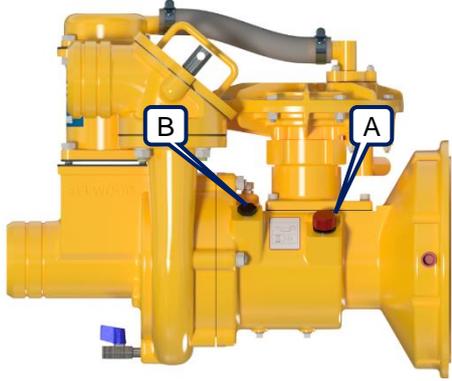
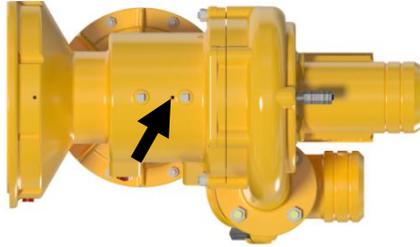
Figure 9: Body Unit internal components.

16.2 Performance Drop

No.	Symptom	Possible Cause	Action
1	Drop on output.	Worn impeller.	Inspect and renew if necessary.
2	Drop on output.	Obstructed flow passages.	Check for solids in the suction tube, and in pipework generally.
3	Drop on output.	Engine speed incorrectly set.	Check that the engine/motor speed is 2000 RPM off load.

16.3 Air Handling Performance & Lubricant Leaks or Contamination

No.	Issue	Diagnosis	Image
1	Pump will not prime or primes slowly.	Leaking suction pipework. Tighten clips and replace if necessary.	
		Faulty delivery valve assembly. Inspect there is nothing obstructing the valve closing. If damaged, then replace.	
		Blocked or faulty suction/delivery valves.	
		Blocked or faulty actuator valves.	
		Blocked or faulty actuator seal.	
Blocked or faulty neck seal.			
2	Oil leaking from air pump ports.	Air pump seal assembly is worn and needs replacing.	

3	Significant worked fluid droplets in flushing chamber oil levels (B).	Mechanical seal or lip seals are damaged.	
4	Significant drop in bearing housing oil level (A).	Potential lip seal failure.	
5	Oil leaking from flushing chamber vent	Potential lip seal failure.	
6	Significant amount of water passes the air pump.	It is likely the Separator peel valve or float has failed.	

17 End of Life

CAUTION	
	<p>Ensure that local legislation is followed when disposing of the pump, this includes environmental and recycling laws.</p> <p>Ensure all lubricants are disposed of in accordance with local laws.</p>
	<p>Reference engine/motor manual for similar end of life procedures.</p>

Before disassembling the pump:

- Drain the pump of all worked liquids.
- Drain the pump of all lubricants.

Part	Material
Separator cap	Cast iron
Separator body	Tube, aluminium; Flanges, steel
Suction tube & volute	Flake graphite iron
Impeller	Ductile cast iron
Bearing housing	Flake graphite iron
Delivery chamber	Ductile cast iron
Air pump body	Aluminium alloy
Shaft	Steel

18 Vacuum Test

CAUTION



Pipes under pressure and internal rotating parts are dangerous.

If experiencing a loss of prime, a vacuum test can be completed. This section instructs on that test with the use of Selwood vacuum gauge kit.

Tool	Part No.
Selwood vacuum gauge kit	2019244000

Step	Action	Image
1	Drain the body unit in accordance with section 10.	
2	Pipework to the air pump and separator must be free from cracks, damage and securely connected at the spigots.	
3	Start the engine/motor until the pump reaches its optimum RPM.	
4	Position Selwood gauge kit (2019244000) over the suction tube flange or the coupling flange, the gauge assembly is held in place by the body unit suction.	
5	Once fitted, the pressure gauge should read -0.85 bar/-25psi. If the pump fails to reach these pressures, then there is an issue with priming, refer to trouble shooting sections.	
6	Leave the engine/motor and body unit running for 15 minutes, continuously observe the gauge for any drastic change in pressure.	
7	Turn the motor/engine off and bring the body unit to a halt and leave for 3 minutes. Ensure that the pressure does not drop, if there is a drop in pressure then there is a fault, see trouble shooting sections.	

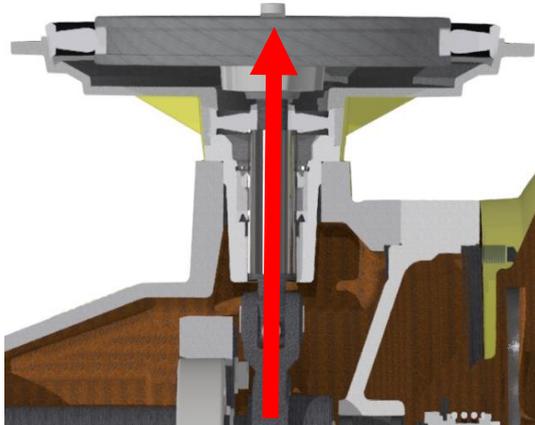
19 Major Servicing

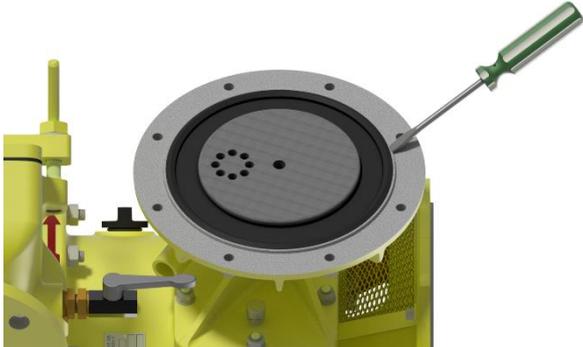
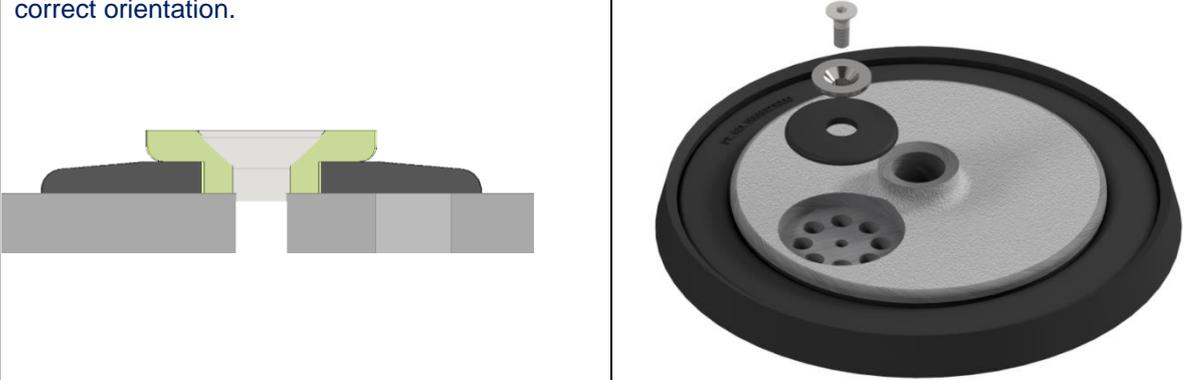
19.1 Servicing Prerequisites

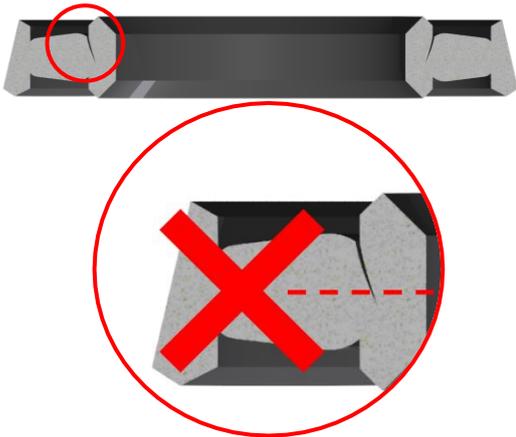
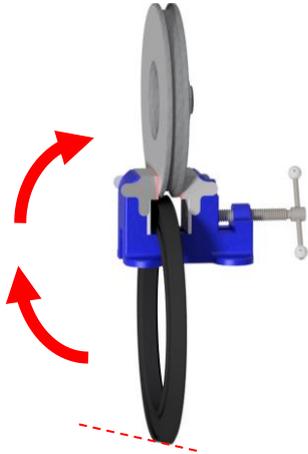
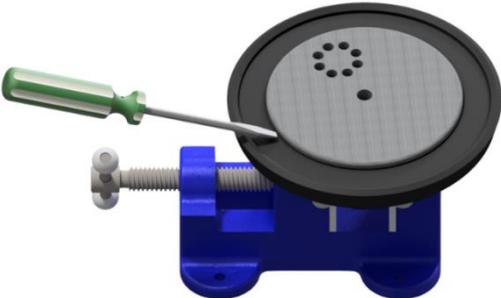
DANGER	
	<p>Leaked or spilled fuel from the driver can ignite if exposed to hot engine parts, causing injury or loss of life.</p> <ul style="list-style-type: none"> ▪ Do not spill fuel. ▪ No open flames when working on the fuel system. ▪ Do not smoke in the vicinity of the pump.
CAUTION	
	<p>Before any maintenance is carried out, isolate the pump's power supply to the off position. If there is no isolation switch, then disconnect the battery leads at the battery. Place a sign: 'DO NOT SWITCH ON, MAINTENANCE IN PROGRESS!'</p> <p>Drain pipelines of any fluids to relieve pressure.</p> <p>Personnel performing maintenance must be trained, competent and understand all relevant risk assessments.</p>
	<p>Be aware of high temperatures from the driver. Allow the driver to cool before carrying out any work.</p>
	<p>Liquids captive to the pump can be damaging to the environment and must be disposed of in accordance with local law. Drip trays are always recommended when operating Selwood pumps.</p>
	<p>It is understood that working conditions are not always ideal when the pump is operational, where practical:</p> <ul style="list-style-type: none"> ▪ Rest the pump on trestles so that the pump is at a comfortable height. ▪ Use a workstation when working on removed components to eliminate twisting, bending and straining. ▪ Use mechanical lifting aids where possible and when required to lift manually Follow local manual handling guidelines. ▪ Do not work in uncomfortable positions for long periods of time.
	<p>Pump servicing must always be carried out in accordance with this manual. Only components supplied and approved by Selwood Ltd should be used. It is advisable to hold a small stock of spare parts to cover breakdown circumstances. Refer to body unit part's list found on the Selwood website.</p>
	<p>Additional to mandatory PPE (eye protection, coveralls, steel toe cap boots and high visibility clothing), gloves that protect against the ingress of lubricants, chemicals and infectious agents are required for servicing sections.</p>

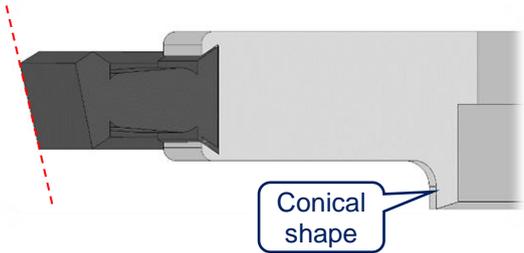
19.2 Air Pump Assembly

19.2.1 Air Pump Suction Valve

Step	Action	Image
1	Loosen clips and remove hose.	
2	Remove all fixings securing air pump outer body.	
3	Inspect suction valve rubber. Ensure correct orientation of valve.	
4	Rotate the shaft to set the actuator piston to top dead centre.	

Step	Action	Image
5	Remove fixings securing actuator piston.	
6	Use a blunt screwdriver to prise out seal.	
7	Inspect and replace actuator valve. Ensure correct orientation.	

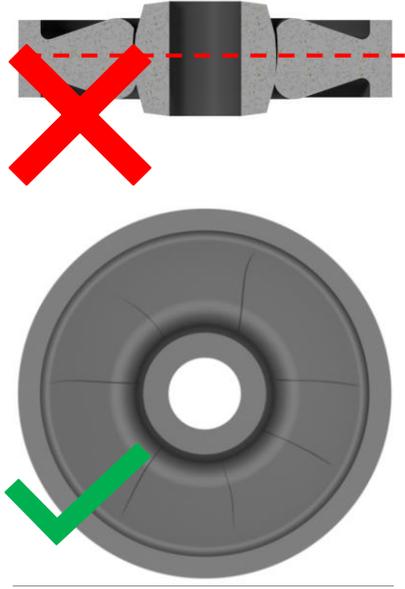
Step	Action	Image
8	Inspect the actuator seal, remove the seal if cracks around inner neck diameter exceeds half the thickness of the seal. The seal may need to be cut from the piston.	
9	Reposition actuator piston into the vice with the soft jaws. Pivot new actuator seal through the red markers to ensure correct orientation. Fit first lip of seal (below).	
10	Fit second lip of seal with a blunt screwdriver or similar.	

Step	Action	Image
11	Ensure correct orientation.	

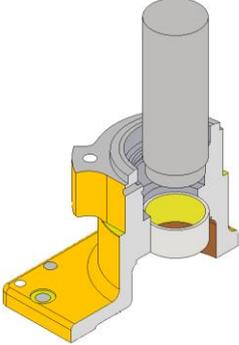
19.2.2 Air Pump Discharge Valve

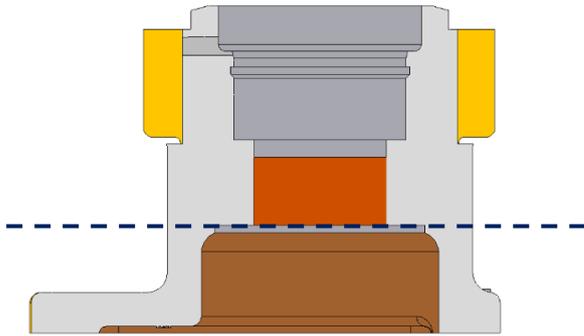
Step	Action	Image
1	Remove air pump delivery spigot.	
2	Inspect exhaust valve and replace if necessary. Reassemble in reverse, see below for valve orientation.	

19.2.3 Neck Seal

Step	Action	Image
1	Remove air pump components in accordance with 19.2.	
2	<p>Replace the neck seal if cracks around inner neck diameter exceeds half the thickness of the seal. Radial cracks appear throughout the seals life; these can be ignored.</p>	
3	To replace neck seal, remove inner body.	
4	Remove and replace neck seal. To assist with fitment, apply soft soap to the outer surface of the seal. Fit by hand.	
5	If this concludes servicing to this point, refer to section 19.2.5	

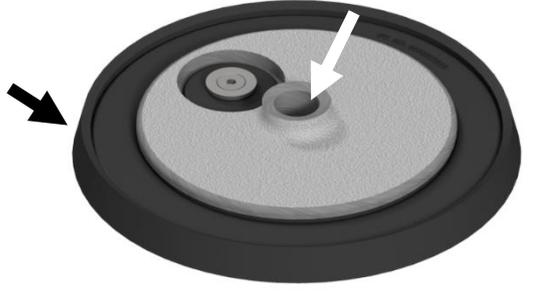
19.2.4 Air Pump Drive Rod Assy & Bearing

Step	Action	Image
1	Remove components in accordance with sections 19.2.1. Remove neck seal in accordance with section 19.2.3.	
2	Remove pedestal. Remove locating pins and store for later assembly (highlighted).	
3	Remove circlip.	
4	Remove seals and carrier.	
5	Use tool 0015168000 to push linear bearing out.	

Step	Action	Image
6	New linear bearing must be flush with pedestal surface. Use oil on the outer surface to assist when pressing.	
7	Press new wiper seal to seal housing with tool 0010103000. Ensure correct orientation (below).	
8	Refit seals, carrier and circlip in reverse. Ensure correct orientation (below)	
9	If the linear bearing has been replaced, it is likely the air pump drive shaft needs replacing. Remove circlips.	

Step	Action	Image
10	<p>Press fulcrum pin to release drive rod. New pin can be fitted with grease and refit circlips.</p> <p>i Inspect the connecting rod and its bushes. If these are damaged, then they must be replaced. This is not within the scope of this manual.</p>	
11	<p>Refit new gasket. Ensure locating pin has been refitted.</p>	
12	<p>Refit pedestal. Be careful not to damage any of the seals on the drive rod.</p>	

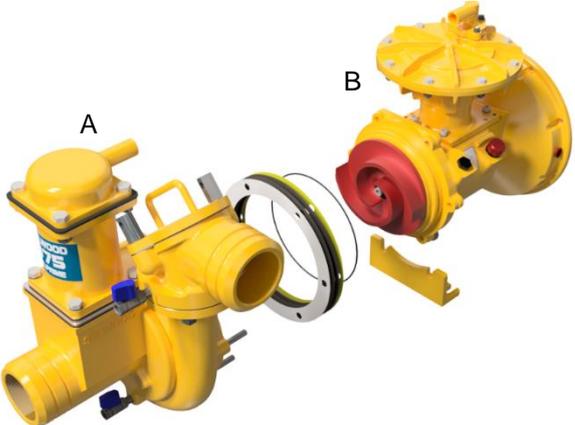
19.2.5 Refitment of Air Pump

Step	Action	Image
1	Refit air pump lower half. Ensure washers are still in place within recess (highlighted).	
2	Grease actuator bore (white arrow) and apply soft soap to the outer surface of seal (black arrow).	
3	Secure actuator in position, ensure Belleville washer orientation (below) and tighten cap screw to 56 Nm.	
4	Rotate shaft 10 times to allow seal to seat. Stop rotating when the actuator is at bottom dead centre.	

Step	Action	Image
5	Lightly tap the actuator seal around the edges to fully fit.	
6	Refit top cap casting and cross tighten fixings to fully secure.	
7	Inspect and refit/replace pipework. Ensure clips are secure and air cannot leak.	

19.3 Volute Removal & Refitting

19.3.1 Removal

Step	Action	Image
1	Drain the flushing chamber in accordance with section 10.2.	
2	Loosen clips and remove hose.	
3	Support the body unit under the bearing housing in accordance with local lifting laws and workshop procedures.	
4	Remove all fixings securing the volute to the flushing chamber.	
5	<p>Slide the volute casting from the flushing chamber. Take care not to damage the shims and 'O' ring. Retain foot spacer.</p> <p> Approximate weights: A = 30 Kg B = 55 Kg</p>	

19.3.2 Refitting of the Volute

Refit in the reverse of the removal procedure, be aware of the following:

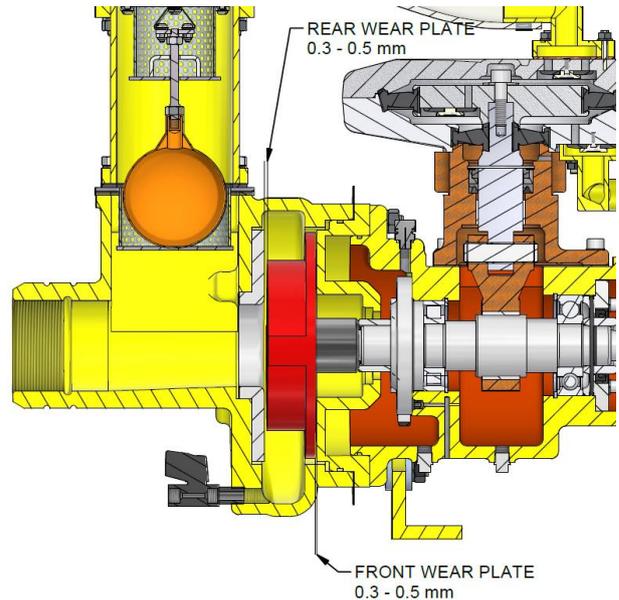
Step	Action	Image
1	Inspect that all 'O' rings, shims and gaskets are in good condition; replace if necessary.	
2	Ensure that volute 'O' ring is seated within its groove and does not pinch.	
3	Fit the foot correctly with a space either side	

19.4 Wear Plates

MUST READ



If the pump's efficiency has dropped, wear plate to impeller gaps may be too high. If this is the case, shims can be removed to decrease the gap. If shims cannot be removed or the wear plates or impeller are excessive worn, then replace components.



19.4.1 Rear Wear Plate

Step	Action	Image
1	Loosen clips and remove hose.	
2	Removing the Separator will give access to the rear wear plate/impeller gap through hole.	
3	Remove volute in accordance with section 19.3.	

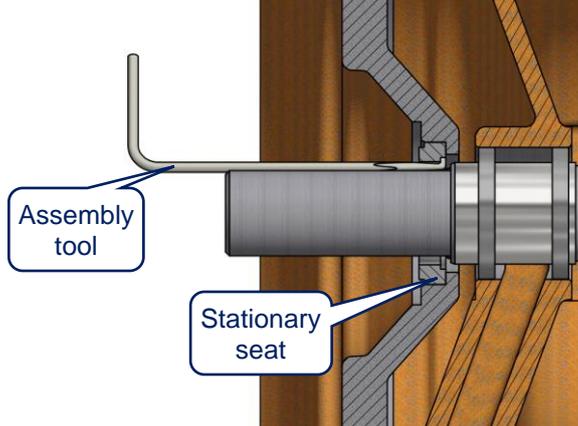
Step	Action	Image
4	If fitting a new wear plate, remove wear plate securing fixings. If adjusting shims, refer to step 7.	
5	Remove separator if wear plate is stuck to lever wear plate free.	
6	<p>When fitting new wear plate:</p> <ul style="list-style-type: none"> - Thoroughly clean wear plate and volute. - Lightly grease wear plate/volute plate interface. - Refit new retaining screws and washers with 'Loctite 242' or similar. 	
7	<p>Refit Volute with shims and check rear impeller/wear plate gap. Adjust as necessary.</p> <p>Once adjusted to the correct size refit Volute and Separator in reverse. Check all gaskets and seals for good condition.</p>	

19.4.2 Fron Wear Plate

Step	Action	Image
1	Remove Volute in accordance with section 19.3 to inspect front wear plate gap.	
2	If gap is excessive the impeller or mechanical seal housing may need replacing. To remove mechanical seal and impeller, see section 19.5.1.	
3	Replace mechanical seal housing if necessary.	
4	Refit mechanical seal and impeller in accordance with section 19.5.2. Refit volute in accordance with section 19.3.2.	

19.5 Impeller & Mechanical Seal

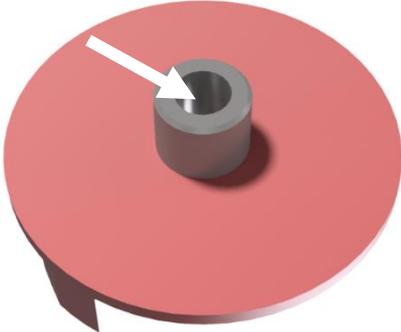
19.5.1 Removal

Step	Action	Image
1	Remove volute as per section 19.3.	
2	<p>Release the impeller cap screw. Remove impeller, mechanical seal rotary parts and associated components. The impeller key may come free with the impeller.</p> <p> Impeller washer (A) is bonded in position to the impeller with 'Loctite 601'.</p> <p> Be aware, mechanical seal spring may force impeller from the shaft.</p>	
3	<p>Evenly pull at several peripheral points to remove the stationary seat with assembly tool 0015166000. Two assembly tools are optimum.</p> <p> Once mechanical seal stationary seat has been removed, it is recommended to replace the seal in its entirety.</p>	

19.5.2 Fitment

CAUTION	
	Handle the new mechanical seal components with great care, do not touch the highly polished silicon carbide seal faces, these must only contact soft, clean paper that is free from abrasive materials. Premature seal failure is likely to occur if this advice is not heeded.
	Do not delay assembly once a component has been lubricated.

Step	Action	Image
1	thoroughly clean impeller, shaft and mechanical seal housing recess.	
2	Apply diluted soft soap (approximately 20 %) to the outer surface of stationary seat.	
3	Place stationary seat into its recess, ensuring the highly polished surface faces out. Ensure assembly tool (?????) mating faces are free from contamination. Place in position.	

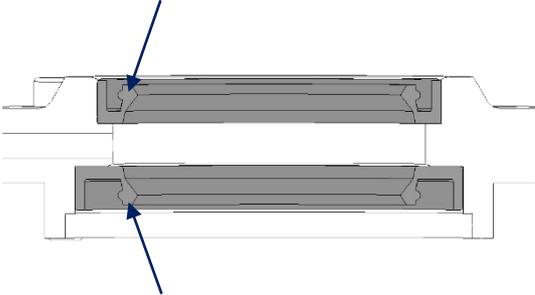
Step	Action	Image
4	Fit tool bolt to shaft thread. Tighten assembly tool bolt to press stationary seat, wind the bolt back off and let the rubber bed for 17 seconds. Retighten the bolt to ensure the stationary part is fitted correctly within the recess.	
5	Ensure impeller bonded washer is secure in position. If this is loose or not sealed correctly, remove and clean seal and mating surfaces and refit with 'Loctite 601' so joints are leakproof.	
6	Fit mechanical seal rotary parts to the impeller spigot with a twisting action, use soft soap to assist, the mechanical seal rubber must be fully home against rear face of impeller. Ensure highly polished surface faces away from the impeller.	
7	Apply a generous coat of grease to the internal bore of impeller.	

Step	Action	Image
8	<p>Ensuring the silicon carbide mating faces are free from contaminants (Loctite 7063 can be used). Use a clean blue roll to apply four small drops of oil to highly polished face, as seen.</p>	
9	<p>Slide impeller onto shaft, taking extreme care not to damage or contaminate seal face. Fit a new sealing washer and refit impeller cap screw using 'Loctite 242' or equivalent. Torque tighten to 30 Nm.</p>	

19.6 Impeller End Lip Seals

19.6.1 Remove of Lip seals

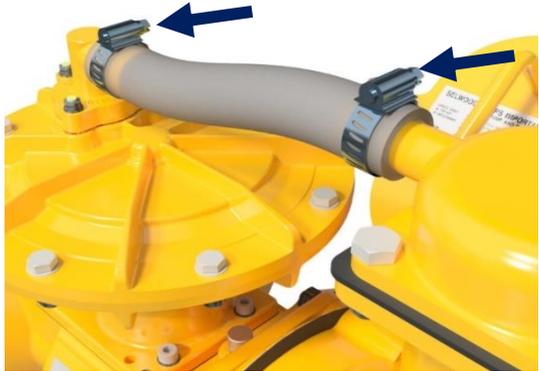
Step	Action	Image
1	Remove volute as per section 19.3 Remove impeller & mechanical seal as per section 19.4	
2	Remove mechanical seal housing.	
3	Remove four cap screws and spring washers, and withdrawer seal retainer complete with seals. Shaft sleeve may come loose with retainer.	
4	Remove 'O' rings and lip seals from seal carrier. Thoroughly clean lip seal seats.	

Step	Action	Image
5	Replace locating dowl pin and 'O' ring. Lightly grease over 'O' ring.	
6	<p>Inspect shaft sleeve sealing surface and 'O' ring for damage and replace if necessary. White arrow indicates 'O' ring groove.</p> <p>If replacing sleeve, lightly oil bore with oil and take care not to pinch the 'O' ring.</p>	
7	Oil outer surface of new oil seals and fit to carrier (note orientation). Lightly grease lip of seals (arrows).	
8	Renew 'O' ring and smear with grease.	

Step	Action	Image
9	Carefully replace lip seal carrier assembly, ensuring dowel pin locates in body unit casting. Refit cap screw bolts & washers and cross tighten and torque to 11 Nm.	
10	Refit mechanical seal housing with new 'O' ring. Lightly grease 'O' ring to assist fitment.	
11	Refit components in accordance with section 19.5.2.	

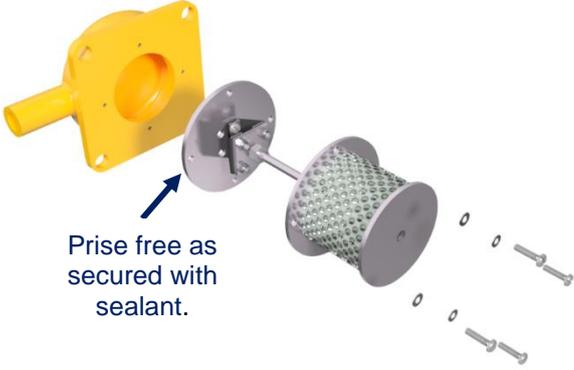
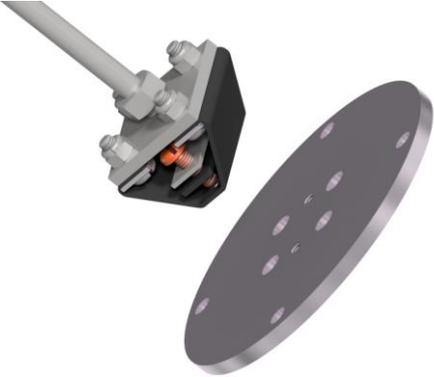
19.7 Separator Assembly

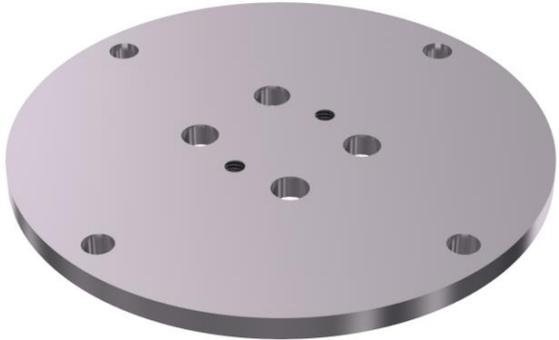
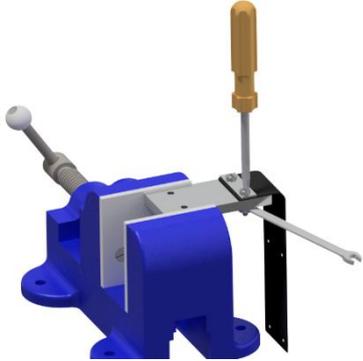
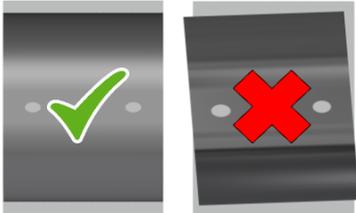
19.7.1 Float

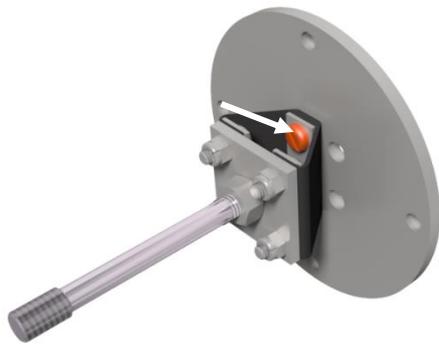
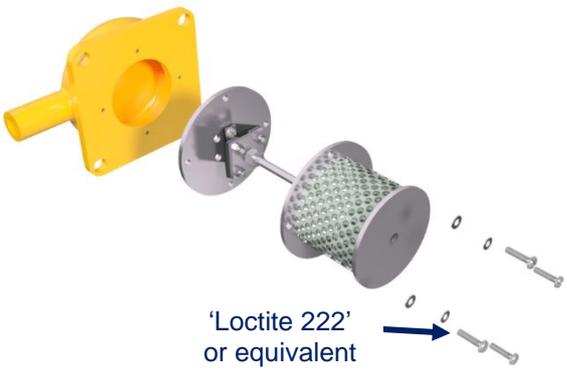
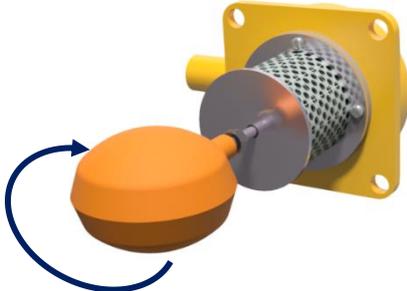
Step	Action	Image
1	Loosen clips and remove hose.	

Step	Action	Image
2	Remove top cap & float assembly. Note orientation of float.	
3	Release locknut and unscrew float.  Warning: do not allow operating rod to rotate, this will cause damage to peel valve.	
4	Upon refitting, ensure the float's correct orientation and exchange the gasket if necessary.	

19.7.2 Peel Valve

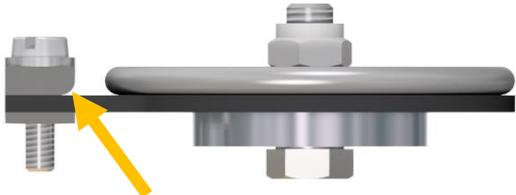
Step	Action	Image
1	Remove float as per section 19.7.1.	
2	Remove upper diffuser assembly and slide upper diffuser off operating rod.	
3	Remove screws and clamp bars retaining peel valve to port plate.	
4	Remove screws, nuts and clamp bars securing peel valve to operating plate.	

Step	Action	Image
5	Remove any remaining sealant. Use soapy water to clean the port plate, ensure no contaminants prevent the peel valve sealing.	
6	Secure one side of the new peel valve with clamp bar.	
7	Secure other side of peel valve with other clamp bar.	
8	To prevent carryover, the peel valve must be positioned correctly to the operating plate.	

Step	Action	Image
9	<p>Fit the peel valve to the port plate in reverse. Highlighted fixings are to be secured with 'Loctite 572' or equivalent.</p> <p>Do not overtighten screws as this may distort the peel valve.</p>	
10	<p>Apply 'Loctite 518' sealant or equivalent around the face of the port plate, to create a seal between the top cap.</p>	
11	<p>Refit upper diffuser, port plate & peel valve assembly in reverse.</p>	
12	<p>Fully tighten float and back off until float is in correct orientation as per picture.</p>	

Step	Action	Image
13	Tighten locking nut.	
14	Refit assembly in reverse. Inspect gasket and replace if necessary.	

19.8 Delivery Valve Assembly

Step	Action	Image
1	Remove fixings securing valve body and lift free. Inspect gasket and replace upon reassembly.	 <p>An exploded view showing a yellow valve body being lifted away from a larger yellow valve assembly. A black gasket is shown between the two components.</p>
2	Disassemble fixing securing the valve.	 <p>An exploded view of the hardware used to secure the valve. It includes a bolt, a nut, a washer, and a clamp bar, shown above the valve body.</p>
3	Replace delivery valve if damaged in any way.	 <p>An exploded view of the delivery valve assembly, showing a grey circular valve mounted on a black mounting plate with a central bolt.</p>
4	Upon reassembly, ensure clamp bar is correctly fitted, with the curved edge towards valve rubber.	 <p>A close-up view of the clamp bar assembly. A yellow arrow points to the curved edge of the clamp bar, indicating its correct orientation towards the valve rubber.</p>

20 Assembly Tools

To order replacement tool(s)/part(s) please contact Chandlers ford's Sales office on:

Phone: +44 (0)2380 250137

Email: PumpSalesOffice@Selwood.co.uk

20.1 Tooling

Always use specialised fitment tools where appropriate to stop the destruction of components upon assembly. It is recommended to purchase a complete set of tools from the table below.

Part no.	Description	Image
XXXXXXXX	Mechanical seal seat insertion tool.	
0015166000	Mechanical seat removal tool.	
0015168000	Drive rod bearing drift	
0010103000	A multi-purpose tool, its application is given throughout the service instruction.	

21 Declaration of Incorporation

	<p>This product complies with the following Essential Health and Safety Requirements of Directive 2006/42/EC Annex 1. These are applied and fulfilled as appropriate:</p> <p style="text-align: center;">1.1.3, 1.1.5, 1.2.4.4, 1.3.1, 1.3.2, 1.3.3, 1.3.4, 1.3.7, 1.4.2.1, 1.5.5, 1.5.13, 1.6.1, 1.6.2, 1.6.5, 1.7.1, 1.7.2, 1.7.4.</p> <p>Presumption of conformity with the above listed EHSRs is by application of relevant parts of the following standard: EN 809:1998 + A1:2009.</p> <p>Any modification of the equipment may affect the compliance with the above standards and directive.</p>
	<p>This product complies with the following sections of the Essential Health and Safety Requirements of the regulation SI 2008/1597 Annex 1. These are applied and fulfilled as appropriate:</p> <p style="text-align: center;">1.1.3, 1.1.5, 1.2.4.4, 1.3.1, 1.3.2, 1.3.3, 1.3.4, 1.3.7, 1.4.2.1, 1.5.5, 1.5.13, 1.6.1, 1.6.2, 1.6.5, 1.7.1, 1.7.2, 1.7.4</p> <p>Presumption of conformity with the above listed EHSRs is by application of relevant parts of the following standard: EN 809:1998 + A1:2009.</p> <p>As amended by The Product Safety and Metrology etc. Amendment etc. EU Exit Regulations 2019 (SI 2019/696).</p> <p>Any modification of the equipment may affect the compliance with the above standards and directive.</p>
<p>Note: Copies of the full Declarations of Incorporation are supplied with the equipment.</p>	

22 Notes

