

## SELWOOD SELTORQUE S160 / ISUZU 4LE2X SUPER SILENT

**Part Number: 1517204S60**

### Operating and Service Manual

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As all products are subject to continuous development, the company reserves the right to alter the specifications and information given in this manual without prior notice.

Whilst every care has been taken in the preparation of this publication the information it contains must not be regarded as binding.

Amendments to this publication will only be issued to cover those design changes which fundamentally alter the build or operation and servicing procedures. They will be distributed through the company's dealers and agencies.

Your attention is drawn to the following symbols used throughout this manual:-



#### CAUTION

*This caution symbol draws attention to special instructions or procedures that, if not correctly followed, may result in damage to, or destruction of equipment.*



#### WARNING

*This warning symbol draws attention to special instructions or procedures that, if not strictly observed, may result in personal injury.*



#### WARNING

A WARNING SYMBOL WITH THIS TYPE OF TEXT DRAWS ATTENTION TO SPECIAL INSTRUCTIONS OR PROCEDURES WHICH, IF NOT STRICTLY OBSERVED MAY RESULT IN SEVERE PERSONAL INJURY, OR LOSS OF LIFE.

**Additional copies of this manual are available from Selwood Pt No 1514127S40MAN**

Published by Selwood Limited.  
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### Instructions for Ordering Replacement Parts

1. Always quote the pump serial number located on the plate fastened to the bearing and air pump mechanism housing.
2. Always quote the part number(s) (ten digit) of the component(s), NOT the item number(s).
3. Always quote the description of the component(s).

Items usually supplied together as sub-assemblies will have the sub-assembly part number printed at the bottom of the relevant page.

### HEALTH AND SAFETY AT WORK 1974

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

We take every care to ensure as is reasonably practicable that our products are safe and without risk to health when properly used. Nevertheless, appropriate health and safety precautions must be taken, and in particular you are requested to have special regard to the operational and safety requirements leaflet P769 which accompanies each pump on despatch from our premises.



Our products also conform to the E.E.C. Machinery Safety Directive and carry the C.E. mark.

### CALIFORNIA USA PROPOSITION 65 WARNING



Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

#### WARNING



Pumps and engines may be fitted with seals or 'O' rings manufactured from **VITON** or similar material.

When temperatures reach 400°C (720°F) a corrosive acid is produced, which cannot be removed from the skin. If signs of material decomposition are evident, or if in doubt, **always wear disposable heavy-duty gloves.**

## SAFETY PRECAUTIONS



### WARNING

ALL ITEMS IN THIS SECTION, IF NOT STRICTLY OBSERVED, COULD RESULT IN SEVERE PERSONAL INJURY OR LOSS OF LIFE.

1. Use only lifting equipment of suitable capacity for the size and weight of the equipment being lifted
2. The equipment must always be lifted using safe working practices and in accordance with any local and national guidelines or statutes. It is intended for guidance only. If in doubt, consult Selwood Pumps or a local lifting expert.
3. Whilst lifting the unit keep personnel well away and **never** allow people underneath.
4. Personnel working on the pump must always wear clean, correctly fitting clothing and safety footwear. Clothing impregnated with oil or fuel can constitute a health hazard through prolonged contact with the skin and may also constitute a fire hazard.
5. Check the type of liquid that the pump has been employed on before working on them. Residues could be hazardous to your health. If in doubt, flush thoroughly with clean water before commencing work.
6. Rotating equipment presents a hazard in itself. Alert surrounding personnel before starting and post notifications whilst in operation.
7. Moving parts are guarded to protect you. Guards removed for maintenance must be replaced before starting the pump.
8. Never insert anything into the pump body whilst the pump is running and the suction or delivery hoses are disconnected.
9. Use all flange bolt holes and ensure the correct bolt size and quality is utilised when connecting suction and delivery hoses.
10. Collapsible hoses must never be used on the suction side of the pump.
11. Keep the hose end suction area free from debris. Although the pump can handle solids up to the size indicated in the Technical Data section of this manual, larger or irregular solids may cause blockage with damage to pump components.
12. Always allow adequate ventilation for the pump driver. Diesel engines require air for both combustion and cooling. This air must never be allowed to re-circulate.
13. Be aware of burn and fire risks from items such as exhaust pipes and silencers. Never place flammable items around the unit.
14. Liquid pressure may still be present even after shutdown of the pump. Particular 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 an operator either directly or indirectly through the rotational motion it can induce.



**WARNING!** 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 variety.



**WARNING!** The pump should only be operated within the speed and pressure limits detailed in Section 1.5 of this manual.

1. If there is a danger of freezing, the fluid, normally retained within the pump between operating cycles, should be drained off through the drain tap provided.



2. **WARNING!** Never start or run the pump against a closed delivery valve (except the pump non return valve). Failure to comply may result in damage to the unit or personal injury.



3. **WARNING!** Noise level at operator position (Start Panel) is over 80dB(A). Hearing protection must be worn at all times within the canopy when the unit is running. Failure to comply may result in hearing damage or loss.

# SELWOOD SELTORQUE S160 / ISUZU 4LE2X SUPER SILENT CONTENTS

Title	Page
<b>SAFETY PRECAUTIONS</b> .....	<b>2</b>
<b>1 GENERAL INFORMATION</b> .....	<b>4</b>
1.1 Installation .....	4
1.2 Operation .....	4
1.3 Maintenance .....	4
1.4 I.C. Engines .....	4
1.5 Seltorque S160 Standard Data .....	4
<b>2 ROUTINE MAINTENANCE</b> .....	<b>5</b>
2.1 Service Information .....	5
2.2 Individual Service Parts .....	5
2.3 Service Kits .....	5
<b>3 LUBRICATION AND FASTENING TORQUES</b> ..	<b>6</b>
3.1 Pump Lubrication .....	6
3.1.1 Commissioning Period .....	6
3.1.2 After Commissioning Period .....	6
3.2 Fastening Torques .....	6
<b>4 Fitting Instructions for Bowex Couplings (Diesel Engines)</b> .....	<b>7</b>
4.1.1 Replacement of the Steel Splined Hub and Splined Rubber Element.....	7
<b>5 CONDITIONS OF WARRANTY</b> .....	<b>7</b>
<b>6 MAJOR SERVICING</b> .....	<b>8</b>
6.1 Air Pump Maintenance .....	8
6.1.1 Delivery and Suction Valves (A07).....	8
6.1.2 Actuator Valve (A16).....	8
6.1.3 Actuator Seal (A18).....	8
6.1.4 Actuator Neck Seal (A21).....	9
6.1.5 Drive Rod Seal Assembly and Bearing (A25 and A28).....	9
6.2 Separator Maintenance .....	10
6.2.1 Float (B11).....	10
6.2.2 Peel Valve (B21).....	10
6.2.3 Deposits of Solids .....	11
6.3 Impeller, Mechanical Seal and Delivery Valve Maintenance .....	12
6.3.1 Impeller (C04).....	12
6.3.2 Mechanical Seal (C08).....	12
6.3.3 Delivery Valve (C27).....	13
6.4 Maintenance of Flushing Chamber, Air Pump Mechanism, Drive Coupling, Drive Shaft Bearings and Lip Seal .....	14
6.4.1 Flushing Chamber (D33).....	14
6.4.2 Air Pump Mechanism .....	15
6.4.3 Bearings and Lip Seal (D15, D18 and D04).....	15
6.5 Chassis Maintenance .....	17
6.6 Supersilent Canopy – Canopy Removal .....	18
6.7 Supersilent Canopy – Fuel Tank Removal .....	18
6.8 Supersilent Canopy – Fuel Tank Refitting .....	19
6.9 Supersilent Canopy – Canopy Refitting .....	19
<b>7 WORKSHOP TOOLS</b> .....	<b>20</b>
7.1 Care of Servicing Tools .....	20
7.2 Fitting of Actuator Neck Seal .....	20
7.3 Removal of Mechanical Seal Stationary Seat and Joint Ring .....	20
7.4 Removal of Drive Rod Seal Assembly.....	21
7.5 Fit Seal Housing Sub-Assembly to Pump.....	21
7.6 Remove Drive Rod Bearing Bush.....	22
7.7 Fit New Drive Rod Bearing Bush.....	22
7.8 Assemble Flushing Chamber .....	22
7.9 Remove Eccentric .....	23
7.10 Remove Impeller .....	23
7.11 Fit Replacement Drive End Bearing .....	24
7.12 Fit Replacement Impeller End Bearing .....	24
7.13 Assembly of Drive Shaft with Bearings into Housing .....	25
<b>8 FAULT FINDING GUIDE</b> .....	<b>26</b>
<b>9 PARTS LIST</b> .....	<b>30</b>
9.1 Air Pump Parts (Single Prime).....	30
9.2 Separator Parts (Single Prime).....	32
9.3 Pump Body Parts .....	34
9.4 Delivery Valve Parts .....	36
9.5 Bearing Housing and Air Pump Drive Assembly Parts .....	38
9.6 S160 Pump Unit, Close Coupled, 1800 RPM – 1515032000 .....	40
9.7 Isuzu 4LE2X on Skid Assembly – 1515025000 .....	42
9.8 S160 / Isuzu 4LE2X Core Build – 1514127C00.....	46
9.9 Pump Drain Kit – 1015013000 .....	48
9.10 S160 / Isuzu 4LE2X Super Silent .....	50
9.11 Battery Isolator Kit – 1015014000 .....	54
<b>10 OPTION KITS</b> .....	<b>56</b>
10.1 Oil Drain Kit – 1515119000 .....	56
<b>11 Start-Stop 15151200000</b> .....	<b>58</b>
<b>Bulk Fuel Kit – 1014227000</b> .....	<b>59</b>
<b>12 NOTES</b> .....	<b>61</b>

# 1 GENERAL INFORMATION

## 1.1 Installation

1. The pump unit and its associated baseplate or trolley mounting should be positioned on a firm horizontal platform, and in the case of portable units restrained from accidental movement.
2. If the pump is fitted with push-on type suction and delivery spigots the hoses must be firmly secured on these spigots with heavy duty clamps or clips capable of withstanding the system operating pressure.
3. The integrity of the hose clamping arrangements should be checked at regular daily intervals in the case of static installations or whenever the pump is repositioned in the case of portable units.
4. Similar precautions should be taken with clamps securing multiple lengths of hose on installation where long delivery and suction lines are involved.
5. Delivery hose and any associated pipework should be capable of withstanding the maximum system operating pressure. Suction hose should be of the non-collapsible variety.

## 1.2 Operation

1. The pump should only be operated within the speed and pressure limits detailed in the operating handbook for the model in question.
2. If there is a danger of freezing, the fluid normally retained within the pump between operating cycles should be drained off through the drain taps provided.
3. Where protective caps are used to prevent damage to the suction and delivery spigots during storage or in transit they must be removed before the pump is started up.

## 1.3 Maintenance

1. Inspection and maintenance procedures are detailed in the operating and servicing manual for the model in question.
2. Replacement parts. Only the manufacturers or factory approved components should be used as replacement parts and where necessary they should be fitted with the assistance of the special purpose tools indicated in the operating and servicing manual.
3. All maintenance work must be carried out with the pump and engine/motor stationary.

## 1.4 I.C. Engines

1. Where I.C. engines are used to power the pump they have been mounted in accordance with the engine manufacturer's recommendations and adequate guarding provided between the pump and engine.
2. **Exhaust and Exhaust Pipes.** If there is a risk of accidental contact by operators, the exhaust

system should be lagged or screened and the outlet directed away from operators or other persons likely to be nearby. Direct contact with flammable materials of all types must be avoided. The importance of adequate ventilation to ensure removal of exhaust fumes when engines are operated in enclosed or covered accommodation cannot be over-stressed. Engines should not be run in hazardous explosive atmospheres.

3. **Access and Operation.** Ensure that the operator can start, control and stop the engine easily by making all controls readily accessible. Fit remote controls if access is difficult. Follow the instructions laid down in the Engine Manufacturer's Operators Handbook for starting, operating and stopping procedures.
4. **Fuel.** In addition to the fire hazard associated with fuel and lubricating oils, preventative action is necessary with respect to leakage, contamination and bodily contact.
5. **Electrical Connections.** It is essential that earth terminals are connected with an absolutely sound 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.

## 1.5 Seltorque S160 Standard Data

Capacity (max)	310M <sup>3</sup> /h 1408 gpm
Delivery Head (max)	27m 89ft
Self-Priming Lift (max)	8.8m H <sub>2</sub> O 28ft H <sub>2</sub> O
Solids Size (max)	100mm 4in
Air Handling Capacity	
Single Prime	24l/s 50ft <sup>3</sup> /min
Twin Prime	48l/s 100ft <sup>3</sup> /min
Pump Speed	1800rpm Max
Port Size BS.4504 Table 6	150mm 6in

## 2 ROUTINE MAINTENANCE

Lack of routine maintenance is the most frequent reason for the breakdown of pumps. We earnestly advise users to ensure that at least the following actions are taken.

1. Check these three oil levels daily:
  - a) Engine oil.
  - b) Bearing housing oil.
  - c) Flushing chamber oil.
2. Always drain water from the pump in cold weather when it is not running. Drain:
  - a) Pump body.
  - b) Delivery valve chamber.
  - c) Both sides of air pump (4 drain taps if twin prime).
3. Do NOT run the pump if significant quantities of water escape through the exhaust valve of the air pump. This pump is designed to handle moisture-laden air, but not to pump a high percentage of water. Refer to servicing instructions for further advice.
4. Do NOT run the pump if malfunction is suspected in any of its parts. In particular, it must immediately be serviced if the level of oil in the flushing chamber varies daily, or if the oil becomes contaminated with the pumped fluid.
5. A hose strainer should always be fitted to the free end of the suction line if there is a possibility of oversized solids entering the pump. The dimensions of rocks, pebbles, etc. must not exceed 100mm (4"). Larger soft solids, however, of the type found in abattoir duties, for example, will pass freely through the pump. Refer to Selwood Ltd if in need of advice in this connection.
6. As loss of prime and indeed loss of on-stream performance can easily arise as the result of leaking pipework joints, we recommend that all line fittings associated with the pump should be checked periodically for air-tightness.
7. It is most important to use the correct fuel oil in the engine. Make sure that it is appropriate for the weather conditions (summer or winter) and that it is clean and free from water and foreign matter. Unsatisfactory running performance, excessive wear and damage can all result from the use of an incorrect or contaminated fuel.
8. Periodically check the tension of all nuts and bolts, especially those securing the engine and pump to the chassis.
9. Pump servicing must always be carried out in accordance with the instructions given in 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. The Company will be pleased to give advice in this connection.
10. Engine servicing must always be carried out in accordance with the instructions given in the

manufacturer's manual. Do not hesitate to contact Selwood Ltd if the need for further advice arises.

11. Please contact Selwood Ltd in the event of experiencing difficulty when servicing. The company will also be very pleased to give advice in connection with the machine's installation, operation and maintenance.
12. All practical work must be carried out in compliance with the Health and Safety at Work Act, 1975. Always start the engine in accordance with the manufacturer's instructions.

**NOTE:** If the above advice is followed, the likelihood of an expensive break down will be greatly diminished. The pump should give a long and trouble free life if these measures are put into effect.

### 2.1 Service Information

Engine Type – 4LE2XABW-02

Coolant Spec – Besco LLC Super Type E / AS

Fuel Spec – EN590, ASTM D975

### 2.2 Individual Service Parts

Oil Filter – 8980756761

Fuel filter (Pre) – 8982402790

Fuel Filter (Main) – 8982402800

Air Filter (Main) – EP110563

Air Filter (Safety) – EP110564

Fan Belt – 8980953350

### 2.3 Service Kits

500 Hour Kit – QIS4LE2X0500H

1000 Hour Kit – QIS4LE2X1000H

### 3 LUBRICATION AND FASTENING TORQUES

#### 3.1 Pump Lubrication

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

COMPONENT	Q8 GRADE
Engine	API CJ-4 or ACEA E6 or E9 10W/40 or 15W/40
Bearing Housing	T760 – 15W/40
Flushing Chamber	T760 – 15W/40
Actuator Bore	Ravel LG
Impeller Bore	Ravel LG
Paper Gaskets	Rembrandt EP2
Axle Shafts	Rembrandt EP2
Axle Pivot Assembly	Rembrandt EP2
M10 Screws - Port Plate to Diffuser	Copper Thread Compound

COMPARTMENT	SERVICE/DRAIN	
	CHANGE OIL & FILTERS	CHECK & TOP UP
Engine	500 Hours	Daily
Bearing Housing Flushing Chamber	500-1000 Hours	Daily
Actuator Bore Impeller Bore Shaft Sleeve Bore	ON ASSEMBLY	
Paper Gaskets Axle Shafts Axle Pivot Assembly	ON ASSEMBLY	
M10 Screws - Port Plate to Diffuser	ON ASSEMBLY	

##### 3.1.1 Commissioning Period

Drain both pump chambers and engine within 100 running hours of commissioning either a new, or rebuilt pump, and refill with new oil to level plugs.

Flushing chamber capacity about 2.3litres (4 pints).

Bearing housing capacity about 3.5litres (6¼ pints).

Engine sump – Refer to Engine Instruction Book.

##### 3.1.2 After 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. Under no circumstances should the period for the pump exceed 1000 running hours.

#### 3.2 Fastening Torques

Failure to tighten threaded fasteners correctly can easily lead to assembly breakdown. It is very important, therefore, when carrying out the instructions in this manual, to achieve the appropriate tensioning torques. In some cases, specific requirements are described in the instructions, which must always be implemented. The following torques, in particular, must be applied.

Item	Tightening Torques	
	lb.ft	Nm
(F29)(F30) M16 Pump/Engine/Fuel Tank to Chassis Fixings	180	245
(D36) Actuator Cap Screw 0015975000	60	81
(A22) Cap Screw M12 9001240-02	60	81
(C01) Impeller Screw 9000160402	80	108
Air Pump Drive rod (D37) to Small End of Connecting Rod (D26) - M8 Fixing (D27) to (D38)	21	28



## 4 FITTING INSTRUCTIONS FOR BOWEX COUPLINGS (DIESEL ENGINES)

### IMPORTANT NOTES – OBSERVE STRICTLY:

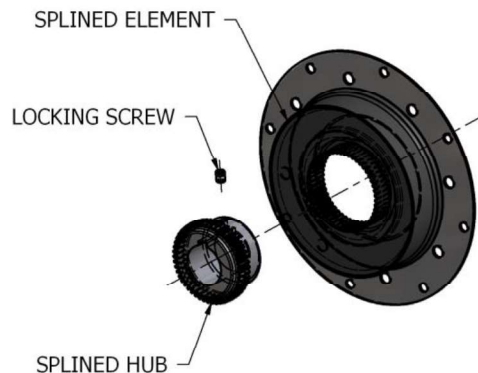
The Bowex Elastic Coupling Assembly is supplied in two halves and must be fitted to the pump drive shaft and engine flywheel individually. Typically, the most likely component to require replacement will be the rubber flywheel element.

The coupling assembly consists of a central steel splined hub fastened to the pump drive shaft using a grub screw onto the drive key and a splined rubber element fastened to the engine flywheel.

#### 4.1.1 Replacement of the Steel Splined Hub and Splined Rubber Element

**NOTE:** Before separating the pump from the engine, the rear of the engine **must** be suitably supported using wooden blocks or similar as this end will become un-supported when unbolted from the pump bell housing.

1. To separate the pump from the engine you must first unbolt the bell housing from the engine. Slide the pump back away from the engine to reveal the coupling.



3. To remove the coupling hub from the pump shaft, loosen the grub screw which is fastened to the pump drive key. Note the position of the hub on the pump shaft to aid re-fitting.
4. Inspect and re-fit or re-furbish as necessary. Secure Grub screw to Drive key and lock with suitable thread locking adhesive.
5. To remove coupling element from the engine flywheel, remove the 8 fastening bolts from the element backplate.
6. Inspect and re-fit or re-furbish as necessary. Check for damage or wear to the splined teeth and/or rubber element.
7. First fasten Coupling element to Flywheel hand tight using 8 off screws grade 8.8 or more.

8. Tighten the screws to a torque of 49Nm using a suitable Torque wrench.
9. Slide the pump back towards the engine ensuring the splined hub and element are in line.
10. The bell housing location to the engine flywheel register will ensure coupling alignment is maintained
11. Fasten bell housing to engine flywheel housing.

## 5 CONDITIONS OF WARRANTY

For a period of twelve months from delivery of any Selwood pump to the first user thereof, or eighteen months from the despatch of any such pump by Selwood, whichever period is the shorter, Selwood will repair or, at its option, replace any component which in the opinion of Selwood has failed due to defective workmanship or materials.

For full terms and conditions please contact Selwood Ltd.

## 6 MAJOR SERVICING

### 6.1 Air Pump Maintenance

#### 6.1.1 Delivery and Suction Valves (A07)

Failure of the pump set to prime quickly or to discharge the expected volume of air, may simply be due to faulty valve operation.

To inspect and service, proceed as follows:

1. Remove air hose (single prime item (A01), twin prime items (A39/40)) from suction valve box (A03/A41), after loosening relevant hose clips (A02).
2. Note the orientation of the suction valve box (A03) and exhaust cover (A04) before commencing. Remove exhaust cover (A04) and suction valve box (A03) by releasing nuts (A05) and spring washers (A06).

**NOTE:** The above actions allow the condition of the two valve rubbers (A07) to be checked. Do NOT attempt to remove valve studs (A08). If valve rubbers are damaged, replace with new components. Pull old valves off stud heads, and discard.

3. Check and, if necessary, clean valve seats in outer pump body (A15) and valve box (A03). Smear heads and grooves of studs with soft soap and push on new valves ensuring that they seat correctly.
4. The valve assemblies can now be replaced by reversing Instructions 1 and 2 of this procedure. It is advisable to fit new gaskets (A30).

#### 6.1.2 Actuator Valve (A16)

Another reason for the pump set failing to prime efficiently or to handle the expected volume of air could be malfunction of the actuator valve (A16).

To inspect and service, proceed as follows:

1. Remove nuts (A11), spring washers (A12), washers (A13) and screws (A14), allowing outer pump body (A15) to be removed complete with attached delivery valve assembly. The actuator valve (A16) may now be examined. If it fails to seat efficiently on actuator (A20) or is in any way damaged, it should be pulled off the actuator nut and discarded.
2. Whilst the actuator valve (A16) is removed, it is advisable to examine the condition of the valve seat in the actuator (A20), and also to check the security of the actuator screw (D36). This should be checked and tightened to 60lbf ft (8.3kgf m) torque.
3. To replace actuator valve (A16):
  - a) Smear soft soap on the conical end and groove of actuator screw (D36).
  - b) Ease new valve rubber into position ensuring that it seats correctly.

**NOTE:** It is advisable to examine the condition of actuator seal (A18) whilst it is exposed. Refer to

Section 6.1.3 Actuator Seal (A18) for servicing instructions.

4. To replace outer pump body assembly, fit and evenly tighten screws (A14), washers (A13), spring washers (A12) and nuts (A11), by sequentially turning each screw a small amount until they are all fully tensioned.

**NOTE:** It is important that the outer diameter of the actuator seal (A18) should be evenly clamped.

#### 6.1.3 Actuator Seal (A18)

A further reason for the pump set failing to prime efficiently or to handle the expected volume of air could be a faulty actuator seal (A18).

To inspect and service, proceed as follows:

1. Remove outer pump body (A15) complete with delivery valve assembly. Remove actuator screw (D36).
2. Set actuator to top dead centre (maximum distance from inner pump body), by rotating engine shaft with starting handle. Using a tool that will not cut the rubber (such as a blunt screwdriver) and a lubricant (soap solution), remove actuator seal (A18) by prising it from the inner pump body (A19).
3. Remove actuator (A20) complete with seal from drive rod (D37).
4. To renew actuator seal (A18):
  - a) Remove the failed component from the actuator.
  - b) Insert firstly one side and then the other into the actuator groove, using a blunt tool that will not cut the rubber.

**NOTES:** The seal is handed and will not enter the inner pump body (A19) if fitted the wrong way round. The correct assembly position for actuator seal (A18) is with the smaller diameter of its conical outer surface towards the inner pump body (A19). It will be seen that the housing in the body is tapered in the same direction as the external surface of the seal.

5. At this stage it is advisable to examine the condition of actuator neck seal (A21). This component should be replaced if any splits are evident on its visible surface. Refer to Section 6.1.4 Actuator Neck Seal (A21).
6. Smear soft soap on the outside section of new actuator seal (A18). Lightly grease actuator bore. Position actuator/seal assembly on drive rod (D37), locate actuator screw (D36) and tighten to 60lbf ft (8.3kgf m) torque.
7. Replace actuator valve if removed (A16) first smearing soft soap on the conical end and groove of actuator screw (D36). The new valve should be eased into position by hand.
8. Before fitting outer pump body (A15), reciprocate the actuator by fitting and rotating the engine's starting handle about ten times to encourage centralisation of the connecting rod bearings. During this procedure, the actuator seal (A18) is likely to rotate slightly in the inner pump body



(A19). Stop shaft rotation when actuator is at bottom dead centre (minimum distance from inner pump body).

9. Seat outside section of actuator seal in inner pump body recess by gently tapping with a non-metallic mallet.
10. Replace outer pump body assembly, and fit and evenly tighten screws (A14) washers (A13) spring washers (A12) and nuts (A11), by sequentially turning each screw a small amount until they are all fully tightened. It is important that the outside diameter of the actuator seal (A18) should be clamped evenly.

#### 6.1.4 Actuator Neck Seal (A21)

Another reason for the pump set failing to prime efficiently or to handle the expected volume of air could be failure of the actuator neck seal (A21).

To investigate and service, proceed as follows:

1. Remove outer pump body (A15) complete with delivery valve assembly, and actuator (A20) with actuator seal (A18) as directed in Section 6.1.3 Actuator Seal (A18) Instructions 1 and 2.
2. Release hose clip (A02) allowing air hose to be disconnected from suction valve box (A03). Screws (A22) should then be removed, leaving washers (A23) in inner pump body (A19).
3. The inner pump body can now be pulled by hand from the bearing housing, if necessary twisting to overcome any tendency of the seal (A21) to stick to drive rod (D37). Remove and discard failed seal.
4. Smear new actuator neck seal (A21) with soft soap to assist fitting, position in inner pump body (A19) and push both components over drive rod (D37) using assembly tool (Part No. 0015102000) smeared with soft soap. Check that washers (A23) are in place, and fit and fully tighten screws (A22). The heads of these screws should be fully contained within the recesses in the inner pump body.
5. Reassemble remaining components in accordance with Section 6.1.3 Actuator Seal (A18) Instructions 6 to 10, inclusively.

#### 6.1.5 Drive Rod Seal Assembly and Bearing (A25 and A28)

If oil leaks from ports in housing (A24) it is probable that seal assembly (A25) is excessively worn. Such a condition may also indicate that drive rod bush (A28) should be replaced.

To inspect and service, proceed as follows:

1. Drain oil from bearing housing by removing filler cap (D08) and drain plug (D13).
2. Remove air pump components in accordance with Section 6.1.3 Actuator Seal (A18) Instructions 1 and 2, and to Section 6.1.4 Actuator Neck Seal (A21) Instructions 2 and 3.
3. Being careful not to damage the flat sealing faces of housing (A24), carefully withdraw housing

complete with its bearing and sealing components from bearing housing (D06) and drive rod (D37).

4. Examine condition of lip and distributor seals together with bearing. If either are worn or damaged, we recommend that a new housing (Part No. 0010905000) complete with seal assembly and bearing (A28) should be ordered and fitted. However, individual components can be renewed in accordance with the following instructions.
5. To replace drive rod bearing (A28) carefully remove circlip (A26) allowing seal components to be pushed from housing with blunt punch or drift from bearing end. The drive rod bearing can now be removed using bearing drift (Part No. 0015168000) and the new component pressed into position so that one face is flush with the end of the housing.
6. Ensure that seal components are assembled in accordance with the following instructions.
  - a) The wiper seal (A34) is first assembled to the drive rod seal carrier (A32) using wiper seal insertion tool (Part No. 0010103000) ensuring the correct orientation.
  - b) Then the internal distributor seal (A33) is offered up to the bearing and seal housing (A24) ensuring again the correct orientation and pushed into place with the drive rod seal carrier (Part No. 0015195000) together with wiper seal (A34) and the whole pressed into place with the wiper seal insertion tool (Part No. 0010103000). Care must be exercised when replacing circlip (A26) to ensure that the lip of the wiper seal (A34) is not damaged by the hand tools used. Refer to Section 6.4.
7. Before replacing bearing/seal housing assembly, check condition of drive rod, particularly if new bush (A28) has been fitted. If surface is significantly worn, the drive rod should be replaced in accordance with instructions given in Section 6.4 Maintenance of Flushing Chamber, Air Pump Mechanism, Drive Coupling, Drive Shaft Bearings and Lip Seal. Specifically Section 5.4.2.
8. Assembly tool (Part No. 0015101000) must be used when replacing bearing/ seal housing assembly to ensure that the wiping edges of the seal assembly (A25) are not damaged. The drive rod must be smeared with clean oil to assist this procedure. See Section 6.5. Gasket (A27) must be renewed. Always use a component supplied by Selwood Ltd. Ensure that ports in housing (A24) are in the 3 and 9 o'clock positions.
9. Reassemble remaining pump components in accordance with Section 6.1.4 Actuator Neck Seal (A21) Instruction 4 and 6.1.3 Actuator Seal (A18) Instructions 6 to 10, inclusively.
10. Replace drain plug (D13) together with sealing washer (D14) and refill bearing housing (D06) with clean oil to level of plug (D08) and replace plug together with 'O' ring (D07). Refer to Section 3.1 Pump Lubrication for details of the oil required for the Bearing Housing.

## 6.2 Separator Maintenance

### 6.2.1 Float (B11)

If water in significant quantities continuously passes through the exhaust valve (A07) of the air pump, it is probable that the float (B11) is in need of replacement.

To inspect and service, proceed as follows:

1. Disconnect air hose (A01) by loosening hose clip (A02), and twin prime (A40) by loosening hose clip (A02).
2. Remove nuts (A11) and washers (A12) and lift off separator cap (B01) complete with peel valve/upper diffuser assembly (B01) to (B21), inclusively.
3. Examine condition of float (B11) and replace with new component if punctured or significantly worn.
4. Check condition of peel valve rubber (B21) and bush (B07) replacing them, if necessary, in accordance with Section 6.2.2 Peel Valve (B21). Also check for deposits of solids likely to interfere with the smooth working of the float system.
5. When fitting a new float, ensure that it is securely tightened against nut (B12). During this procedure the float should be positioned on the rod so that the operating plate (B15) with its associated peel valve fasteners is just clear of the central clamp bar screws (B16), when the float is located in the upper diffuser cone.
6. If all components are seen to be in satisfactory condition, replace separator cap assembly, washers (A12) and nuts (A11). Alternately tighten each nut a small amount to ensure that the cap is pulled down evenly. Do not over tighten. Replace air hose(s) and re-tension hose clip (A02).

### 6.2.2 Peel Valve (B21)

If significant quantities of water are discharged from the exhaust valve (A07) of the air pump, and the float (B11) is in satisfactory condition, it is probable that a fault exists in the peel valve assembly.

To inspect and service, proceed as follows:

1. Remove separator cap sub-assembly (B01) to (B21) and unscrew float (B11) and nut (B12).
2. Release screws (B09) and spring washers (B10) to allow upper diffuser/valve assembly to be withdrawn.
3. Remove screws (B04) and sealing washers (B05) to allow upper diffuser (B06) to be removed from the port plate sub-assembly.
4. Examine condition of peel valve rubber (B21) and air ports in plate (B03) which it should completely cover when the float is fully raised. If the rubber does not seat correctly, is distorted, or in any way damaged, it must be removed and discarded by releasing screws (B16).
5. To fit new peel valve rubber (B21):
  - a) Carefully clean existing parts thoroughly, especially surfaces of port plate (B03), and

clamp bars (B19) and position new rubber on plate.

- b) Assemble screws (B16), clamp bar (B19), clamp bar seal (B20), washer (B18) and nuts (B17) in sequence shown on drawing. Alternately tighten each nut a small amount to ensure that even clamping pressure is produced. Correctly tightened nuts will not cause the clamp bar to distort the rubber.
6. Carefully attach the ends of the valve rubber (B21) to the operating plate (B15), noting that the components and method of assembly are identical to those described in Instruction 5 of this Section except that clamp bar seal (B20) is omitted. Again, ensure that the nuts are not over tightened.
  7. After completing Instructions 5 and 6 of this Section, check that the peel valve rubber is capable of closing all of the air holes in port plate (B03) when operating rod (B13) is square to the plate and fully lifted.
  8. Check condition of bush (B07) in upper diffuser (B06) and replace, together with clip (B08) and nitrile washer (B37), if significantly worn.
- NOTE:** The operating rod (B13) is normally a slack fit in the bush.
9. Position port plate sub-assembly on upper diffuser (B06), fit washers (B05) after checking that they will seal efficiently and fully tighten screws (B04). Reassemble nut (B12) and screw float (B11) on to operating rod and tighten securely in accordance with Section 6.2.1 Float (B11) Instruction 5.
  10. Recheck operation of peel valve rubber (B21) to ensure that it fully covers air ports in plate (B03) when the float is located in the upper diffuser cone. In this position there should be a gap of 3.5 mm between the heads of the centre clamp bar screws (B16) and the operating plate (B15). If the dimension is incorrect, adjust position of float on operating rod.
  11. Examine condition of gasket (B02) and renew, if necessary, before installing between port plate (B03) and separator cap (B01). Fit spring washers (A12) and screws (A11) each of which should be sequentially turned a small amount until fully tightened. Gasket (B02) must be evenly compressed.
  12. Replace separator cap sub-assembly in accordance with Section 6.2.1 Float (B11) Instruction 6.

### 6.2.3 Deposits of Solids<sup>†‡</sup>

When handling liquids containing solids capable of adhering to product wetted surfaces, it is advisable periodically to check the valve system in the separator.

To inspect and service, proceed as follows:

1. Remove separator cap sub-assembly in accordance with Section 6.2.1 Float (B11) Instructions 1 and 2, allowing separator body (B22) together with lower diffuser (B24), to be lifted off the suction tube (B27).
2. Remove any deposits of scale from lower diffuser (B24) and check condition of welds securing its circular bottom to the perforated cylinder. Remove any solids that may have accumulated in the suction tube (B27), renew gasket (B25) and reposition separator body/lower diffuser assembly on suction tube.
3. Remove deposited materials from surfaces of upper diffuser (B06) and note, in particular, condition of welds securing cone and disc to perforated diffuser body. Also examine diffuser bush (B07) and operating rod (B13), and replace if significantly worn in accordance with Section 6.2.2 Peel Valve (B21) Instructions 3 to 11. Remove all deposited solids that would interfere with the free movement of the mechanism, obstruct the passage of air across the port plate holes, or inhibit the flow of water (through the holes in the upper diffuser, for example).
4. Once it is established that all components are in a satisfactory condition and are free from scale, replace separator cap sub-assembly in accordance with Section 6.2.1 Float (B11) Instruction 6. Any re-assembly work carried out on the peel valve assembly should be in accordance with Section 6.2.2 Peel Valve (B21) commencing Instruction 1.

The fabricated separator chamber (B35) (Part No. 0015105100 is normally utilized when the pump is fitted with Twin Prime where the larger volume allows better separation of air from the pumped liquid.

The two top fixings attaching the separator chamber (B35) to the pump body (C09) are located inside the chamber necessitating (B36) M12 dome nuts and spacer washers to protect the stud threads.

<sup>†</sup> Use lower Diffuser (Part No. 1594161000) for sludge handling duties. This is recognised by holes in the base as well as around the side.

<sup>‡</sup> Use lower Diffuser (Part No. 00-15-038000) for other applications where no solids are present which can adhere to the internal surfaces.

## 6.3 Impeller, Mechanical Seal and Delivery Valve Maintenance

### 6.3.1 Impeller (C04)

Generally speaking, it is only necessary to remove the impeller if the existing component has become severely abraded, or if access to other rotating parts is required.

To remove and replace, proceed as follows:

1. Remove air hose item (A01), twin prime item (A39) and (A40) from separator cap (B01), after loosening relevant hose clip (A02).
2. Remove nuts (A11) and washers (A12), and lift off separator cap (B01) complete with peel valve/upper diffuser assembly, (B01) to (B21) inclusively.
3. Lift separator body (B22) complete with lower diffuser (B24) off suction tube (B27) or (B35) allowing (dome) nuts (B36) or (B29) and spring washers (B39) or (B30) to be released.
4. Withdraw suction tube (B27) or (B35) and gasket (B28) after removing nuts (B29) and associated spring washers (B30).
5. Drain oil from flushing chamber by removing filler cap assembly (D08) and drain plug (D34). The condition of the oil will indicate whether or not the mechanical seal has been functioning correctly. If contamination is evident, the mechanical seal must be replaced in accordance with Section 6.3.2 Mechanical Seal (C08).
6. Remove impeller screw (C01) and washers (C02) and (C03), and withdraw impeller (C04) from drive shaft (D17). To remove the screw, it will be necessary to lock the impeller by means of a wooden block wedged between the impeller blades and pump body (C09).

**NOTE:** An impeller removal tool (Part No. 0015WRS781) is available to facilitate removal of the impeller, refer to Section 6.10 Remove Impeller.

Removal of the impeller will allow the mechanical seal spring to expand. Do not touch the shaft sleeve (C06) or spring if the mechanical seal has been functioning correctly and only the impeller is to be replaced. Premature failure of the mechanical seal assembly could result if the seal's faces are disturbed by moving the shaft sleeve.

7. When fitting a new impeller, ensure that key (C05) is not a tight fit in the impeller keyway. If necessary, remove very small amounts of metal from the sides of the key to achieve a close sliding fit that will not allow any perceptible rotation of the impeller on the shaft, and yet allow the impeller to slide into place by hand. Apply Rustilo 431 grease (or approved equivalent) to all impeller mounting surfaces.
8. Check condition of nylon patch on impeller screw (C01). It is *essential* that this screw should be stiff to turn in the thread of the shaft. On no account

use a screw that moves freely. Use a new screw if the head of the original component is abraded or if the screw is not a friction fit in the shaft thread. Do NOT lubricate these threads.

9. Replace impeller (C04), washer (C03) two washers (C02) with concave faces towards impeller and impeller screw (C01), and tension screw to 80lbf ft (11kgf m) torque. It is essential that this screw is correctly tensioned. During this operation, it will be necessary to lock the impeller by means of a wooden block wedged between the impeller blades and pump body (C09). Remove block after use.
10. Use Rustilo 431 on inside of pump register. Fit new gasket (B28), position suction tube on studs, fit washers (B30) and (B39) and fully tighten nuts (B29) and (B36). Grease should be smeared on the inside of the dome nuts (B36), which must be correctly positioned on studs inside suction tube.
11. Renew gasket (B25), reposition separator body sub-assembly on suction tube, and fit separator cap assembly. Assemble washers (A12) and nuts (A11) and alternatively tighten each nut a small amount to ensure that the cap is pulled down evenly. Do NOT overtighten.
12. Reposition air hose (A01) on spigot of separator cap (B01) and tighten hose clip (A02).
13. Replace drain plug (D34) using PTFE tape as a sealant, and fill flushing chamber with new oil to level of plug. Replace plug and 'O' ring (D08) and (D07). Refer to Section 3.1 Pump Lubrication for details of the oil required for the flushing chamber.

### 6.3.2 Mechanical Seal (C08)

The mechanical seal should be replaced if the flushing chamber oil continuously leaks into the pumped fluid, or if the oil becomes contaminated with the product. This latter condition is sometimes indicated by leakage of fluid out of a breather cap (D12). Under extreme conditions, pumped fluid may be seen escaping out of the vent at the bottom of flushing chamber (D33).

In the event of abrasive materials being detected in the oil, it is likely that lip seal (D04) will have become worn and necessitate replacement in accordance with Section 6.4.3 Bearings and Lip Seal (D15, D18 and D04).

Daily checks on oil condition should ensure that seal failure is detected before damage occurs to related components.

If the mechanical seal leaks, proceed as follows:

1. Drain oil from flushing chamber (D33) by removing its filler cap (D08) and drain plug (D34).
2. Remove impeller (C04) in accordance with Section 6.3.1 Impeller (C04) Instructions 1 to 6 inclusively, and remove impeller key (C05).
3. Withdraw shaft sleeve (C06) together with rotating mechanical seal parts and spring. It is likely that 'O' ring (C07) will be withdrawn with the sleeve remove it and check condition. Replace 'O' ring if unsuitable for further service.

4. Using seat removal tool (Part No. 0015166000), withdraw mechanical seal stationary seat from its housing in pump body (C09). Also remove the seat's rubber joint ring. Refer to Section 7.3 Removal of Mechanical Seal Stationary Seat and Joint Ring.
5. The rotating parts of mechanical seal (C08) should now be removed from the shaft sleeve and discarded, taking care not to damage the sleeve's surfaces. This operation should be carried out by hand using a tool that will not scratch the sleeve. Once removed, examine condition of sleeve and replace with new component if unacceptably corroded or worn.

### IMPORTANT ADVICE



New mechanical seal components must be handled with great care; in particular, the seal faces must not be touched by hand and must only come into contact with clean soft paper that is free from abrasive materials. Premature seal failure is likely to occur if this advice is not heeded.

6. Thoroughly clean recess in pump body (C09) and also the surrounding surfaces. Smear lubricant (soft soap or washing up liquid, but not grease) in recess and also on outside diameter of rubber joint ring. Using several layers of clean soft paper to protect the seating face, press seat into recess by applying even finger pressure. Make sure that the highly polished sealing face is on the impeller side of the recess, that the new joint ring has been used, and that the seat is positioned directly against the shoulder at the bottom of the recess, the face must be absolutely clean.
7. Smear oil on drive shaft diameters and 'O' ring (C07). Position 'O' ring on shaft taking care to prevent it contacting the shaft's keyway. If a new shaft sleeve (C06) is being used, ensure that it is capable of sliding freely along the shaft and correctly trapping the 'O' ring in the recess provided.
8. With clean hands, smear soft soap on outside diameters of shaft sleeve (C06) and place flange down on a flat, clean surface. Smear soft soap on the inside of the rubber seal bellows and before it dries push the bellows onto the shaft sleeve (face upwards) with a twisting action. Make sure that the face is protected during this procedure. The reduced diameter of the sleeve will assist location of the seal, which must be pushed until it rests firmly against the sleeve flange. Apply even pressure to the spring and carrier (Not the seal face).
9. Make sure seal face is clean and lubricate with a couple of drops of fresh oil spread with a clean finger. Carefully place the sleeve on pre-lubricated

shaft see Section 6.3.2 instruction 7 and slide until both faces touch together. There is no need to compress the seal this will be done by the fitment of the impeller.

10. Refit key and lightly grease protruding shaft and Rustilo 431 or equivalent. Refit impeller, washers and screw in accordance with Section 6.3.1 instructions 7 to 9. The action of tightening the impeller screw (80 lbf/ft – 11Kgf/m torque) will compress the seal assembly into position. Replace remaining components in accordance with Section 6.3.1 Impeller (C04) Instructions 10 and 13, inclusively.

### 6.3.3 Delivery Valve (C27)

Failure of the pump set to pump under suction lift conditions could be due to a fault in the delivery valve assembly.

To inspect and service, proceed as follows:

1. Ensure that pump has been shutdown and the delivery line has been drained.
2. Release T-bolt (C19), swing locking bar (C22) clear, and remove inspection panel (C24) and gasket (C25). It now becomes possible to lift the valve by hand to expose the valve seat (C16) so allowing foreign matter to be removed. Also undertake a preliminary check of the condition of the valve rubber.
3. If further disassembly is required, remove screws (C29) and washers (A13), allowing clamping bar (C28) and delivery valve (C27) complete with valve plates (C26) and (C30) to be removed.
4. Separate upper and lower valve plates (C26) and (C30) by removing nut (C31), and examine condition of rubber (C27), especially along the hinge line and seating surface. Discard if damaged or misshapen.
5. To replace valve seat (C16), remove valve chamber (C18) after releasing nuts (B31) and spring washers (C15).
6. Reassemble components in reverse order, renewing gaskets (C17) and (C25) if necessary. Ensure that radiused edge of clamping bar (C28) is adjacent to hinge line of valve rubber (C27) and that each screw is tightened a small amount so as to produce an even clamping pressure. Correctly tightened screws will not cause the clamp bar to distort the rubber. Seal screws with Loctite 572.



## 6.4 Maintenance of Flushing Chamber, Air Pump Mechanism, Drive Coupling, Drive Shaft Bearings and Lip Seal

### 6.4.1 Flushing Chamber (D33)

Leakage of oil through the vent at the bottom of flushing chamber (D33) could be due to failure of either of the lip seals (D04). If the pumped liquid also leaks through the vent, the mechanical seal (C08) will require to be replaced in addition to its adjacent lip seal (D04). In any of these events, proceed as follows:

1. Drain oil from flushing chamber and bearing housing by removing filler caps (D08) and drain plugs (D13) and (D34).
2. Remove separator assembly and suction tube (B27) or (B35) in accordance with Section 6.3.1 Impeller (C04) Instructions 1 and 4, inclusively.
3. Remove impeller screws (C01) and washers (C02) and (C03), and withdraw impeller (C04) mechanical seal spring, and shaft sleeve (C06) complete with mechanical seal parts (C08). Handle the sleeve and mechanical seal with great care and store in safe place, particularly if these parts are to be reused.
4. Remove split guard fitted around flexible coupling, and release all of the coupling's fasteners allowing the rubber tyre to be removed.
5. Attach lifting equipment to bearing housing and pump body in compliance with requirements of Health and Safety at Work Act, 1975.
6. Remove nuts, bolts and washers securing pump to chassis and hoist clear, carefully noting the positions of any shims between pump feet and chassis.
7. Lower unit onto working surface and, in compliance with Health and Safety at Work Act, 1975, tip pump onto ends of studs (C10) ensuring that they are suitably protected from damage.
8. Remove nuts (A11) and spring washers (A12) and carefully separate bearing housing and flushing chamber assembly from pump body (C09). During this operation, be very careful not to damage the mechanical seal stationary seat by allowing it to contact the shaft.
9. It now becomes possible to remove flushing chamber (D33) from bearing housing (D06), after releasing screws (D31) and spring washers (A06).
10. To replace lip seals (D04):
  - a) Press failed components out of housings and discard.
  - b) Thoroughly clean all surfaces of flushing chamber (D33) and press new seals into position, ensuring that they face in the correct directions: The garter spring fitted to the lip of the seal nearest the bearing housing, should be visible from the bearing housing side of the flushing chamber. The garter spring fitted to the lip of the seal nearest the impeller, should be visible from the impeller side of the flushing chamber. Refer to Section 7.8.5 Assemble Flushing Chamber for disposition of seals.
11. Replacement of the flushing chamber sub-assembly in the bearing housing must be undertaken very carefully to ensure that the lips of seals (D04) are not damaged by the shoulders on the drive shaft (D17). Use assembly tool (Part No. 0015165100) for this purpose. A generous quantity of oil should be applied to the shaft to assist this operation, and a new gasket (C13) should be fitted. Replace and tighten screws (D31) and spring washers (A06).
12. Position new gasket (C13) on studs (C14) and fit bearing housing assembly to pump body, taking great care to ensure that the shaft does not touch the mechanical seal stationary seat. Replace and tighten nuts (A11) and spring washers (A12).
13. Using lifting equipment in compliance with the Health and Safety at Work Act, 1975, position pump unit on chassis being careful to replace any shims in their original positions. Replace nuts, bolts and washers and assemble, but do not tighten nuts.
14. Refer to Section 1.5 when refitting the pump to a diesel engine. Refer to Section 1.7 when refitting the pump to an electric motor.
15. Replace split guards around flexible coupling and ensure that it is securely fastened, with nuts bolts and washers. Also fasten to flywheel guard where applicable with bolts and washers.
16. Read Instructions 19 to 21 of this Section and Section 6.4.2 Air Pump Mechanism Instructions 1 to 3, and:
  - a) Carefully remove any foreign matter from the sleeve and mechanical seal components. Smear clean engine oil on both the 'O' ring (C07) and the drive shaft diameters.
  - b) Position the 'O' ring on the shaft taking care to prevent it contacting the drive shaft's keyway, and slide the sleeve/seal assembly onto shaft (carbon face towards stationary seat) and press into working position using only the sleeve's flange.
  - c) Ensure that 'O' ring is correctly trapped in sleeve recess.
17. Replace impeller, suction tube and separator components in accordance with Section 6.3.1 Impeller (C04) Instructions 7 to 12, inclusively.
18. Replace bearing/seal housing assembly and actuator neck seal in accordance with Section 6.1.5 Drive Rod Seal Assembly and Bearing (A25 and A28) Instruction 8 and Section 6.1.4 Actuator Neck Seal (A21) Instruction 4.
19. Replace remaining air pump components in accordance with Section 6.1.3 Actuator Seal (A18) Instructions 6 and 10, inclusively.



20. Replace drain plug (D34) using PTFE tape as sealant, and fill flushing chamber with new oil to level of plug hole. Replace plug (D08) with 'O' ring (D07). Refer to Section 3.1 Pump Lubrication for details of the oil required for the flushing chamber.
21. Repeat this procedure for bearing housing ensuring that level plug (D08) with 'O' ring (D07) are replaced after the correct oil level is attained.

#### 6.4.2 Air Pump Mechanism

Should actuator (A20) fail to reciprocate when the pump is running, or if other abnormal conditions are suspected, the air pump mechanism should be immediately inspected to minimise the risk of consequential damage.

Proceed as follows:

1. Drain oil from bearing housing and flushing chamber by removing filler caps (D08) with 'O' ring (D07) and drain plugs (D13) with sealing washer (D14) and (D34).
  2. Remove air pump components in accordance with Section 6.1.3 Actuator Seal (A18) and Section 6.1.4 Actuator Neck Seal (A21) Instructions 2 and 3 (discard actuator neck seal if it has failed).
  3. Being careful not to damage the flat sealing faces of housing (A24) carefully withdraw housing complete with bearing and sealing components from bearing housing (D06) and drive rod (D37).
  4. Carry out Section 6.3.1 Impeller (C04) Instructions 2 to 4, inclusively.
  5. Carry out Section 6.4.1 Flushing Chamber (D33) Instructions 2 to 9, inclusively.
  6. Release nut (D38) and withdraw screw (D27), allowing fulcrum pin (D28) to be removed. Drive rod (D37) and connecting rod (D26) may then be withdrawn. If second priming pump is fitted, repeat these operations, ensuring that the connecting rod, fulcrum pin and drive rod components are kept as sets, and can later be reassembled in their original positions.
  7. Remove circlip (D24). Eccentric (D23) can now be removed by inserting M10 bolt in tapped hole provided and tapping to loosen in an anti-clockwise direction (eccentric has a right hand thread). See Section 7.9 Remove Eccentric.
  8. Examine condition of all components and renew failed or significantly worn items. A replacement connecting rod, complete with bushes, should be ordered against sub-assembly (Part No. 0015908000).
  9. To rebuild mechanism, ensure thread and abutting shoulder is thoroughly clean and simply screw on the eccentric, making sure it abuts against the shaft (D17) shoulder. Refit circlip (D24).
  10. Position connecting rod(s) (D26) on eccentric, thoroughly degrease tapping in drive rod(s) (D37) and assemble drive rod(s) and fulcrum pin (D28) in connecting rod(s).
  11. Assemble lock nut(s) (D38) to new screw (D27) locating groove in fulcrum pin (D28). Do NOT re-use old component. Fully tighten unit against recess in drive rod(s) (D37) to 2.9kgf m (21lb. ft) torque.
  12. Replace flushing chamber and pump on chassis in accordance with Section 6.4.1 Flushing Chamber (D33) Instructions 11 to 15, inclusively.
- NOTE:** It will be necessary to start at instruction Section 6.4.1 Flushing Chamber (D33) Instruction 10 if lip seals (D04) have to be replaced.
13. Read Section 6.3.2 Mechanical Seal (C08) Instruction 8 and carefully remove any foreign matter from the sleeve and mechanical seal components. Smear clean oil on both the 'O' ring (C07) and the drive shaft diameters. Position the 'O' ring on the shaft taking care to prevent it contacting the drive shaft's keyway, and slide the sleeve/seal assembly onto shaft (carbon face towards stationary seat) and press into working position using only the sleeve's flange. Ensure that 'O' ring is correctly trapped in sleeve recess.
  14. Replace impeller, suction tube and separator components in accordance with Section 6.3.1 Impeller (C04) Instructions 7 to 12, inclusively.
  15. Replace bearing/seal housing assembly and actuator neck seal in accordance with Section 6.1.5 Drive Rod Seal Assembly and Bearing (A25 and A28) Instruction 8 and Section 6.1.4 Actuator Neck Seal (A21) Instruction 4.
  16. Replace remaining air pump components in accordance with Section 6.1.3 Actuator Seal (A18) Instructions 6 to 10, inclusively.
  17. Replace drain plug (D34) using PTFE tape as sealant and fill flushing chamber with new oil to level of plug (D08). Replace plug and 'O' ring (D07). Refer to Section 3.1 Pump Lubrication for details of the oil required for the flushing chamber.
  18. Repeat this procedure for bearing housing ensuring that level plug (D08) and 'O' ring (D07) are replaced after the correct oil level is attained.

#### 6.4.3 Bearings and Lip Seal (D15, D18 and D04)

In the unlikely event of a bearing failure, or if the bearing housing oil escapes from the engine end of the bearing housing by passing across lip seal (D04) it becomes necessary to undertake work on the drive shaft assembly.

1. To replace lip seal (D04) only proceed as follows:
  - a) Remove oil from bearing housing by removing the filler cap (D08) and drain plug (D13).
  - b) Remove lip seal carrier (D03) lip seal (D04) and 'O' ring (D05) by removing cap screws (D01) and washers (A06).
  - c) Prise out the old lip seal and press in a new seal. When fitting, lightly lubricate the lips of the seal and if damaged replace 'O' ring

(D05).

- d) Refit the components taking care not to damage the seal on the sharp edges of the keyway.
- e) Replace drain plug (D13) and sealing washer (D14) in bearing housing (D06). Fill with oil to correct level and replace level plug (D08) and oil 'O' ring (D07).

2. For bearing replacement proceed as follows:

- a) Carry out Section 6.4.2 Air Pump Mechanism Instructions 1 to 8, inclusively.
- b) Remove lip seal carrier (D03) lip seal (D04) and 'O' ring (D05) by removing capscrews (D01) and washers (A06). If lip seal (D04) is to be utilized again ensure seal is not dragged over sharp edge of keyway.
- c) Moving to the impeller end of the bearing housing (D06), remove bearing carrier (D20) by removing setscrews (D22) and washers (A13). The bearing carrier (D20) can be jacked free by the two screwed holes adjacent to the fixings.
- d) Remove drive shaft (D17) complete with bearings (D18) and (D15) from bearing housing (D06) by applying pressure (preferably with a fly-press) to the protected coupling end of the drive shaft.
- e) Press bearings (D15) and (D18) from shaft (D17) and discard. Thoroughly clean all bearing housing surfaces and inspect shaft (D17) for damage.
- f) To fit new bearings, thoroughly clean all drive shaft surfaces and smear oil on bearing mounting diameters. Press new bearings onto shaft using workshop tools and method described under Section 6.11 Fit Replacement Drive End Bearing and to Section 6.12 Fit Replacement Impeller End Bearing, taking care to ensure that:
  - i) The bearings are kept in their as received condition and do not come into contact with foreign matter;
  - ii) Pressure during fitting is applied directly to the inner rings of the bearings and not to the outer rings;
  - iii) The bearings are square to the shaft throughout the fitting procedure; and
  - iv) When fitted, the bearings register against the shaft shoulders.

**NOTE:** Use of the workshop tools will ensure the above criteria is fulfilled.

- g) Before replacing the drive shaft sub-assembly into the bearing housing, make sure that the bores that receive the bearings are clean and smeared with clean oil. Care must be exercised when passing the drive shaft with bearings into the bearing housing to ensure it is concentric and parallel to the mating surfaces. This is described at Section 6.13

Assembly of Drive Shaft with Bearings into Housing.

- h) The sub-assembly should be pressed into position by 'jacking' home the bearing carrier (D20) by means of the setscrews (D22). Do NOT apply shock loads such as hammer blows.

**NOTE:** 'Jack' home evenly. Protect surface of bearing carrier (D20) with plain washers under setscrews (D22) finally remove setscrews (D22) and fit new washers (A13).

- i) The remaining components may now be reassembled in accordance with Section 6.4.2 Air Pump Mechanism Instructions 9 to 18, inclusively.

## 6.5 Chassis Maintenance

It is possible to work on individual components of the chassis without removing either the engine or the pump unit. In all cases work should be undertaken on level ground and care should be exercised to ensure that the pump set is fully immobilised. If the chassis is to be completely dismantled, both the engine and pump unit should be removed in compliance with the requirements of Health and Safety at Work Act, 1975.

1. To remove the fuel tank:
  - a) Drain the fuel by removing the drain plug and washer.
  - b) Disconnect the fuel feed and return lines.
  - c) Place suitable supports beneath the tank and remove the four nuts bolts and washers, the access to the nuts and washers being inside the main chassis members. The tank can then be slid from beneath the chassis.
2. To clean the fuel feed filter:
  - a) Remove the three set bolts and washers.
  - b) Lift the filter from the tank, taking care not to lose the gasket.

**NOTE:** The filter can be removed for cleaning without removing the tank from the chassis.

3. To remove the front axle:
  - a) Support the chassis beneath either the fuel tank ensuring that the weight is taken on a suitable piece of wood extending the full width of the tank, or underneath the main chassis members.
  - b) Remove the split pins and washers retaining the wheels and slide the wheels from the axle.
  - c) Remove the split pin and washer. From one side only of the draw bar pivot pin, slide the pin free of the pivot and draw bar thus allowing the draw bar to come away from the assembly.
  - d) Remove the split pin and washer from one end of axle pivot pin and slide the pin clear of the pivot and axle thus freeing the axle.
4. The front axle pivot locking system is designed as a backup to the single bolt fixing. To remove pivot:
  - a) Bend back lock washer and release the set bolt lock washer and pivot topcap.
  - b) Drop the pivot clear of the chassis member.

**NOTE:** If the engine is in place on the chassis the access to the set bolt is from beneath the engine between the chassis members.

- c) Extract and replace spring roll pin if damaged, from top of pivot.
5. To remove the rear axle:

- a) Support the chassis and remove the wheels as described in Instruction 3 of this Section.
  - b) Release the four horizontally disposed nuts, bolts, and spring washers and the two vertical nuts, bolts, spring and taper washers.
6. To remove the lifting eye remove the four set bolts and spring washers.
7. Reassembly is a reverse of the above, ensuring that the wheel hubs, axles, pivot, pivot turntable, axle pivot pin and drawbar pin are thoroughly cleaned and liberally greased. Renew the fuel feed filter gasket if necessary.

**NOTE:** When placing pivot top cap on top of pivot, ensure the top cap locates correctly over the spring roll pin in top of pivot shaft. Also when placing the lock washer with fixing bolt in place over the pivot top cap, ensure small tab locates in second hole of the pivot top cap - the first hole locating the spring roll pin. Always use new lock washer. Finally bending up in one place to lock against the flat of the setbolt hexagon.

## 6.6 Supersilent Canopy – Canopy Removal

To remove the canopy, proceed as follows:

1. Disconnect the battery.
2. Unbolt and joggle plate at the outlet end and remove.
3. Using the key provided, remove panel of the canopy where joggle plates were.
4. Unbolt discharge Bauer connection from the pump and remove.
5. Repeat for the inlet joggle plate, panel and suction Bauer connection.
6. Remove the insulating cover surrounding the exhaust and then disconnect the exhaust pipe from the manifold flange.
7. Disconnect emergency stop switch loom, preferably from the plug connector but it can also be disconnected from the switch. Tie onto engine to prevent any damage to the wiring.
8. If applicable, disconnect the bulk fuel connection.
9. If the canopy has an auto stop/start or telemetry panel, unbolt the panel and push inside of the canopy. This can remain wired up.
10. If there is a telemetry aerial, this needs to be removed from inside the control box.
11. Remove the air hose between the separator and air primer if it is deemed to impede the removal of the canopy.
12. Remove the bolts between the canopy and the skid.
13. Using appropriate lifting equipment and the lifting eye on the canopy, lift the canopy clear of the skid. If required, there are extra holes in the top of the canopy where eye bolts can be applied to give extra support and stability.

## 6.7 Supersilent Canopy – Fuel Tank Removal

To remove the fuel tank, proceed as follows:

1. Suitably support the rear of the engine prior to removing the M10 bolts between the engine and the bell housing of the pump, as it will become unstable when the pump is removed.
2. Remove the M16 bolts mounting the pump from its mounting points. Using the appropriate lifting equipment draw the pump away from the coupling. When the pump is clear of the coupling, lift the pump clear of the skid chassis.
3. Disconnect and drain the fuel lines, and tie them to the engine to prevent any damage. Slacken the bulkhead fitting lock nut on the oil drain hose and remove the hose end from the skid base. Tie the hose back to a suitable location on the engine. If required, undo and remove the control panel and bracket from the engine.
4. Remove any other additional parts that will impede the removal of the fuel tank. This may include the battery assembly or the air pump silencer.
5. Attach the appropriate lifting equipment to the lifting eye of the engine so that it takes the weight. Remove the fixings between the engine mounts and A/V mounts. Lift the engine vertically up and away and place in a suitable frame to prevent any damage to the oil drain or the sump.
6. Remove the bolts holding the fuel tank to the A/V mounts on the skid.
7. Using the appropriate lifting equipment remove the fuel tank.

## 6.8 Supersilent Canopy – Fuel Tank Refitting

To refit the fuel tank, proceed as follows:

1. Refit the tank as per removal taking note of the fuel drain plug position and its relationship to the access plug in the skid base. Orientate the tank so that the drain is behind the larger plug.
2. Insert the four screws to secure the tank to the AV mounts and check the alignment of the tank in the skid base before tightening these screws. During the tightening procedure a twisting moment can be applied to the rubber element of the mount which is undesirable. If this occurs, use or make a suitable tool to counteract this twist and tighten to 150 Nm. Recheck alignment and ensure no mounts are twisted. Correct if required.
3. Refit engine but do not fully tighten the mounting to the AV mount screws at this stage, finger tighten only. Ensure it is suitably supported before removing the lifting equipment from the engine. Reconnect all fuel lines, oil drain and refit the control panel.
4. Before refitting the pump unit slacken the grub screw (hex socket set screw) in the pump half coupling boss. Ensure that the hub and rubber element are free to slide on the pump shaft. This will be used as a guide for checking the alignment of the coupling at a later stage. Leave the coupling hub loose on the shaft.
5. Lift the pump end onto the chassis and push the unit onto the engine side coupling drive pins. With the coupling halves engaged drop in the four pump mounting fasteners and tighten nuts, finger tighten only.
6. The pump should now be visually aligned and can be tightened down to 150 Nm torque. Check that the coupling element and hub is free to move on the shaft to confirm correct alignment. A pry bar can be used, but it should not require any effort to move the assembly.
7. Move the engine on its mountings to make alignment adjustments. Any shimming to adjust vertical height should be added under the engine AV mounts.
8. When alignment is satisfactory gradually tighten the four AV mount screws to 70 Nm, checking element/hub movement on the shaft each time. During this procedure it is possible for the AV mount rubber to twist. To prevent this use a suitable tool to counteract the applied torque on the mount. This will maintain the mount in a neutral condition.
9. When complete, tighten the grub screw in the coupling hub into position on the pump shaft. The element should not be fitted against the flywheel adaptor plate but clearance should be present to prevent end thrust transmission through the coupling element.

## 6.9 Supersilent Canopy – Canopy Refitting

To refit the canopy, proceed as follows:

1. Lift the canopy as for removal and lift into position. Take care not to damage the radiator when positioning. Lower onto skid base checking for alignment. Dummy studs can be used to aid alignment.
2. When down and before fitting any fixings check that the radiator overflow pipe is not trapped by the canopy bulkhead. Release if trapped.
3. Refit the bolts between the canopy and the skid, checking the alignment before tightening down.
4. If used, Remove eye bolts from canopy roof and replace with fasteners to prevent water ingress.
5. Refit the side panels of the canopy, joggle plates and Bauer connections as the reverse of removal.
6. Reconnect the exhaust pipe to manifold flange and refit insulating cover.
7. Refit the fuel lines, control panel and bulk fuel kit.
8. Refit the air hose between the separator and air primer.
9. Refit the air pump exhaust silencer assembly.
10. Refit the telemetry aerial inside the control box.
11. Reconnect the emergency stop wiring and battery.
12. Refit coupling guards.
13. Fill with fuel and bleed the system as required. Test run. Inspect all fasteners after 50 hours of running.

## 7 WORKSHOP TOOLS

Major Servicing will always be carried out more quickly by the use of the following special tools and procedure. More importantly, their use will help to ensure that new components are not damaged whilst being fitted.

The tools are simple to employ and have been designed for use in combination with standard fitter's tools. For some operations, a simple press, and a bench complete with a vice will be desirable.

We earnestly advise all pump users to purchase a complete set of tools.

### 7.1 Care of Servicing Tools

Always clean, oil and safely store tools after use.

Complete sets of tools are available by quoting:

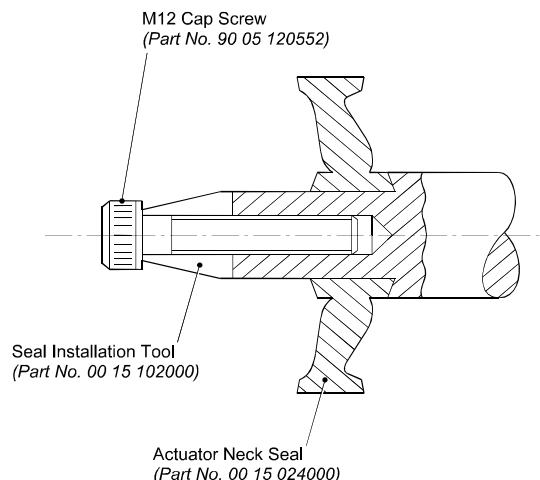
Part No. 0015948200 - Seltorque S160 Excluding Impeller Removal Tool Part No. 0015WRS781

Comprising:

Drive End Bearing Assembly Tool	0015181100	1
Bearing Assembly Stud	0015172100	1
Eccentric Puller Block	0015170000	1
Impeller End Bearing Assy Tube	0015169200	1
Drive Rod Bearing Drift	0015168000	1
Mechanical Seal Seat Removal Tool	0015166000	1
Flushing Chamber Lip Seal Fitting Tool	0015165100	1
Drive Rod Seal Tool	0010103000	1
Actuator Neck Seal Cone	0015102000	1
Drive Rod Installation Tool	0015101000	1

### 7.2 Fitting of Actuator Neck Seal

1. Lightly clamp seal installation tool against end of drive rod by means of capscrew, as shown.
2. Push seal into rear of inner pump body recess (Part No 0015014000).
3. Clean exposed shaft and tool surfaces, and smear with soft soap. Carefully slide the actuator neck seal onto shaft until it abuts against the conical shoulder.



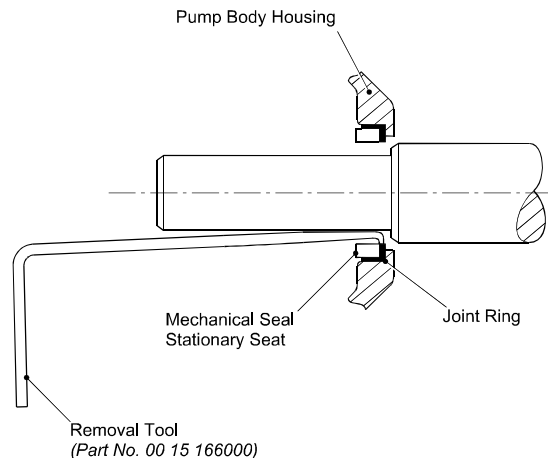
### 7.3 Removal of Mechanical Seal Stationary Seat and Joint Ring

1. Ensure oil is drained from flushing chamber. Remove impeller and shaft sleeve, complete with rotating mechanical seal components.
2. Engage tip of removal tool on inside face of seat. Remove seat by pulling evenly at several peripheral points.
3. Joint ring can then be collapsed and discarded.
4. To replace, the mechanical seal stationary seat and joint ring must be assembled together with the outer face of the joint ring smeared with soft soap, offered up to the flushing chamber housing and gently pressed home using a piece of wood.

#### IMPORTANT ADVICE



New Mechanical Seal Components must be handled with great care. In particular, the seal faces must not be touched by hand and must only come into contact with clean soft paper that is free from abrasive materials. Premature seal failure is likely to occur if this advice is not heeded.





## 7.4 Removal of Drive Rod Seal Assembly

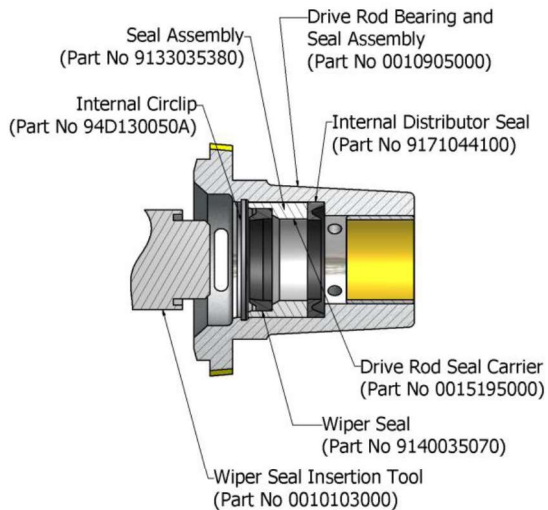
1. Remove internal circlip with suitable pliers and remove seal assembly by carefully tapping with blunt punch or drift from bush end.
2. Replacement of all components may be aided by smearing adjacent surfaces with soft soap.
3. Prior to sliding home the drive rod seal carrier (Part No. 0015195000), wiper seal (Part No. 9140035070) **must first** be assembled together, using insertion tool Part No. 0010103000. Carefully applied pressure from a hand press or vice jaws may be employed for this operation.



### IMPORTANT ADVICE

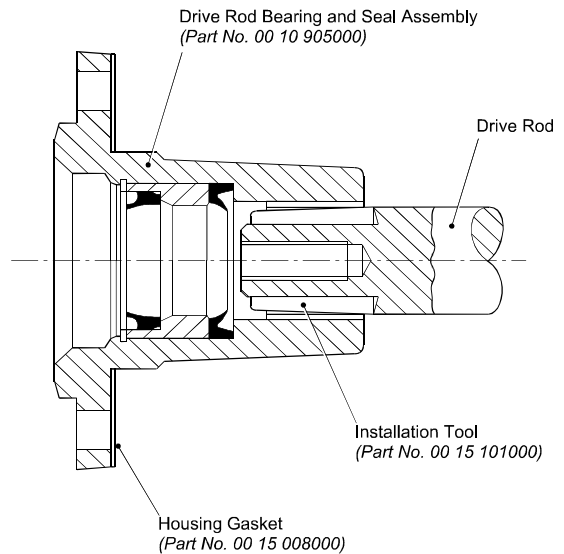
Parts must be assembled in correct order and orientation.

4. Great care must be exercised when replacing the circlip to ensure that the lip of the wiper seal is not damaged by the handtools used.



## 7.5 Fit Seal Housing Sub-Assembly to Pump

1. Thoroughly clean exposed drive rod surfaces and position installation tool as shown.
2. Smear tool and drive rod surfaces with oil.
3. Thoroughly lubricate drive rod bearing and drive rod seal with oil and fit new gasket before pushing seal housing assembly along drive rod until it registers in bearing housing.

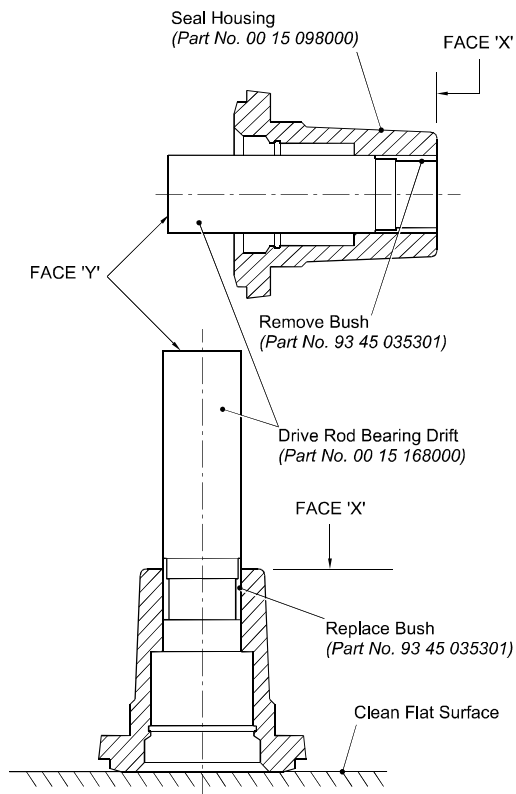


## 7.6 Remove Drive Rod Bearing Bush

4. Insert shouldered end of drift into bush as shown in upper sketch.
5. Support air pump pedestal evenly on face 'X' leaving sufficient clearance for bush to emerge freely.
6. Push out bearing bush by pressing or striking on tool face 'Y'.

## 7.7 Fit New Drive Rod Bearing Bush

1. Position seal housing on clean flat surface and register new bush in bore as shown in lower drawing.
2. Lightly oil bore and bush to prevent pick up.
3. Insert shouldered end of drift into bush as shown in lower sketch.
4. Insert bush by pressing or striking on tool face 'Y' until end of bearing is flush with face 'X'.



## 7.8 Assemble Flushing Chamber

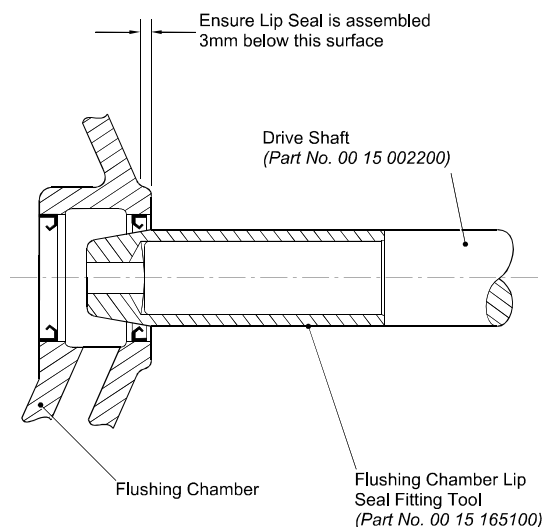
1. Check that circlip has been fitted to eccentric, and thoroughly clean exposed shaft surfaces and smear with oil.
2. Check that lip seal fitting tool is internally and externally clean, smear with oil and slide over end of drive shaft as shown.
3. Check that flushing chamber lip seals are correctly orientated and generously lubricate their lips with oil. Slide chamber along fitting tool and onto drive shaft, taking great care to ensure that it remains concentric to the shafts axis.



### WARNING

Lip seals must not be used to support the flushing chamber.

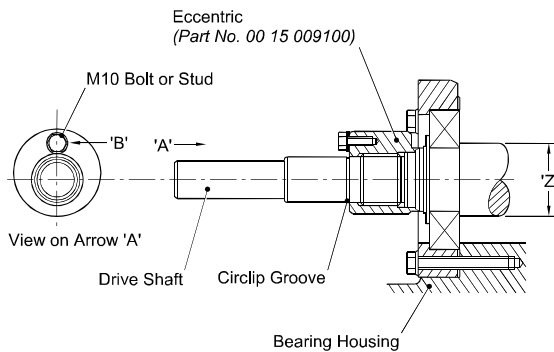
4. Ensure that the lip of the leading seal does not become deformed.



## 7.9 Remove Eccentric

1. Check that circlip adjacent to eccentric is removed.
2. Insert M10 bolt plus washer into eccentric as shown.
3. To release tap using drift in anticlockwise direction, i.e. in direction of arrow 'B'.

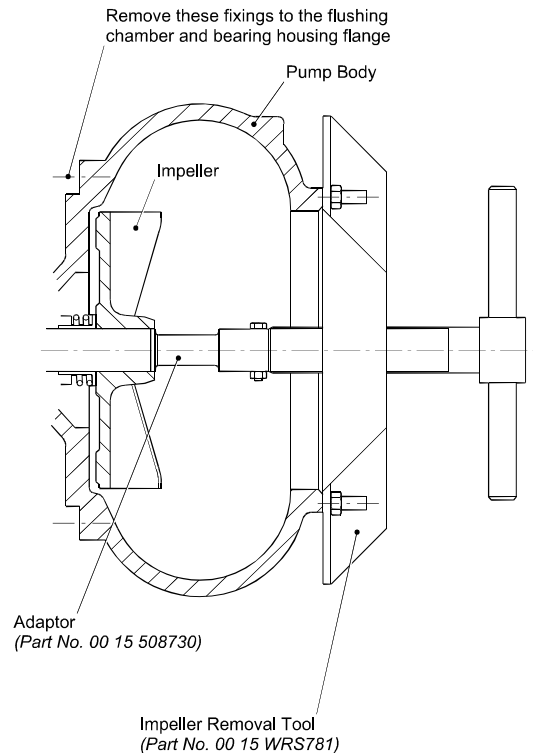
**NOTE:** If removing eccentric when shaft is disassembled from pump, clamp with soft jaws on diameter 'Z'.



## 7.10 Remove Impeller

1. Pump should be removed from the chassis or the engine decoupled and the bearing housing supported.
2. Remove suction tube together with separator components ensuring that the gasket between pump body and suction tube is also removed.
3. Remove impeller screw and washers.
4. Remove nuts and washer (8off each) from the studs protruding from the pump body through the flushing chamber and bearing housing flange joint.
5. Offer up impeller removal tool across front face of pump body as shown ensuring the correct nose adapter is fitted. Affix by using existing nuts and washers.
6. Turn screw handle so that the drive shaft connected to the bearing housing is pushed through and out of the pump body leaving the impeller free.

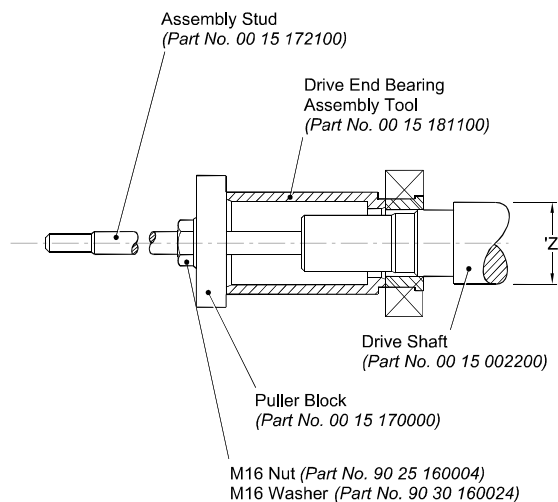
**NOTE:** When re assembling impeller ensure end of shaft is coated with Shell ENSIS grease or approved equivalent.



## 7.11 Fit Replacement Drive End Bearing

1. Remove old bearing taking care not to damage the shaft in any way. Fit soft jaws to vice and clamp shaft horizontally on diameter 'Z' leaving the abutment shoulder overhanging.
2. Screw assembly stud (Part No. 0015172100) into shaft end until it bottoms. Thoroughly clean bearing mounting surfaces of shaft and smear with oil.
3. Carefully register bearing on shaft, ensuring that it is **NOT** contaminated by foreign matter, and position assembly tool (Part No. 0015181100) and puller block (Part No. 0015170000) as shown.
4. Ensuring that the bearing is square to the shaft and that assembly tool is concentric to the shaft's centre line, push bearing onto shaft by applying steady and continuous screwing torque to the M16 nut and washer.
5. Check that inner ring of bearing is touching abutment shoulder of drive shaft:

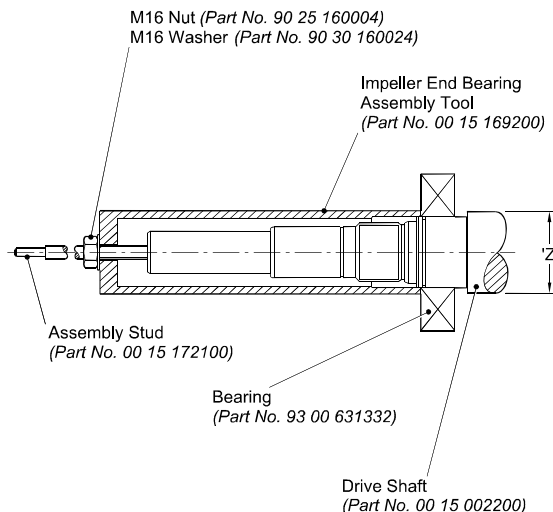
**NOTE:** Bearings may be replaced by using the assembly tool in conjunction with a press only, thus eliminating stud and puller block.



## 7.12 Fit Replacement Impeller End Bearing

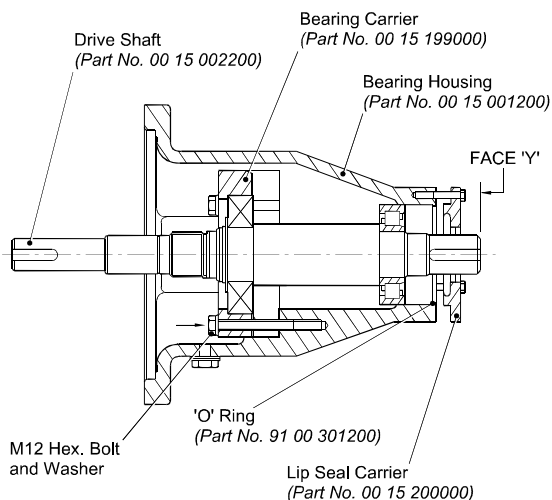
1. Remove old bearing taking care not to damage the shaft in any way. Fit soft jaws to vice and clamp shaft horizontally on diameter 'Z' leaving the abutment shoulder overhanging.
2. Screw assembly stud (Part No. 0015172100) into shaft end until it bottoms. Thoroughly clean bearing mounting surfaces of shaft and smear with oil.
3. Carefully register bearing on shaft ensuring that it is **not contaminated by foreign matter** and position assembly tool (Part No. 0015169200) as shown.
4. Ensuring that the bearing is square to the shaft and that assembly tool is concentric to the shaft centre line, push bearing onto shaft by applying steady and continuous screwing torque to the M16 nut and washer.
5. Check that inner ring of bearing is touching abutment shoulder of drive shaft.
6. Replace the bearing spacer and circlip.

**NOTE:** Bearings may be replaced by using the assembly tools in conjunction with a press only, thus eliminating stud and puller block.



### 7.13 Assembly of Drive Shaft with Bearings into Housing

1. Remove assembly by releasing the 4 x M12 fixings. The bearing carrier can be jacked free by the two screwed holes adjacent to the fixings. Remove the lip seal carrier (ensuring seal is not dragged over sharp edge of keyway) together with 'O' ring and press or strike (with soft faced mallet) shaft end 'Y', to withdraw bearings and bearing carrier.
2. When assembling, all parts should be scrupulously clean and bearing mounting surfaces smeared with oil.
3. Position bearing housing in vertical attitude with bell end upwards mounted on suitable supports so that end of shaft can emerge through bottom.
4. Ensure shaft with bearings is inserted into the bearing housing so that it is concentric and parallel to the mating surfaces. Assembly is 'jacked' home by tightening the M12 fixings assembled together with the bearing carrier 60 lbs/ft (8.3 kgf m).
5. The outer race of the drive end bearing is inserted by carefully drifting or pressing the race into the housing. Alternatively, the Lip Seal Carrier (Part No. 0015200000) may be utilized, pressing the race into the housing by making use of longer bolts and jacking home evenly. If this latter method is employed be sure to use large washers beneath the bolt head to distribute pressure over a larger area as the lipseal carrier may be manufactured in light alloy.
6. Finally ensure lip seal is in good condition together with 'O' ring before finally bolting up the carrier.



## 8 FAULT FINDING GUIDE

This table gives the most common symptoms arising in connection with water handling duties. Please consult Selwood Pumps for further advice if the service fault is not described, and particularly if the duty has uncommon characteristics.

At no time should the pump be run if its bearing housing or flushing chamber contains contaminated oil. Very small volumes of oil may be lost from these chambers during a day's normal running, but remedial action should immediately be taken if the loss becomes excessive. The most likely causes of failure are given in the sequence in which they should be investigated. For example, if the pump will not prime, carry out the first service instruction that is listed and proceed to the second only if the first proves to be inappropriate.

### PUMP WILL NOT PRIME, OR LOSES PRIME HAVING PUMPED PRODUCT FOR A BRIEF PERIOD OF TIME

ACTION	COMMENT
1 Check that drain taps fitted to volute and air pumps are closed.	Drain taps are sometimes left open overnight. If okay, try Action 2.
2 Remove inspection cover and check that delivery valve is seating efficiently.	The delivery line <b>MUST BE DRAINED</b> before the cover is removed. If okay, try Action 3.
3 Disconnect hose from air pump spigot and attach vacuum gauge to pump - should read 29" H <sub>2</sub> O (25.6" Hg) or more, after the pump is stopped.	If vacuum is okay, check Action 4. If vacuum is low or fails quickly, check Action 8.
4 Reconnect air pump hose, and check vacuum at suction spigot of main pump. Correct reading is given above.	If vacuum is okay, check Actions 5(a) and (b). If vacuum is slow to rise or low at terminal condition, check Actions 6 and 7.
5 (a) Check all suction side hoses, fittings and joints for air leaks.	Priming problems are <b>VERY</b> often caused by faults in supply pipework. Air must not be allowed to pass into the system across couplings, etc.
(b) Check strainer and suction hose for blockages.	Do not use non-reinforced hose. Always fit a strainer of correct size and type.
6 Examine separator assembly for air leaks or trapped solids. Check peel valve seat for ice in cold conditions.	Refer to Section 6.2 Separator Maintenance for instructions. The float must be able to rise and fall freely. The peel valve must completely shut off the air pump when the float rises to its maximum position.
7 Check level of oil in flushing chamber.	If level is very low, mechanical seal may be admitting air. Top up, and re-check vacuum. Substantial oil loss indicates seal failure - refer to Section 6.3.2 Mechanical Seal (C08) for instructions.
8 Examine valves and flexing seals in air pump assembly and check that castings are not cracked.	Refer to Section 6.1 Air Pump Maintenance for instructions.

### OUTPUT AND HEAD ARE LESS THAN PUBLISHED FIGURES

ACTION	COMMENT
1 Check strainer and suction pipework for blockages. Also check that air is not being pulled through a vortex created in the supply reservoir.	Choking of the supply system by solids will increase the flow resistance, thus increasing the head against which the pump has to operate, and so reducing output. The entry of air through faulty pipe joints will have a similar effect. Reduction also occurs if air is entrained through a vortex - to eliminate, increase strainer's submergence.
2 Check pump speed with tachometer.	Speed, off load must not exceed 1600rev/min.
3 Check that delivery valve, discharge branch of casing, and pipework are free from blockages.	Obstructions downstream of the pump will increase the flow resistance and thus reduce output.
4 Check condition of impeller.	Excessively worn vanes will reduce output. Also check outside diameter of vanes: Standard Seltorque S160 Standard Dia. 235mm  Contact Selwood with pump number to confirm correct impeller variant fitted.



**LIQUID IS BEING PUMPED OUT OF AIR PUMP, I.E. WATER CARRYOVER IS OCCURRING****ACTION**

- 1 Check condition of separator assembly.
- 2 Check condition of valves and flexing seals in air pump.

**COMMENT**

No significant amounts of water should normally pass across the air pump. The rubber peel valve may not be seating correctly, the float may be punctured, or not be able to rise and fall freely, etc. Also, check that bush is correctly positioned. Refer to Section 6.2 Separator Maintenance for instructions.

On rare occasions, malfunction of the air pump seals in air pump can cause the separator float to move erratically. Refer to Section 6.1 Air Pump Maintenance for instructions.

**WATER LEAKING OUT OF FLUSHING CHAMBER VENT BEHIND VOLUTE, OR FROM BREATHER VALVE FITTED TO CHAMBER****ACTION**

- 1 Drain flushing chamber to check contents.

**COMMENT**

The chamber should only contain oil. If the mechanical seal has failed, water may be present in the chamber. If so, replace seal in accordance with instructions given in Section 6.3.2 Mechanical Seal (C08).

**OIL LEAKING OUT OF FLUSHING CHAMBER VENT BEHIND VOLUTE****ACTION**

- 1 Top up both oil reservoirs, and run pump under supervision for say 30 min to determine from which reservoir leakage is occurring.

**COMMENT**

Replace faulty lip seal in accordance with instructions given in Section 6.4 Maintenance of Flushing Chamber, Air Pump Mechanism, Drive Coupling, Drive Shaft Bearings and Lip Seal.

**OIL LEAKING FROM VENTS BEHIND AIR PUMP****ACTION**

- 1 Check that mechanism reservoir has not been overfilled with oil.
- 2 Check conditions of air pump drive rod and associated seal.

**COMMENT**

It is extremely difficult to overfill pumps built to latest specifications. However, earlier machines were fitted with oil level plugs which did not automatically limit the oil volumes.

Refer to Section 6.4 Maintenance of Flushing Chamber, Air Pump Mechanism, Drive Coupling, Drive Shaft Bearings and Lip Seal for instructions.

**OIL LEAKING FROM ENGINE END OF PUMP ASSEMBLY****ACTION**

- 1 Check that mechanism reservoir has not been overfilled with oil.
- 2 Replace lip seal between air pump mechanism and drive shaft bearings.

**COMMENT**

Although unlikely, incorrect filling may be responsible for the problem.

Refer to Section 6.4 Maintenance of Flushing Chamber, Air Pump Mechanism, Drive Coupling, Drive Shaft Bearings and Lip Seal for instructions.

**PUMP CANNOT BE ROTATED BY HAND BY MEANS OF STARTING HANDLE, FOR EXAMPLE****ACTION**

- 1 Check for ice in air pump or volute.
- 2 Check that air pump assembly is not faulty.
- 3 Check that impeller and drive shaft are free to rotate.

**COMMENT**

In cold weather, ice can form in these chambers if they have not been drained. Eliminate by means of hot water.

The actuator must be securely fastened to its drive rod, and must be able to reciprocate freely without touching any stationary surface. Refer to Section 6.1 Air Pump Maintenance for instructions.

Although unlikely, it is possible for fibrous solids to restrict the impeller's movement. Also, failure of the drive shaft bearings may have resulted in the impeller striking the casing. Seizure of the bearings could also produce the problem. Refer to Section 6.3 Impeller, Mechanical Seal and Delivery Valve Maintenance for instructions.

## PUMP PRODUCES UNEXPECTED NOISES WHEN RUNNING

### ACTION

### COMMENT

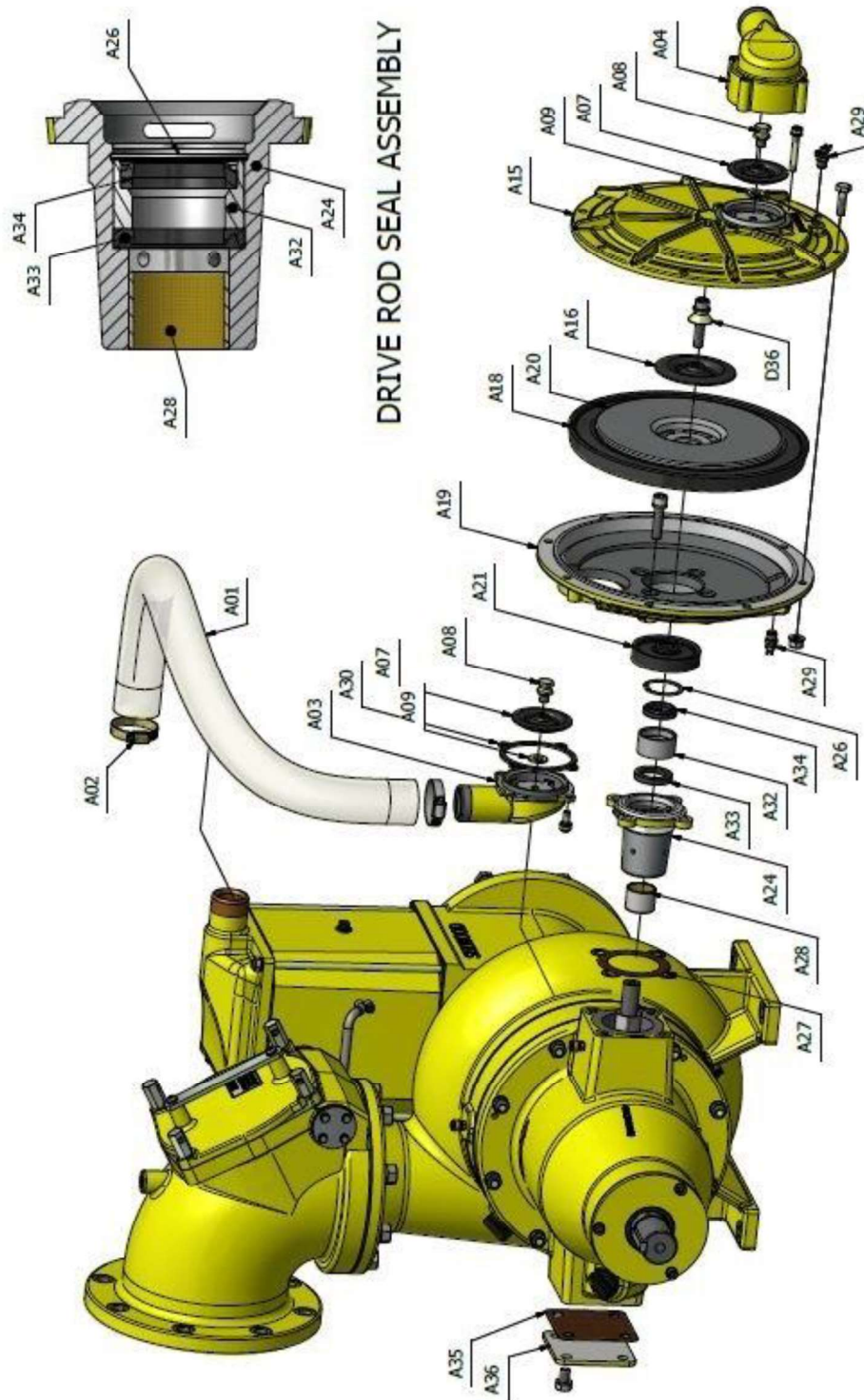
- |   |  |  |
|---|--|--|
| 1 | Check quality and quantity of oil in mechanism chamber and flushing chamber. | Incorrect volume and quality may result in overheating as well as abnormal noise. Note that extensive running under such circumstances can significantly damage pump components.   |
| 2 | Check that air pump assembly is not faulty.                                  | The actuator must be securely fastened to its drive rod, and must be able to reciprocate freely without touching any stationary surface. Refer to Section 6.1 Air Pump Maintenance for instructions.   |
| 3 | Check that air pump mechanism is not faulty.                                 | Excessively worn connecting rod bearings, or an undersized eccentric or fulcrum pin, could cause this problem. Refer to Section 6.4 Maintenance of Flushing Chamber, Air Pump Mechanism, Drive Coupling, Drive Shaft Bearings and Lip Seal for instructions. |

Refer to Selwood Ltd if the above advice does not solve your problem.

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## 9 PARTS LIST

### 9.1 Air Pump Parts (Single Prime)



## NOTES: Linear seal assembly

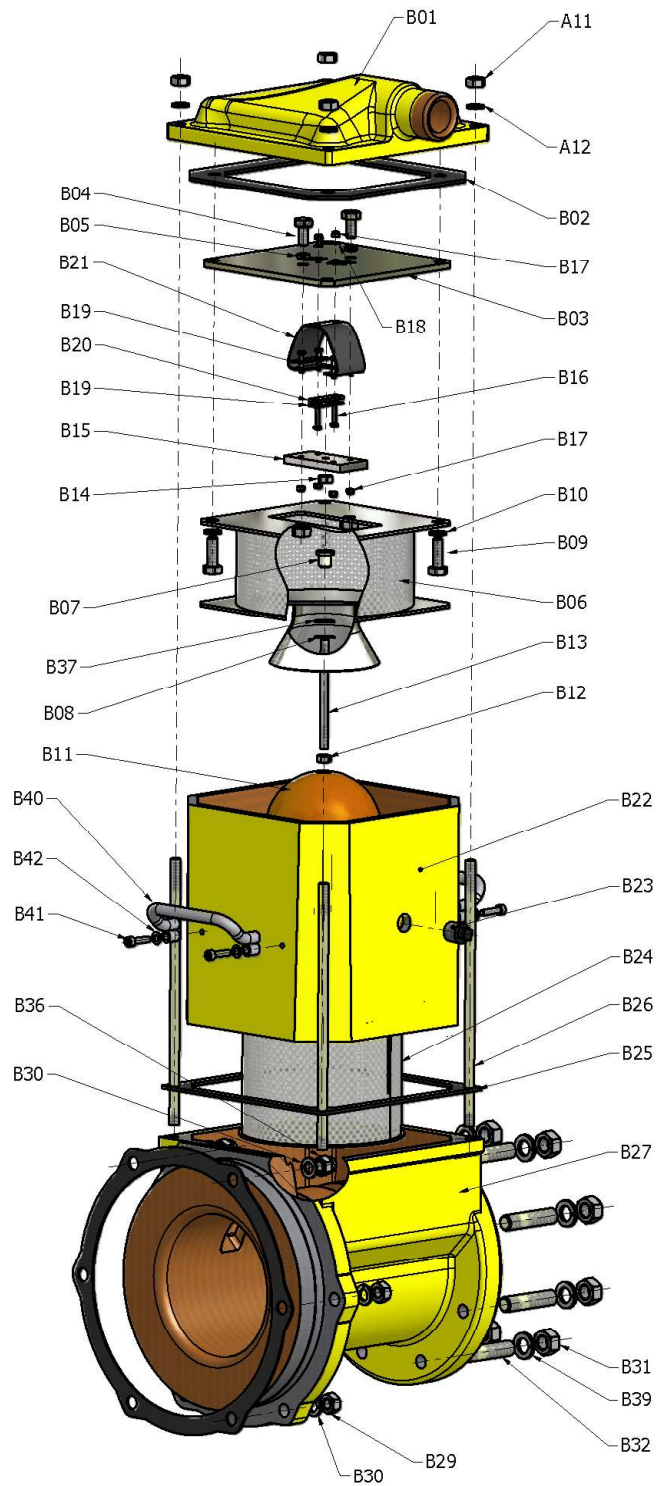
1. Complete assembly available as Part No. 0010905000.
2. Linear Bearing and Seal Assembly (A25) Part Nos. 0015195000, 9140035070 and 9171044100 available as sub-assembly Part No. 9133035380.
3. Ensure that seal components are positioned as shown above, and are retained by the internal circlip. Great care must be exercised when fitting the circlip to ensure that the lip of the wiper seal is not damaged by the hand tools used. Refer to Section 6.3 Impeller, Mechanical Seal and Delivery Valve Maintenance.
4. To safeguard the sealing lips, lubricate the bearing and seals with light oil and use seal installation tool when fitting assembled housing unit to pump assembly. Refer to Section 6.4 Maintenance of Flushing Chamber, Air Pump Mechanism, Drive Coupling, Drive Shaft Bearings and Lip Seal

ITEM	DESCRIPTION	PART NUMBER	QTY
A01	Hose 50mm Nom Bore	9542000000	1
A02	Size 3 Clip	9505007004	2
A03	Suction Valve Box	0015017000	1
A04	Air Pump Cover	1592306000	1
A07	Suction / Delivery Valve	0015021000	2
A08	Actuator Stud (Suction Del)	0015019000	2
A09	Valve Washer	0002068000	2
A15	Outer Pump Body	0015015000	1
A16	Actuator Valve Syn	0003221200	1
A18	Actuator Seal	0015023000	1
A19	Inner Pump Body	0015014000	1
A20	Air Pump Piston	0015016000	1
A21	Connecting Rod Seal	0015024000	1
A24	Lin Bearing Housing Machined	0015098000	1
†A25	Wiper Seal Assembly	9133035380	1
A26	Circlip Internal 50 Dia	94D130050A	1
A27	Gasket Air Pump Mounting	0015008000	1
A28	Glacier Bearing	9345035301	1
A29	¼" BSP Drain Tap	9520103000	2
A30	Suction Valve Box Gasket	0015022000	1
A35	Blanking Plate Gasket	0015089000	1
A36	Blanking Plate	0015083000	1
D36	Actuator Ret. Assy	0015975000	1
†A25	Comprises Per Housing:		
A32	Drive Rod Seal Carrier	0015195000	1
A33	Internal Distributor Seal	9171044100	1
A34	Wiper Seal RS35457 GACO	9140035070	1

When ordering spares, please state:

PUMP NUMBER - PART NUMBER – DESCRIPTION OF PART

## 9.2 Separator Parts (Single Prime)





ITEM	DESCRIPTION	PART NUMBER	QTY
A11	M10 Hex Full Nut	9025100004	4
A12	M10 Spring Washer Rect Sect	9030100229	4
B01	Separator Top Cap	0015034000	1
B02	Top Cap Gasket	0015043000	1
B03	Port Plate Drilled S/S	0015036000	1
B04	M10 x 20 LG Hex Head Sets SS.	9000100207	2
B05	M10 x 12.5 Sealing Washer	9030100289	2
B06	Upper Diff Assy	0015037000	1
B07	Diffuser Bush	0015160000	1
B08	½" x 1.0" Starlock Washer SS	9030130407	1
B09	M10 x 30 Hex Head Sets SS	9000100307	4
B10	M10 Spring Washer Sq Sect SS	9030100207	4
B11	Float Assembly	9565001000	1
B12	5/16" B.S.W. SS Full Nut	0006741030	1
B13	Peel Valve Rod	0015090000	1
B14	M8 Hex Full Nut SS	9025080007	1
B15	Operating Plate SS	0015085000	1
B16	M4 x 20 Pan Hd Mach Screw SS	9018040207	6
B17	M4 Hex Self Lock Nut SS	9025040307	6
B18	M4 x 9.0 x 0.8 Plain Washer SS	9030040027	6
B19	Peel Valve Clamp Bar	0015084000	3
B20	Clamp Bar Seal	0015183000	1
B21	Peel Valve Rubber	0015039000	1
B22	Separator Body (aluminium)	1517117000	1
B23	½" BSP Plug	9522004000	1
B24	Lower Diffuser Plain Base	0015038000	1
	Lower Diffuser (Perforated)	1594161000	1
B25	Separator Body Gasket	0015044000	1
B26	Tie Rod Plated	0015045000	4
B27	Flgd Suction Tube	0015035000	1
B28	Pump Body Suction Tube Gasket	0015048000	1
B29	M12 Hex Full Nut	9025120004	4
B30	M12 Spring Washer Rect Sect	9030120229	6
B31	M16 Hex Full Nut	9025160004	8
B32	M16 Stud	9035160551	8
B33	S8 Label	0015189000	1
B34	Seltorque S160 Label	0015188100	1
B36	M12 Hex Dome Nut	9025120254	2
B37	Washer - Nitrile	1590049000	1
B39	M16 Rect Sect Spring Washer	9030160229	8
B40	Separator Handle	1507264000	2
B41	Socket Cap Screw M6 x 25	9005060250	4
B42	M6 x 12.5 x 0.8 Plain Washer	9030060024	4

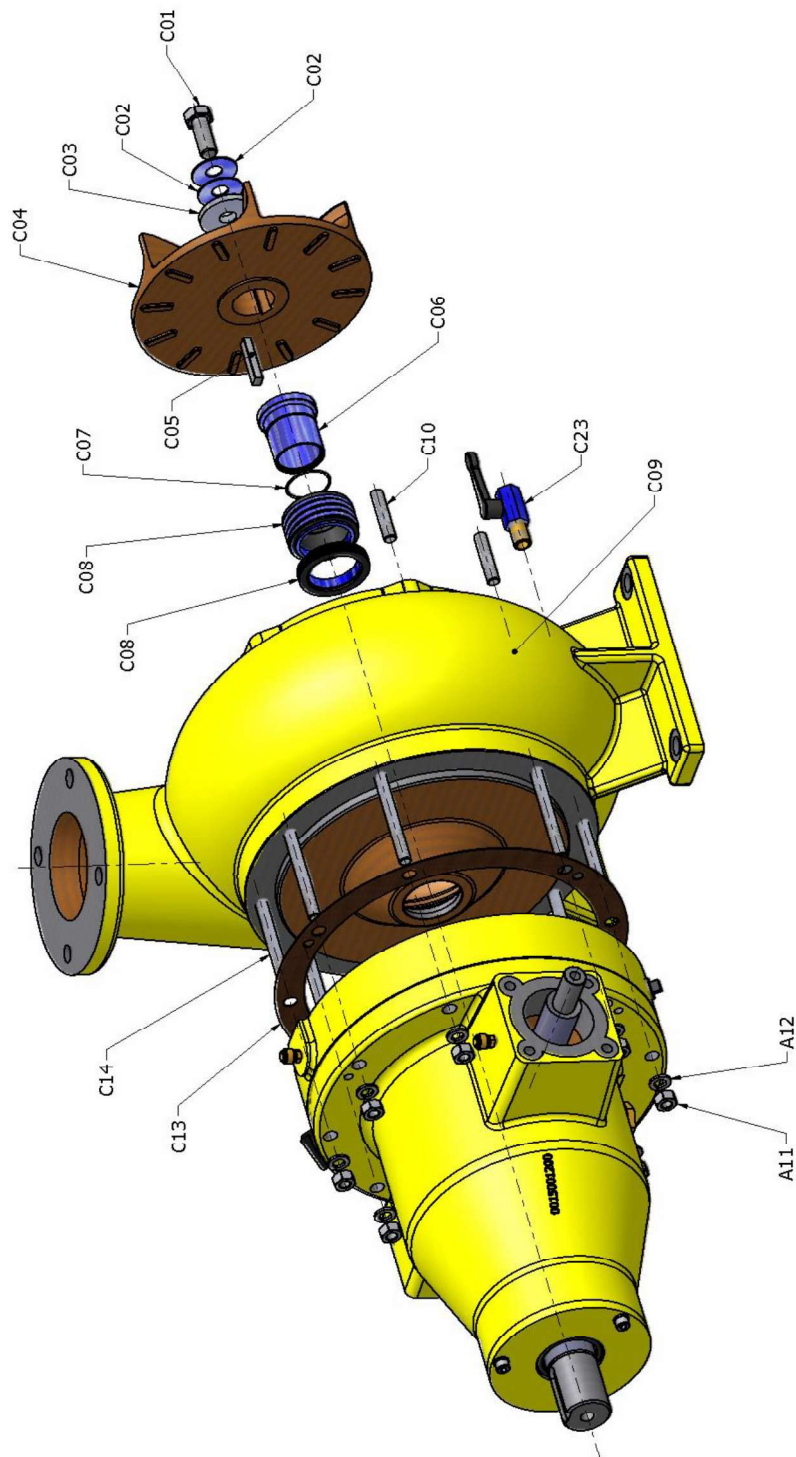
Sub-Assembly B06 includes B07, B08 and B37.

Items B05, B07, B08, B16, B17, B18, B20 and B21 are available as spares kit Part No. 0015996000

When ordering spares, please state:

PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART

### 9.3 Pump Body Parts



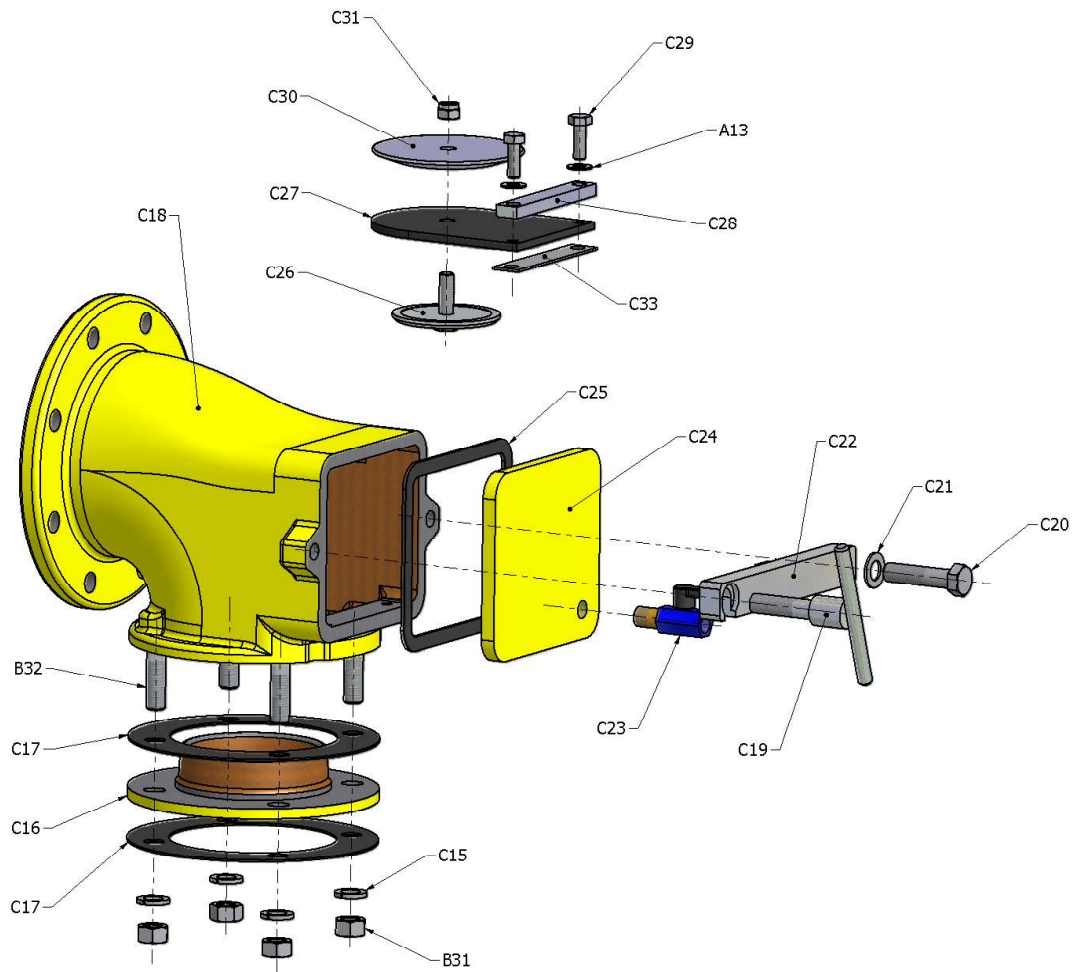
ITEM	DESCRIPTION	PART NUMBER	QTY
C01	M16 x 40 Lg Hex Hd Setscrew	9000160402	1
C02	M16 Belleville Washer	9030610359	2
C03	Impeller Retaining Washer	0015013000	1
C04	Impeller – (235 Diameter)	0015012000	1
C05	Key (12 x 8 x 50)	9041125013	1
C06	Shaft Sleeve	0015161001	1
C07	41ID x 1.78 Section 'O'-Ring	9150001400	1
C08	Mechanical Seal S160 Build Only	910166-003	1
C09	S160 Body Mach D	0015010000	1
C10	M12 Stud	9036120401	6
A11	M12 Hex Full Nut	9025120004	8
A12	M12 Spring Washer Rect Sect	9030120229	8
C13	Body Gasket	0015011000	2
C14	M12 Stud	9036121054	8
C23	Drain Tap 450	9520003000	1

**NOTE:** C01 Impeller Screw is available in stainless steel quote Part No. 9000160407

When ordering spares, please state:

PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART

## 9.4 Delivery Valve Parts



ITEM	DESCRIPTION	PART NUMBER	QTY
B31	M16 Hex Full Nut	9025160004	4
C15	M16 Spring Washer Rect Sect	9030160229	4
C16	Rep Valve Seat	0015046000	1
C17	Delivery Valve Box Gasket	0015047000	2
B32	M16 Stud	9035160551	4
C18	Delivery Valve Chamber	0015026000	1
C19	T Handle Lckg Blt	0015031000	1
C20	M16 x 65 Hex Head Bolt	9001160651	1
C21	M16 x 30 x 2.0 Plain Washer	9030160024	1
C22	Inspection Panel Locking Bar Ctd	0015030000	1
C23	Drain Tap 450	9520003000	1
C24	Inspection Panel	0015029000	1
C25	Inspection Panel Gasket	0015028000	1
C26	Valve Plate Lower	0015032000	1
C27	Delivery Valve Rubber	0006604000	1
C28	Valve Clamping Bar	0015027000	1
C29	M10 x 30 Lg Hex Head Setscrew	9000100301	2
A13	M10 x 21 x 1.2 Plain Washer	9030100024	2
C30	Delivery Valve Plate 100 / 150	0006698000	1
C31	M12 Hex Self Lock Nut	9025120344	1
C32	Instruction Label – English	0008072000	1
C33	Delivery Valve (as required)	1596050000	A/R

When ordering spares, please state:

PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART



ITEM	DESCRIPTION	PART NUMBER	QTY	
			SINGLE PRIME	TWIN PRIME
D01	M8 x 25 Hex. Hd Socket Capscrew	9005080250	3	3
A06	M8 Spring Washer Rect Sect	9030080229	3	3
D03	Lip Seal Carrier	0015200000	1	1
D04	Lip Seal 65 x 50 x 8	9127050080	3	3
D05	'O'-Ring 119.5 I/D x 3.0 Section	9100301200	1	1
D06	Bearing Housing – Machined	0015001200	1	1
	S160 Bearing Housing – Close Coupled	0015001300	1	1
D07	'O'-Ring 24.5 I/D x 3.0 Section	9100300250	2	2
D08	Oil Filler Plug	0015186000	2	2
D09	Label Direction Arrow	0015078000	1	1
D10	2 x ¼ Hammer Drive Screw Round	9045002259	2	2
D11	Label Manufacturer CE	00150 1000	1	1
D12	Breather Valve 1/8 – BSPT	9528001000	2	2
D13	Tank Drain Plug ¾ - BSP	9521005000	1	1
D14	Bonded Washer ¾ - BSP – for 471	9030710272	1	1
D15	Bearing Nj311E Tvp2 C3	9309J31130	1	1
D16	Rect Parallel Key 14 x 9 x 56 Lg	9041145613	1	1
D17	Drive Shaft S160	0015002200	1	1
D18	Bearing (6313 2Zr-C3)	9300631332	1	1
D19	6313 Bearing Spacer	0015004000	1	1
D20	Bearing Carrier	0015199000	1	1
D21	M12 x 24 x 1.6 Plain Washer	9030120024	4	4
D22	M12 x 90 Lg Hex. Head Setscrew	9000120901	4	4
D23	Air Pump Eccentric (1800 RPM)	1508184000	1	1
D24	Circlip – External 50 Dia	9401000501	1	1
D25	Connecting Rod Bush	0015066000	1	2
D26	Connecting Rod Assembly	0015006100	1	2
D27	M8 x 35 Hex. Socket Capscrew	9005080350	1	2
D28	Drive Rod Fulcrum Pin	0015007000	1	2
C13	Body Gasket	0015011000	2	2
D30	Circlip-Ext Dia 65	9401000651	1	1
D31	M10 x 60 Hex. Socket Capscrew	9005100600	3	3
A12	M10 Spring Washer Rect Sect	9030100229	3	3
D33	Flushing Chamber	0015157000	1	1
D34	Drain Plug ½ - BSPT	9522004000	1	1
D35	Small End Bearing	0015065100	2	4
D36	Actuator Ret Assy	0015975000	1	2
D37	Drive Rod	0015018200	1	2
D38	Self Locking Nut - M8	9025080344	1	2
C05	Impeller Key 12 x 8 x 50	9041125013	1	1

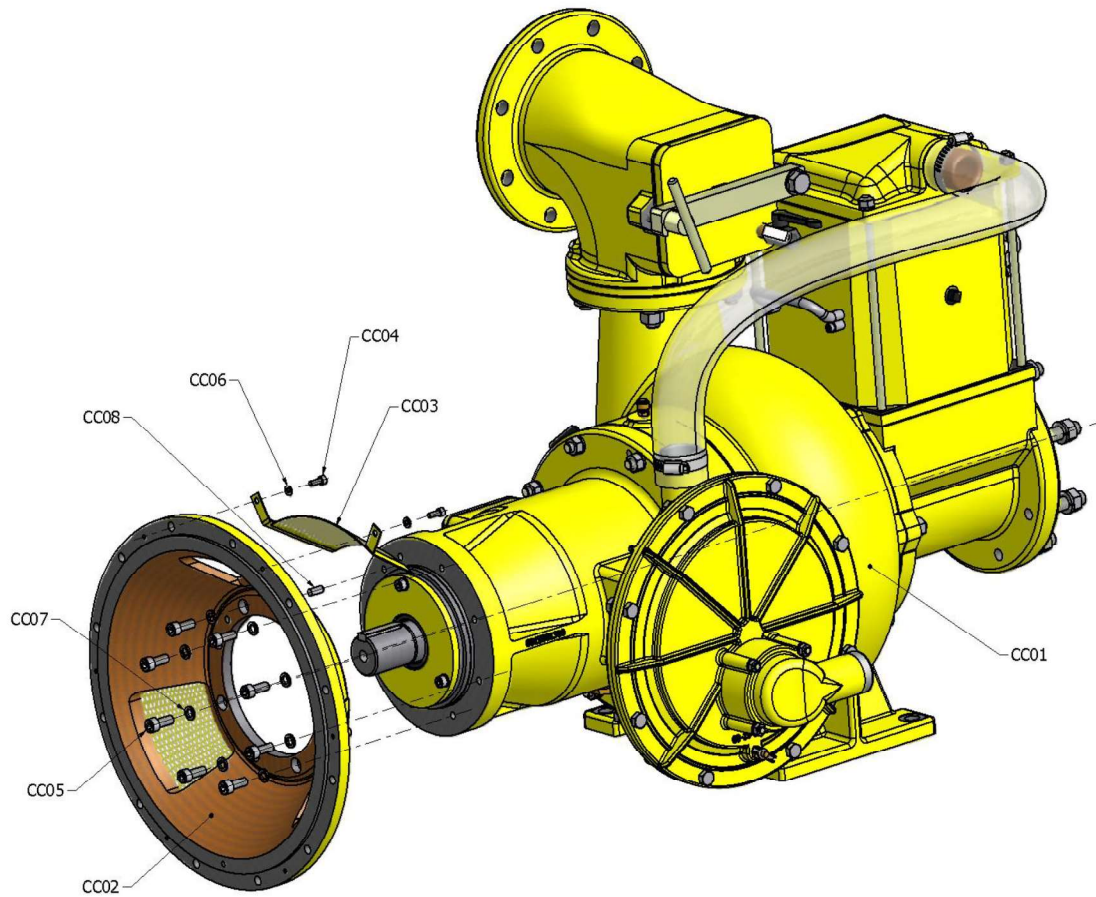
Items D27, D36, D37 and D38 can be supplied as Sub-Assembly Part No. 0015976000.

Items D25, D26 and D35 are supplied as Sub-Assembly Part No. 0015908000.

When ordering spares, please state:  
PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART



## 9.6 S160 Pump Unit, Close Coupled, 1800 RPM – 1515032000



ITEM	DESCRIPTION	PART NUMBER	QTY
CC01	S160 Pump Unit – Close Coupling	1508216000	1
CC02	S160 Bell Housing	1506063000	1
CC03	S160 Vent Cover	1508125000	3
CC04	Socket Cap Screw M6 x 16 Long	9000641-01	6
CC05	Socket Cap Screw M10 x 25 Long	9005100250	8
CC06	Spring Washer M6	9030060229	6
CC07	Spring Washer M10 – Sqr' Secn	9001079-01	8
CC08	Dowel Pin $\phi$ 8 x 20	9000869-01	1

When ordering spares, please state:  
PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART

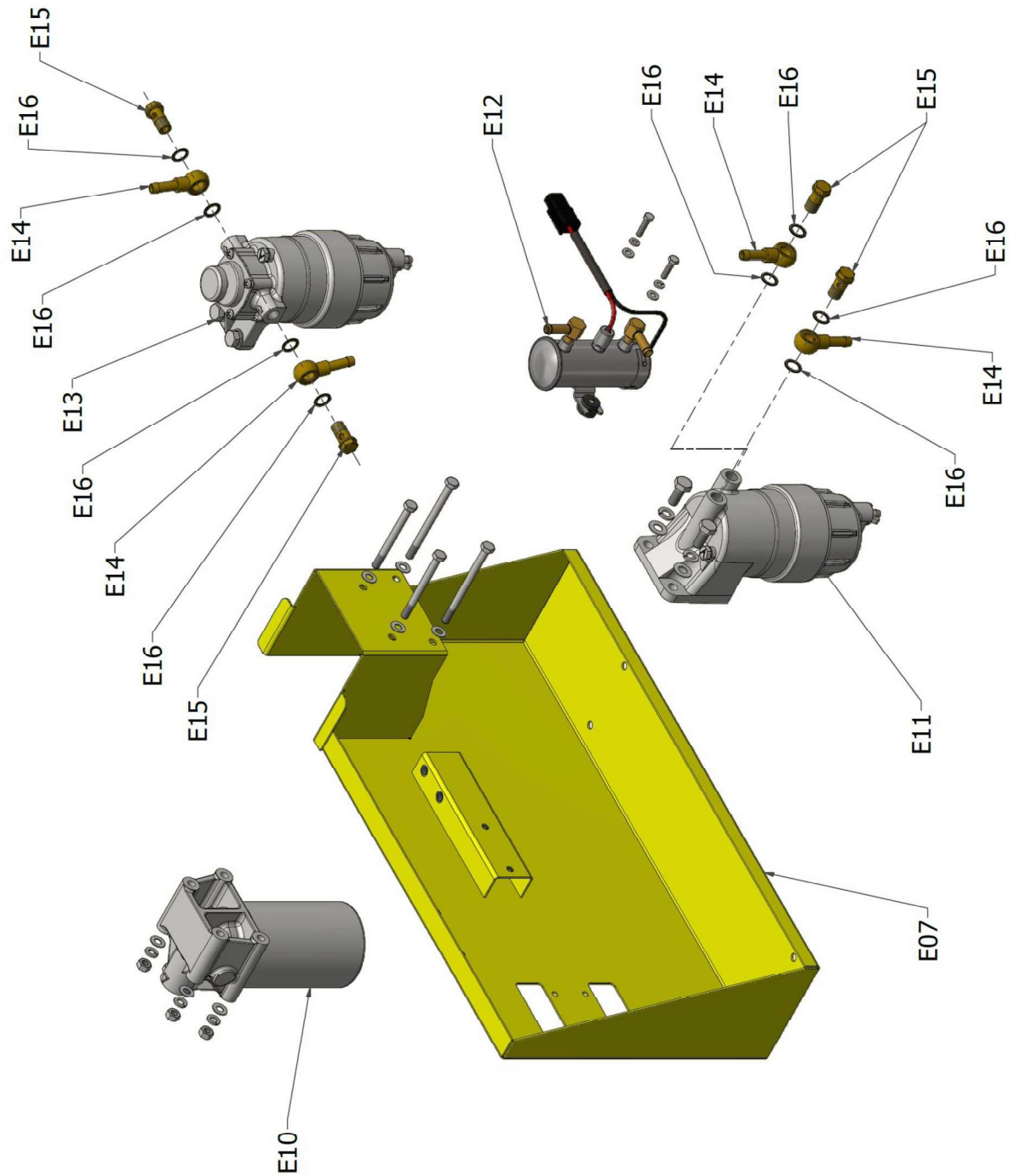


ITEM	DESCRIPTION	PART NUMBER	QTY
E01	Isuzu 4LE2X/T Skid Assembly	1514249000	1
E02	Fuel Filler Plate Gasket	1501280000	2
E03	Fuel Sender Mounting Plate	1515102000	1
E04	Fuel Filler / Inspection Plate	1506251000	1
E05	Hose Adaptor Assembly – 3/8" BSPT	1514134000	2
E06	Oil Filter Hose	1514187000	2
E07	Fuel Filter Panel	1014226000	1
E09	Isuzu 4LE2X Diesel Engine	92046-0004	1
E10	Oil Filter	8980756710	1
E11	Primary Fuel Filter	8982369910	1
	Primary Fuel Filter Element	8982402790	1
E12	Fuel Pump	8980682750	1
E13	Secondary Fuel Filter	8982369900	1
	Secondary Fuel Filter Element	8982402800	1
E14	Fuel Banjo Fitting	8981263320	4
E15	Fuel Banjo Bolt	1096751930	4
E16	Fuel Sealing Washer	8982513450	8
E18	A/V Mount	9680M00045	2
E19	Fuel Filler Filter	7501252000	1
E20	Fuel Filler Cap	9550M11501	1
E21	Fuel Level Gauge Sender	92800-0233	1
E23	3/4" BSPP x 1/2" BSPP Male Adaptor	9532P00405	4
E24	3/4" Bonded Seal	9532P00603	4
E52	Turbo Guard – 4LE2X/T	1518015000	1
E53	Turbo Guard Spacer – Short	1515101000	2
E54	Turbo Guard Spacer - Long	1510246000	2
E56	Exhaust Clamp	9506134000	1
E57	Exhaust Clamp	9506M06101	1
E100	Turbo Guard Isuzu 4LE2X	1518016000	1

When ordering spares, please state:

PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART

## Isuzu 4LE2X on Skid Assembly – 1515025000



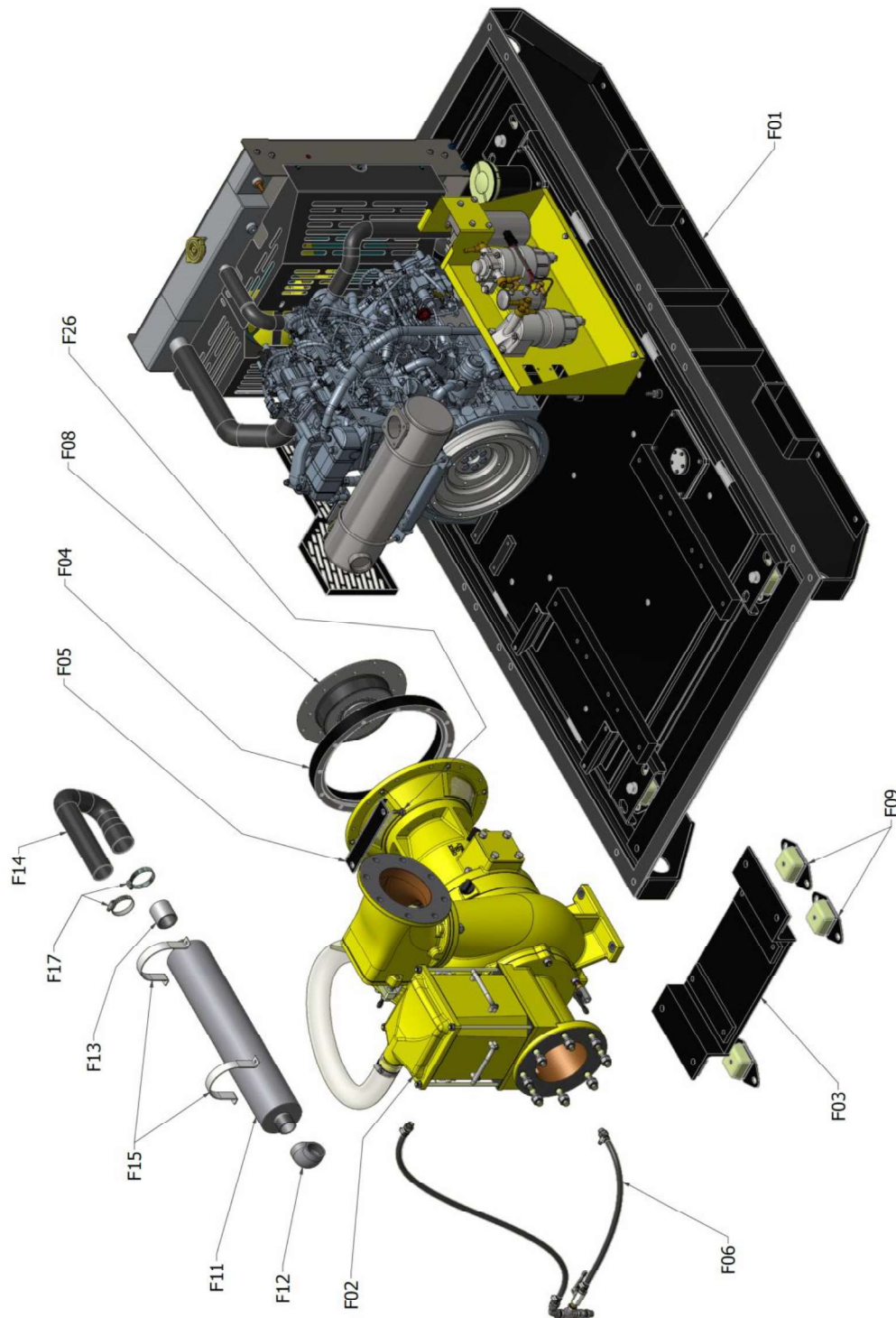
ITEM	DESCRIPTION	PART NUMBER	QTY
E01	Isuzu 4LE2X/T Skid Assembly	1514249000	1
E02	Fuel Filler Plate Gasket	1501280000	2
E03	Fuel Sender Mounting Plate	1515102000	1
E04	Fuel Filler / Inspection Plate	1506251000	1
E05	Hose Adaptor Assembly – 3/8" BSPT	1514134000	2
E06	Oil Filter Hose	1514187000	2
E07	Fuel Filter Panel	1014226000	1
E09	Isuzu 4LE2X Diesel Engine	92046-0004	1
E10	Oil Filter	8980756710	1
	Oil Filter Element	8980756761	1
E11	Primary Fuel Filter	8982369910	1
	Primary Fuel Filter Element	8982402790	1
E12	Fuel Pump	8980682750	1
E13	Secondary Fuel Filter	8982369900	1
	Secondary Fuel Filter Element	8982402800	1
E14	Fuel Banjo Fitting	8981263320	4
E15	Fuel Banjo Bolt	1096751930	4
E16	Fuel Sealing Washer	8982513450	8
E18	A/V Mount	9680M00045	2
E19	Fuel Filler Filter	7501252000	1
E20	Fuel Filler Cap	9550M11501	1
E21	Fuel Level Gauge Sender	92800-0233	1
E23	3/4" BSPP x 1/2" BSPP Male Adaptor	9532P00405	4
E24	3/4" Bonded Seal	9532P00603	4
E52	Turbo Guard – 4LE2X/T	1515100000	1
E53	Turbo Guard Spacer – Short	1515101000	2
E54	Turbo Guard Spacer - Long	1510246000	2
E56	Exhaust Clamp	9506134000	1
E57	Exhaust Clamp	9506M06101	1

When ordering spares, please state:

PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART



## 9.8 S160 / Isuzu 4LE2X Core Build – 1514127C00

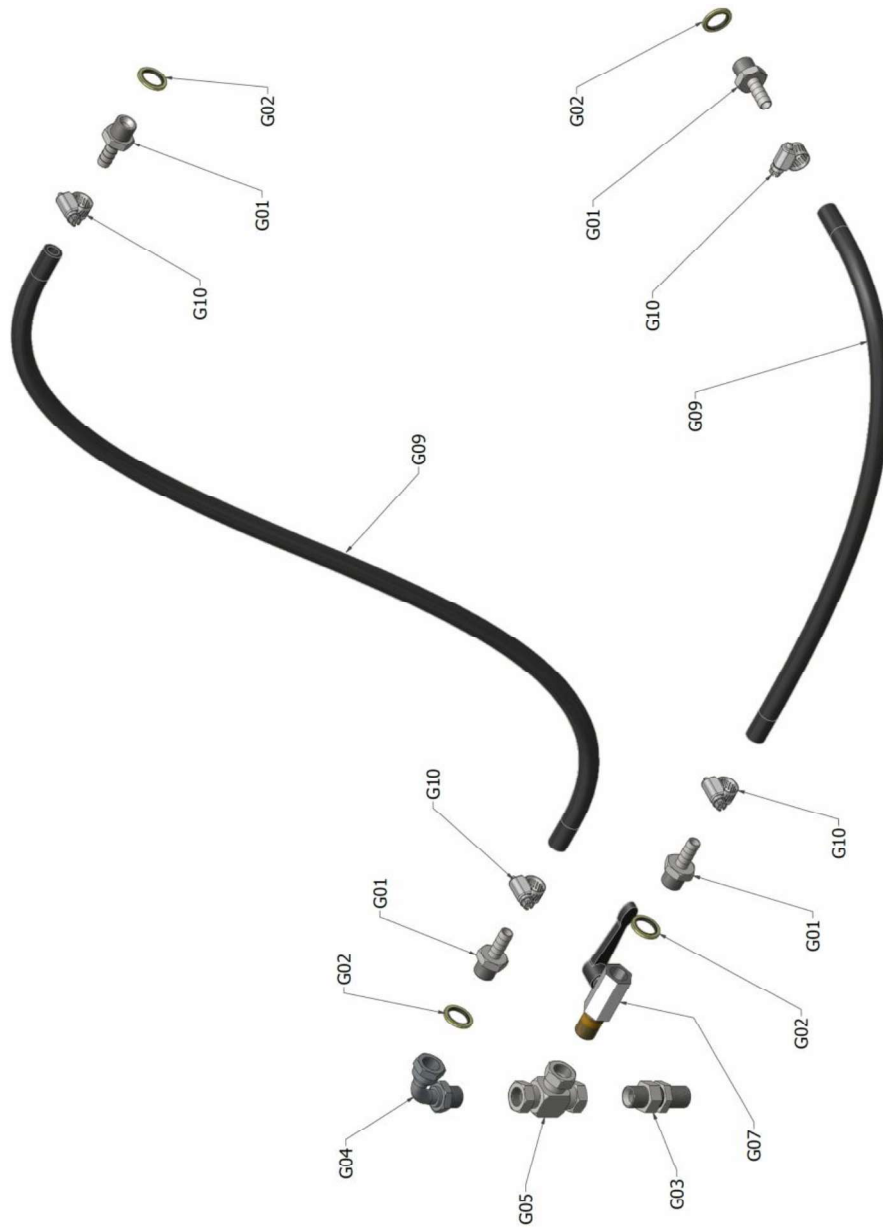


ITEM	DESCRIPTION	PART NUMBER	QTY
F01	Isuzu 4LE2X on Skid Assembly	1515025000	1
F02	S160 Pump Unit, Close Coupled, 1800 RPM	1515032000	1
F03	Pump Mounting Saddle	1515064000	1
F04	Bellhousing Spacer	1514128000	1
F05	D.O.C. Bracket	1514129000	1
F06	Pump Drain Kit	1015013000	1
F08	Coupling	9600M04806	1
F09	A/V Mount	9680M00048	4
F11	Air Pump Silencer 1.½" BSP	9510P01201	1
F12	Socket 1.½" BSP	9517P01202	1
F13	Equal Elbow 1.½" BSP	9517P01201	1
F14	Air Exhaust Connector Hose	1007411000	1
F15	Clamp	0015509940	2
F17	Hose Clip	9505007004	2
F26	M10x25 Hex Head Screw (Fine Pitch)	9001030-02	2

When ordering spares, please state:

PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART

## 9.9 Pump Drain Kit – 1015013000

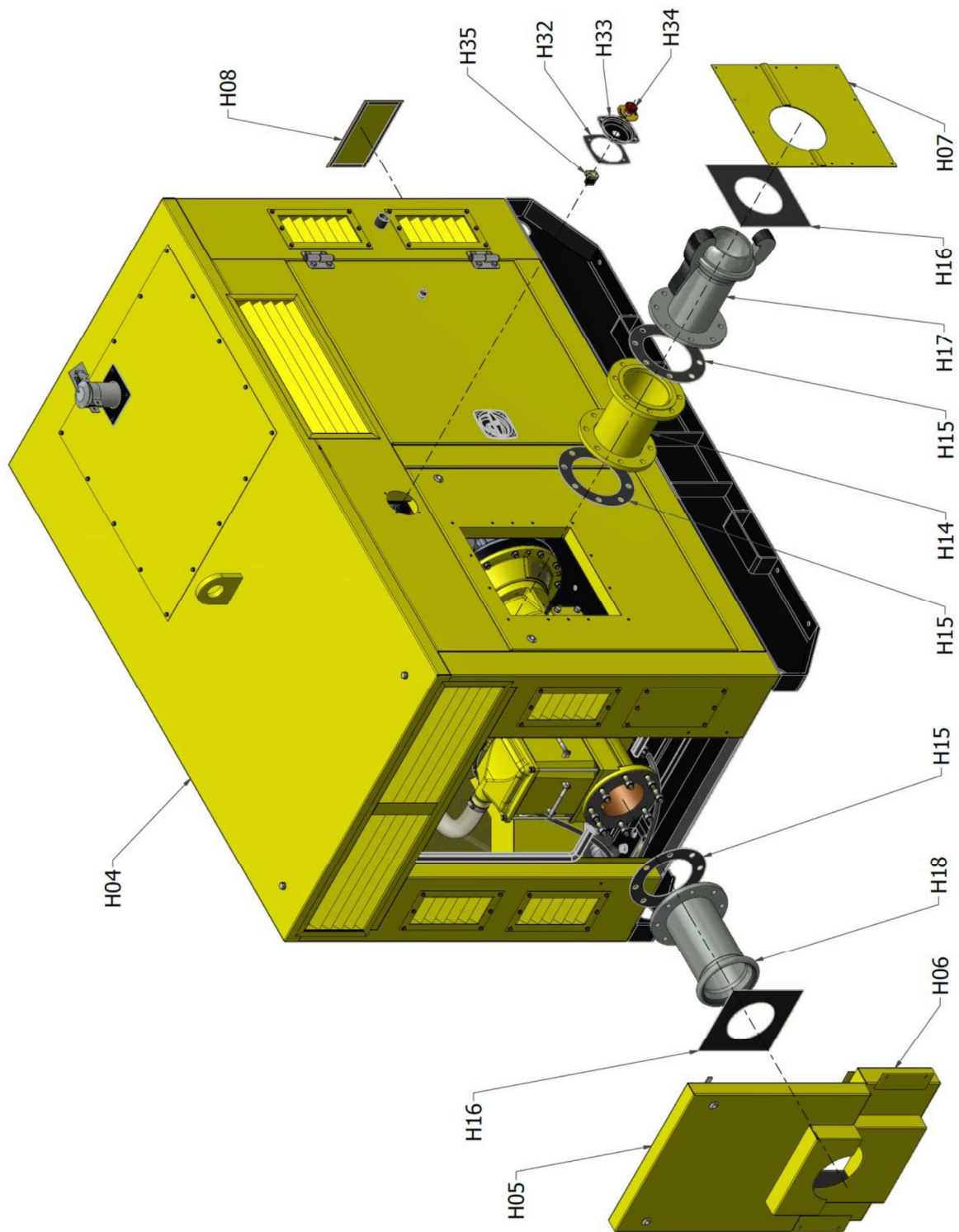


ITEM	DESCRIPTION	PART NUMBER	QTY
G01	3/8" BSPP x 3/8" Hosetail	9532P00332	4
G02	3/8" Bonded Seal	9532P00307	4
G03	3/8" BSPP Bulkhead, C/W Locknut	9532P00313	1
G04	3/8" BSPP Male x Swiv. Fe., 90° Swept Elbow	9532P00321	1
G05	3/8" BSPP Swivel Female Tee	9532P00330	1
G07	Drain Tap	9520003000	1
G09	Oil Resistant Hose	9508K00301	1.5m
G10	Hose Clip	9505M02001	4

When ordering spares, please state:

**PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART**

## 9.10 S160 / Isuzu 4LE2X Super Silent



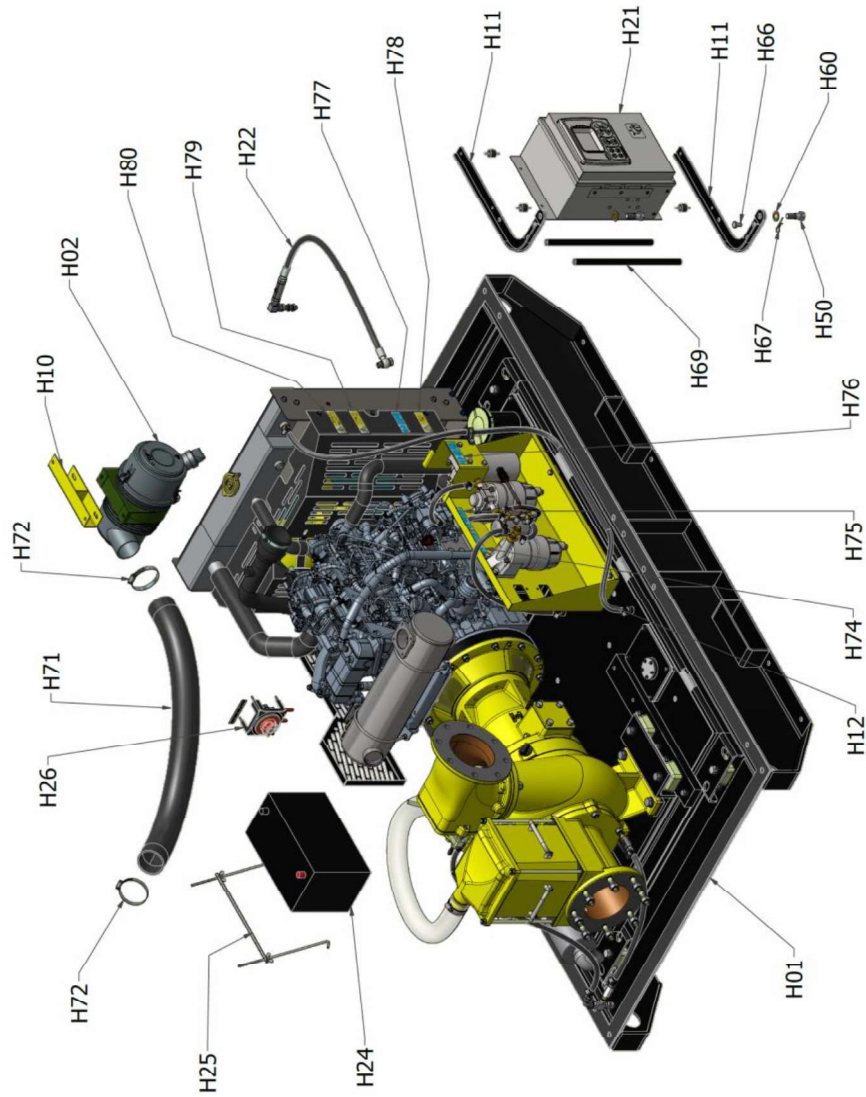
ITEM	DESCRIPTION	PART NUMBER	QTY
H01	S160 / Isuzu 4LE2X Core Build	1514127C00	1
H02	Air Filter – Main	EP110563	1
	Air Filter – Safety	EP110564	1
H04	Isuzu 4LE2X/T Canopy	1514250000	1
H05	S160 Removable Rear Door	1515004000	1
H06	S160 Rear Bottom Panel	1515006000	1
H07	S160 Delivery Joggle Plate Set	1515009000	1
H08	Fuel Cover Plate	1007356000	1
H10	Air Cleaner Bracket	1514133000	1
H11	Control Panel Mounting Arm	1015011000	2
H12	Fuel Link Kit – Standard	1015021000	1
H14	150mm Flanged Connector	1502336000	1
H15	Flange Gaskets	0015079000	3
H16	Bauer Surround Gasket	1503164000	2
H17	150mm Flanged Male Bauer Adaptor	0015094000	1
H18	150mm Flanged Female Bauer Adaptor	0015095000	1
H19	Bauer Strainer (Not Shown)	0015156000	1
H21	Control Panel & Loom	92700-0463	1
H22	Engine Oil Drain Hose	92700-0458	1
H24	Battery	92800-0049	1
H25	Battery Clamp Set	9297500000	1
H26	Battery Isolator Kit	1015014000	1
H27	Battery Lead, Negative	0804035000	1
H28	Battery Clamp Boot	92800-0005	1
H30	Cover Terminal	0006712000	2
H32	Gasket	9728-00046	2
H33	Black Coated Dish Pan	9728-00045	2
H34	Mushroom Push Button	92800-0054	2
H35	Contact Block	92800-0055	2
H37	Emergency Stop Loom	1503238000	1
H38	Cable Clip – Self Adhesive	9705003000	10
H39	Sound Label	TBA	1
H40	Label – Tier 4 / Stage IV	1515106000	1
H41	Label – Weight	1515108000	1
H66	M12x20 Clevis Pin	9001290-01	1
H67	R-Clip	9001290-02	1
H69	Control Panel Mounting Arm Stiffener	1515099000	2
H71	75 I/D Air Inlet Hose	9500M07501	1m
H72	Hose Clip	9505M02003	2
H74	Label – Primary Fuel Filter	1515092000	1
H75	Label – Secondary Fuel Filter	1515093000	1
H76	Label – Oil Filter	1515094000	1
H77	Label – Engine Service Kits	1515095000	1
H78	Label – Diesel Specification	1515096000	1
H79	Label – Oil Specification	1515097000	1
H80	Label – Anti-Freeze	1515098000	1

When ordering spares, please state:

PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART



## S160 / Isuzu 4LE2X Super Silent

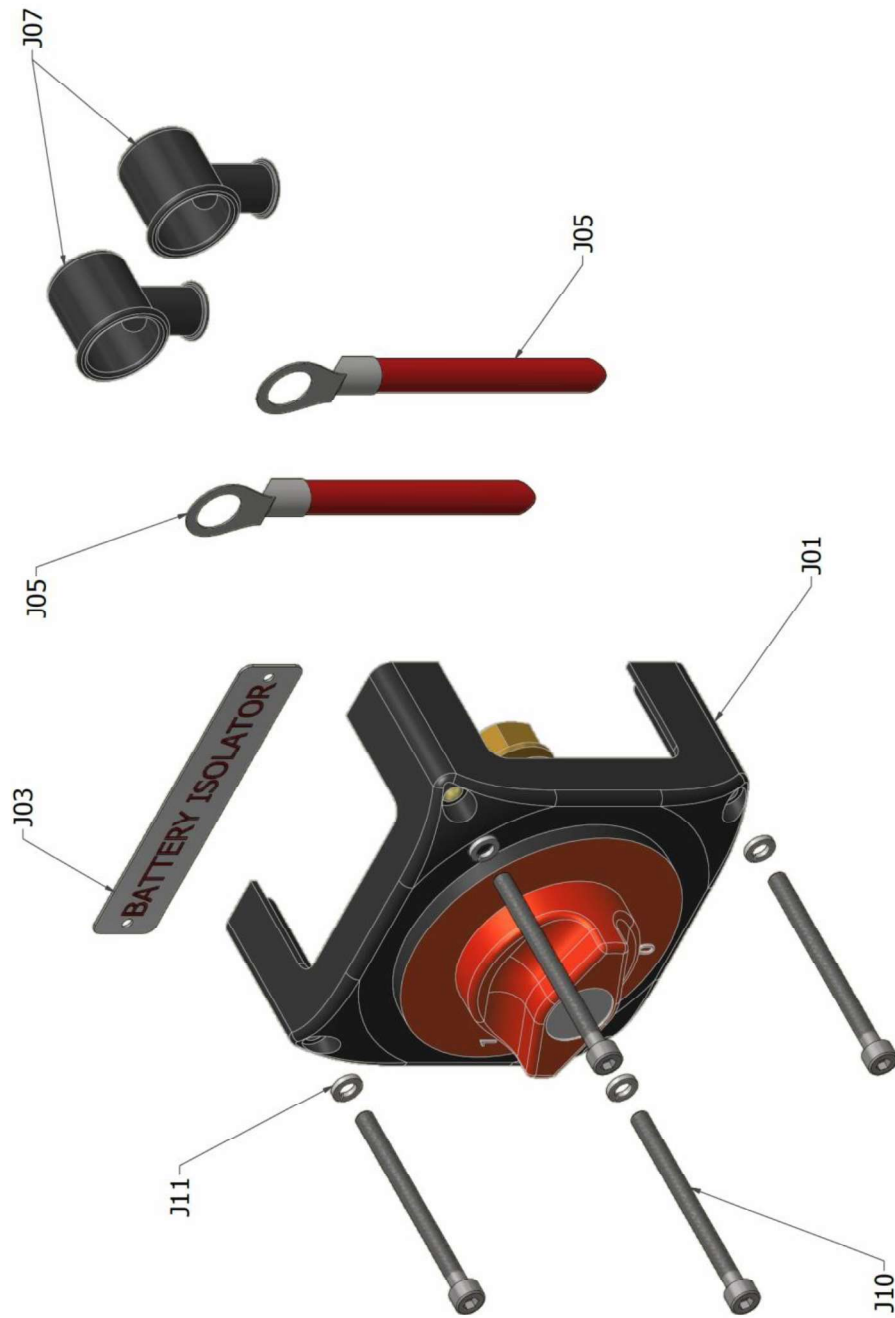


ITEM	DESCRIPTION	PART NUMBER	QTY
H01	S160 / Isuzu 4LE2X Core Build	1514127C00	1
H02	Air Filter – Main	EP110563	1
	Air Filter – Safety	EP110564	1
H04	Isuzu 4LE2X/T Canopy	1514250000	1
H05	S160 Removable Rear Door	1515004000	1
H06	S160 Rear Bottom Panel	1515006000	1
H07	S160 Delivery Joggle Plate Set	1515009000	1
H08	Fuel Cover Plate	1007356000	1
H10	Air Cleaner Bracket	1514133000	1
H11	Control Panel Mounting Arm	1015011000	2
H12	Fuel Link Kit – Standard	1015021000	1
H14	150mm Flanged Connector	1502336000	1
H15	Flange Gaskets	0015079000	3
H16	Bauer Surround Gasket	1503164000	2
H17	150mm Flanged Male Bauer Adaptor	0015094000	1
H18	150mm Flanged Female Bauer Adaptor	0015095000	1
H19	Bauer Strainer (Not Shown)	0015156000	1
H21	Control Panel & Loom	92700-0529	1
H22	Engine Oil Drain Hose	92700-0458	1
H24	Battery	92800-0049	1
H25	Battery Clamp Set	9297500000	1
H26	Battery Isolator Kit	1015014000	1
H27	Battery Lead, Negative	0804035000	1
H28	Battery Terminal Clamp Cover, Black	92800-0005	1
H30	Cover Terminal	0006712000	2
H32	Gasket	9728-00046	2
H33	Black Coated Dish Pan	9728-00045	2
H34	Mushroom Push Button	92800-0054	2
H35	Contact Block	92800-0055	2
H37	Emergency Stop Loom	1503238000	1
H38	Cable Clip – Self Adhesive	9705003000	10
H39	Sound Label	TBA	1
H40	Label – Tier 4 / Stage IV	1515106000	1
H41	Label – Weight	1515108000	1
H66	M12x20 Clevis Pin	9001290-01	1
H67	R-Clip	9001290-02	1
H69	Control Panel Mounting Arm Stiffener	1515099000	2
H71	75 I/D Air Inlet Hose	9500M07501	1m
H72	Hose Clip	9505M02003	2
H74	Label – Primary Fuel Filter	1515092000	1
H75	Label – Secondary Fuel Filter	1515093000	1
H76	Label – Oil Filter	1515094000	1
H77	Label – Engine Service Kits	1515095000	1
H78	Label – Diesel Specification	1515096000	1
H79	Label – Oil Specification	1515097000	1
H80	Label – Anti-Freeze	1515098000	1

When ordering spares, please state:

PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART

## 9.11 Battery Isolator Kit – 1015014000



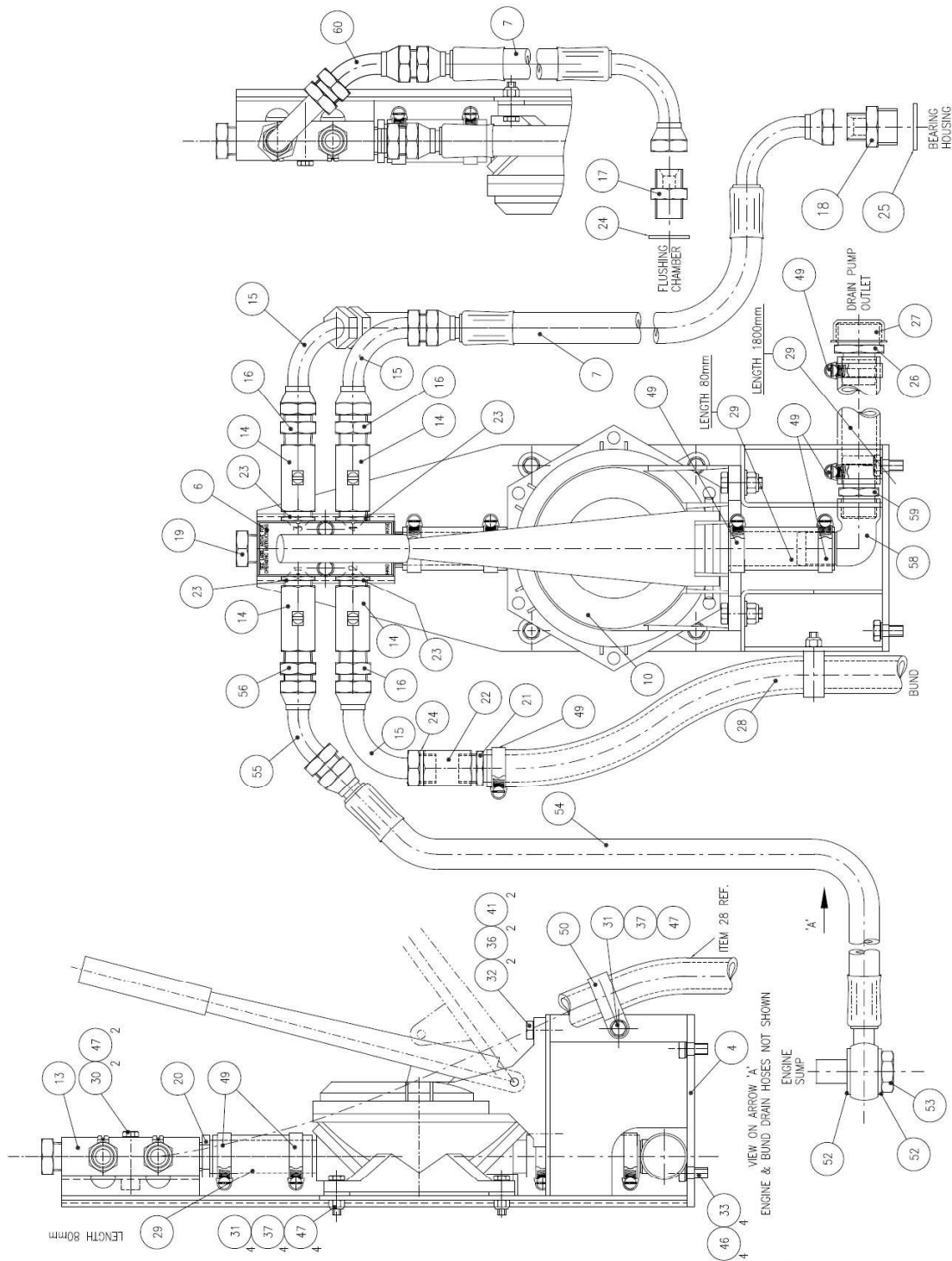
ITEM	DESCRIPTION	PART NUMBER	QTY
J01	Battery Isolator Kit	92800-0137	1
J03	Label – Battery Isolator	1306091000	1
J04	Battery Lead, Positive (Battery to Isolator)	1515103000	1
J05	Link Lead, Positive (Isolator to Starter Motor)	1515104000	1
J07	Terminal Boot	92800-0008	2
J08	Battery Terminal Clamp Cover, Red	92800-0158	1
J10	M5x65 Hex Socket Capscrew	9000540-02	4
J11	M5 Spring Washer	9000579-01	4

When ordering spares, please state:

PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART

## 10 OPTION KITS

### 10.1 Oil Drain Kit – 1515119000



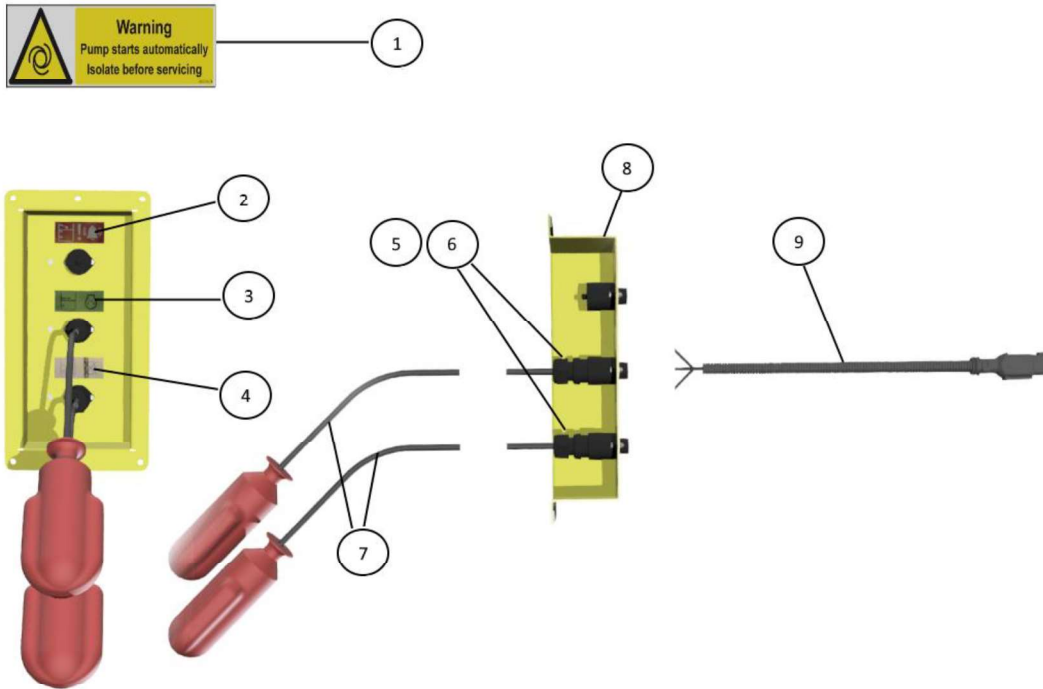
ITEM	DESCRIPTION	PART NUMBER	QTY
4	Oil Drain Pump Bracket	1505208000	1
5	Instructions Label	1515121000	1
6	Manifold Label	1505284000	1
7	Oil Drain Hose Assembly	1510305000	2
10	Hand Pump	980257-001	1
13	½" BSPP Manifold – 6 Port	9532P00401	1
14	½" BSPP Male x Female Ball Valve	9530P00404	4
15	½" BSPP Male x Swiv. Fe. 90 Swept Elbow	9532P00402	3
16	½" BSPP x ½" BSPT Male Adaptor	9532P00403	3
17	½" BSPP Male Adaptor	9532P00404	1
18	½" BSPP x ¾" BSPP Male Adaptor	9532P00405	1
19	½" BSPT Solid Plug	9532P00406	1
20	½" BSPT Male x 1" Hosetail	9532P00407	1
21	½" BSPT Male x ¾" Hosetail	9532P00408	1
22	½" BSPP Fixed Female Adaptor	9532P00409	1
23	½" BSP Locknut	9532P00410	4
24	½" BSP Bonded Seal	9532P00411	2
25	¾" BSP Bonded Seal	9532P00603	1
26	1" BSPP Male x 1" Hosetail	9532P00801	1
27	1" BSPP Plastic Cap	9539P00801	1
28	¾" Oil Resistant Hose	9500K00601	0.5m
29	1" Oil Resistant Hose	9507K00801	2m
49	Hose Clip	9505030004	7
50	P-Clip	9539M02801	1
52	3/8" BSP Bonded Seal	9532P00307	2
53	3/8" Banjo Bolt	9532P00331	1
54	3/8" Hydraulic Hose	1515065000	1
55	3/8" Male x Swiv. Fe. 135 Swept Elbow	9532P00325	1
56	3/8" BSPP x ½" BSPT Male Adaptor	9532P00333	1
58	90 Degree Hose Elbow, Female	9516P00605	1
59	Hose Connector	9516P00606	1
60	½" Male x Swiv. Fe. 135 Swept Elbow	9532P00419	1

When ordering spares, please state:

PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART



## 11 START-STOP 15151200000

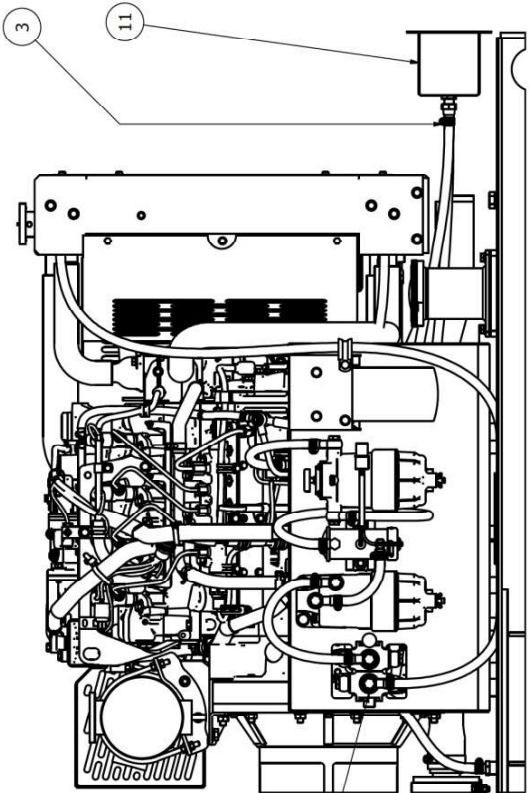
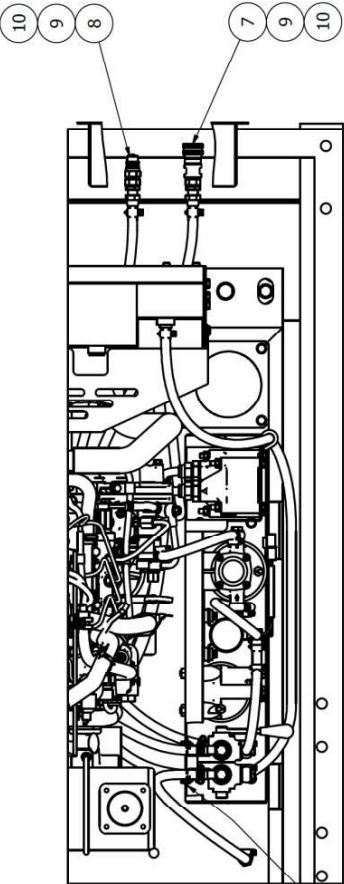
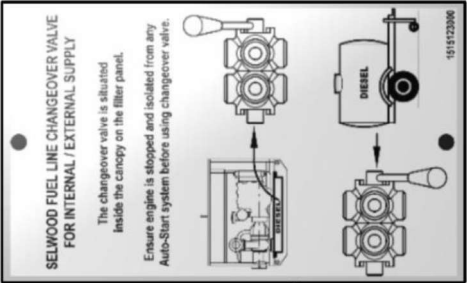


Item	Description	Part Number	QTY
1	Auto-Start Label	8500000-EN	3
2	Alarm Label - Float	1505174000	1
3	High Label - Float	1505175000	1
4	Low Label-Float	1505176000	1
5	Cable Plug - 4 Way	92800-0083	2
6	Dust Cap	92800-0084	2
7	Float Switch + 20 mm Cable	92900-0033	2
8	Float Plug Panel	1004100000	1
9	Float Switch Loom	92700-0516	1

When ordering spares, please state:

PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART

**BULK FUEL KIT –  
1014227000**



6 5 4 1  
2 2 2  
2 POS'NS

ITEM	DESCRIPTION	PART NUMBER	QTY
1	Diverter Valve Mounting Bracket	1014229000	2
2	Diverter Valve	9530K00301	1
3	Fuel Line Kit – Bulk Fuel	1015022000	1
4	M6x16 Hex Head Screw	9000630-01	4
5	M6 Spring Washer	9030060229	4
6	M6 Plain Washer	9030060024	4
7	Hydraulic Coupling Connector	9532P00301	1
8	Hydraulic Plug Connector	9532P00302	1
9	3/8" BSP Bonded Seal	9532P00307	2
10	3/8"BSPP Bulkhead w/ Locknut	9532P00313	2
11	Fuel Connection Box	1015026000	1
12	Label – Bulk Fuel Instructions	1515123000	1
14	Label – Bulk Fuel External Label	1745030266	1

When ordering spares, please state:

PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART

## 12 NOTES