

SELWOOD D100 / ISUZU 2CA1

Operating and Service Manual

The products of Selwood Limited, are designed, developed and produced in the company's Chandler's Ford factory. Many features are covered by world-wide patents. Product names such as Spate, Simplite and Seltorque, are registered trade marks.

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 0913024000

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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. 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 1.8 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 taps provided.



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



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

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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 manufacturers 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 Fitting Instructions for Centaflex Couplings (Diesel Engines)

IMPORTANT NOTES – OBSERVE STRICTLY:

The Centaflex Coupling Assembly is supplied in a pre-assembled state and must be fitted to the pump drive shaft and engine flywheel in this state. On no account should any of the components that make up the coupling assembly be dismantled unless it has become necessary to service one of the component parts. Typically, the most likely component to require replacement will be the rubber element and servicing of this item is explained in Section 1.5.3 below.

The coupling assembly consists of a central steel hub whose outside diameter locates within a bore of a rubber element and is secured within the element using three cap screws that pass radially through its outer diameter. In turn, the rubber element locates onto three horizontal pins, equally disposed on a PCD and each secured to the face of a steel adaptor plate with cap screws. The cap screws securing both the central steel hub and the horizontal pins are torque tightened to the values shown in the table in Section 1.5.2 below.

The rubber element itself is free to slide on the horizontal pins. It is therefore unnecessary to remove the cap screws that secure the pins unless the pins themselves have become damaged.

1.5.1 Preparation of the Centaflex Coupling for Pump Removal

NOTE: Before commencing, mark the position of the coupling assembly on the pump drive shaft. Pay particular attention to the size of the gap between the back of the rubber element and the face of the steel adaptor plate. This gap has been factory set and is maintained when the setscrew in the steel hub is locked in position.

1. In order to allow the pump drive shaft to be withdrawn from the steel hub of the coupling, it will be necessary to loosen the setscrew located in the outside radius of the steel hub just in front of the rubber element. The setscrew clamps the coupling assembly onto the top of the pump drive shaft key and it is not necessary to completely remove this screw.
2. Once the setscrew is loose the pump drive shaft is free to be withdrawn from the hub of the coupling. Note too that when the setscrew is loose the coupling assembly is free to slide in either direction onto the pump drive shaft or onto the horizontal pins.

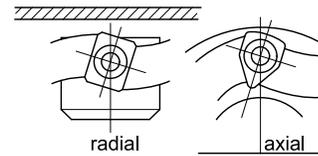
1.5.2 Centaflex Coupling Assembly Sequence

1. The radial and axial screws connecting the rubber element to the hubs must all be tightened to the torque given in the table below, using a torque wrench.

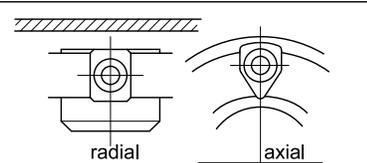
Centaflex Size	Screw Size	Tightening Torque	
		Nm	kgf.m
8	M10	50	5,13

2. Tightening with a torque wrench is particularly important. Tightening by feel will not do as experience has proved the tightening torques in such cases are far too low. Tightening torques which are too low will inevitably lead to slackening of the screws in service and consequently to the destruction of the coupling.
3. Ensure that on tightening the screws, the aluminium bushes in the rubber part are not twisted at the same time, but sit straight. In order to reduce friction between the screw head and the aluminium part, a small amount of grease should be applied under the head of the screw before fitting.
4. If necessary, use a suitable tool for applying counter pressure on the element to prevent twisting of the rubber part during tightening of the screws. This is particularly important with radial screws, otherwise the cylindrical faces between the aluminium insert and the hub will not engage on the full area, but only on two corners. This will inevitably lead to slackening of the screws and

subsequent destruction of the coupling. If the coupling is supplied in a pre-assembled state do not dismantle it, but fit it in this condition.



WRONG

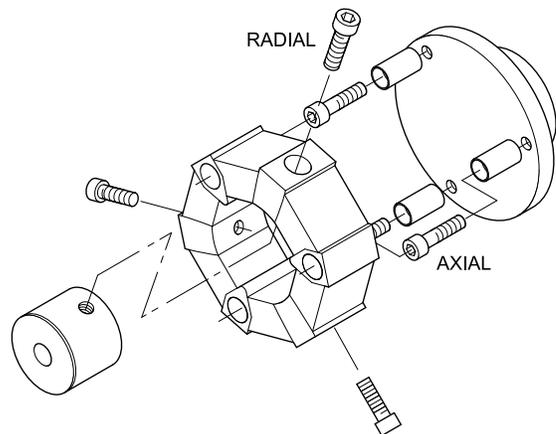


CORRECT

1.5.3 Replacement of the Steel Hub and Rubber Element

NOTE: Once the Centaflex coupling has been prepared in accordance with Section 1.5.1 above, it is free to be removed from the horizontal pins on the face of the adaptor plate.

1. If it becomes necessary to replace either the steel hub or rubber element, the three radial cap screws must be removed in order to separate the two components. When removing these cap screws it is recommended that the coupling assembly remain on the horizontal pins for ease of their removal.



2. Once the three radial screws are removed, the steel hub can be separated from the rubber element. Also at this stage the rubber element can be removed from the horizontal pins of the adaptor plate.
3. Replace the rubber element and/or steel hub as necessary to refurbish the assembly.
4. Fit the rubber element onto the horizontal pins of the adaptor plate.
5. Insert the steel hub into the centre of the rubber element and align the radial mounting holes with tapped holes in the hub.

6. Fit the three radial cap screws in accordance with the instructions at Section 1.5.2.
7. The coupling assembly is now prepared for the replacement of the pump.
8. Once the pump drive shaft is engaged in the coupling hub bore, set the position of the coupling assembly to that previously marked when Section 1.5.1 was performed.
9. Tighten the setscrew that locks the steel hub of the coupling assembly to the pumps drive shaft key.

1.6 Selwood D100 Standard Data

Capacity D100	120m ³ /h
Delivery Head	23m
Self Priming Lift	9.1m
Solids Size	29m sphere
Air Handling Capacity	4.25 l/s
Pump Speed Max	2000rpm
Port Size BS EN 1092-2:2002 PN6	100mm

2 ROUTINE MAINTENANCE

Lack of routine maintenance is the most frequent reason for the break-down 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.
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 over-sized solids entering the pump. The dimensions of rocks, pebbles, etc., must not exceed 29mm. Larger soft solids, however, of the type found in abattoir duties, for example, will pass freely through the pump. Refer to Selwood Pumps 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 pipe-work 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 Pumps should be used. It is advisable to hold a small stock of spare parts to cover break-down 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 Pumps if the need for further advice arises.
11. Please contact Selwood Pumps 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.

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 Q8 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 – Isuzu 2CA1	See Engine Handbook
Bearing Housing	T750 – 15W/40
Flushing Chamber	T750 – 15W/40
Actuator Bore	Ravel LG
Impeller Bore	Ravel LG
Paper Gaskets	Rembrandt EP2
Axle Shafts	Rembrandt EP2
M10 Screws - Port Plate to Diffuser	Copper Thread Compound

COMPARTMENT	SERVICE/DRAIN	
	CHANGE OIL & FILTERS	CHECK & TOP UP
Engine – Isuzu 2CA1	250 Hours	Daily
Bearing Housing Flushing Chamber	250 – 500 Hours	Daily
Actuator Bore Impeller Bore Shaft Sleeve Bore	ON ASSEMBLY	-
Paper Gaskets	ON ASSEMBLY	-
Axle Shafts Axle Pivot Assembly	6-12 Months	-
M10 Screws - Port Plate To Diffuser	ON ASSEMBLY	-

3.1.1 Commissioning Period

Drain both pump chambers and engine within 50-100 running-hours of commissioning either a new, or rebuilt pump, and refill with new oil to level plugs.

Flushing chamber capacity about 3.4 litres (6 pints).

Bearing housing capacity about 2.3 litres (4 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. This will usually require the pump oils to be drained and replaced every 250 running hours. Under no circumstances should the period for the pump exceed 500 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	kgf m
M16 Lifting frame to Chassis Fixings	180	25
(D36) Actuator Cap Screw	42	5.5
(A22) Cap Screw M12 9005120552	60	8.3
M12 Engine & Pump to chassis fixings	72	10
Air Pump Pedestal Cap screws	25	5.8

4 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 contact Selwood Ltd.

5 MAJOR SERVICING

5.1 Air Pump Maintenance

5.1.1 Delivery and Suction Valves

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 hoses from suction adaptor (A03) and exhaust adaptor (A03) spigots after loosening relevant hose clips.
2. Note orientation of both suction adaptor (A03) and exhaust adaptor (A03) before commencing. Remove both suction and exhaust adaptors by releasing nut (A05) and spring washers (A06). Remove gasket (A30) between suction adaptor and air pump outer body (A15), it is recommended that this item be replaced by new gasket on reassembly.

3. The exhaust valve (A07) can now be inspected. To replace the valve rubber if damaged, remove hex. Soc. C's'k. head screw (A04) which will release valve clamp (A08) and valve rubber (A07). Check and clean if necessary, valve seat and clamp and reassemble by reversing procedure. Ensure valve rubber is fitted correctly i.e. flat face against valve seat.
4. The exhaust adaptor (A03) may now be refitted by reversing procedure in instructions 1 & 2. Ensure that hose spigot is clean and in correct orientation to refit hose and tighten clip.
5. The suction valve is situated inside the outer air pump body (A15) and may be inspected by releasing 8 hex. Hd. Screws (A14), nuts (A13), spring & plain washers (A11) & (A12). The outer body (A15) may now be lifted off to expose the suction valve. If the valve needs replacement follow procedure for exhaust valve as instruction 3.

NOTE: It is advisable to inspect both actuator seal and actuator valve (A07) while the outer body (A15) is removed. See Sections 5.1.2 & 5.1.3 for procedure.

6. To reassemble outer body (A15) together with suction adaptor (A03), reverse procedures in instructions 5,3 & 1. Ensure that 8 hex. Screws (A05) are tightened sequentially in small increments to give an even clamping force on actuator seal. Ensure also that suction adaptor hose spigot is clean and in correct orientation to fit hose.

NOTE: To give a vacuum tight seal it is recommended that gasket (A30) is renewed.

5.1.2 Actuator Valve

Malfunction of the actuator valve may also contribute to loss of priming efficiency, to inspect proceed as follows:

1. Remove outer air pump body (A15) as section 5.1.1 Instruction 5. This will expose the actuator (A20) and actuator seal (A18). To access the valve (A107) remove the actuator and seal in situ by following the procedure in section 5.1.3 Instructions 1 & 2. If actuator seal is suitable for continued use, handle with care to avoid cutting or damaging surfaces. On removal of actuator (A20), valve (A07) will be exposed for inspection. To replace valve follow procedure in Section 5.1.1 Instruction 3.

NOTE: It is advisable to check condition of actuator seal whilst it is exposed. See Section 5.1.3 for service and/or replacement.

2. To refit the actuator and seal follow procedure in Section 5.1.3 Instructions 4,6,8,9 & 10.

5.1.3 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 exhaust 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). Remove actuator (A20) complete with seal from drive rod (D37).
3. To renew actuator seal (A18) remove failed component from actuator, insert firstly one side and then the other into the actuator groove, using a blunt tool that will not cut the rubber.

NOTE: The seal is handed and will not enter the inner pump body (A19) if fitted the wrong way round.

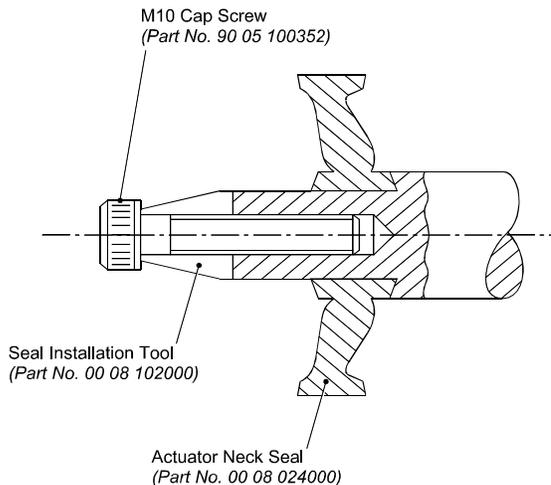
4. The correct assembly position for actuator seal (A18) is with the smaller diameter of its conical outer surface towards the inner pump body (A19). It will be seen that the housing in the body is tapered in the same direction as the external surface of the seal.
5. At this stage it is advisable to 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 5.1.4 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 (D22) and washer (A23) and tighten to 42lb ft torque.
7. 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).
8. Seat outside section of actuator seal in inner pump body recess by gently tapping with a non-metallic mallet.
9. 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.

5.1.4 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 5.1.3 Instructions 1 and 1.
2. Release hose clip (A02) allowing air hose to be disconnected from suction adaptor (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. 0008102000) 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.



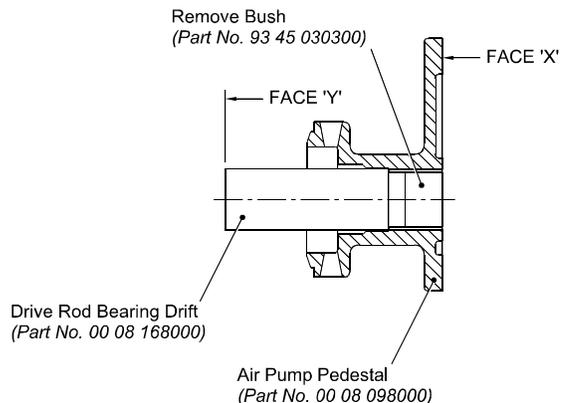
Reassemble remaining components in accordance with Section 5.1.3 Actuator Seal (A18) Instructions 6 to 9, inclusively.

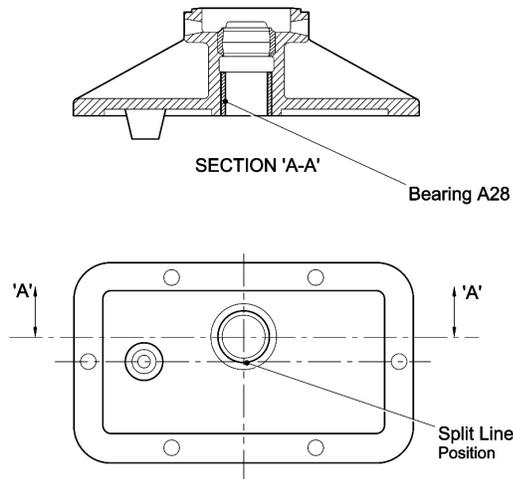
5.1.5 Drive Rod Seal Assembly and Bearing (A25 and A28)

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.

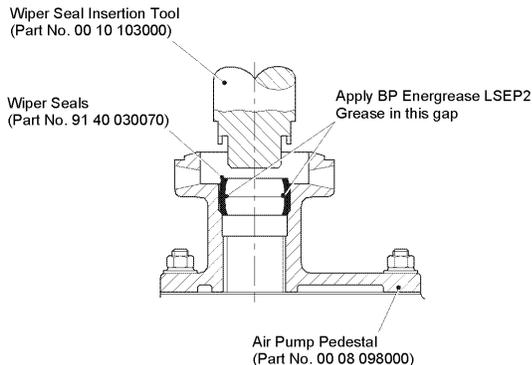
To inspect and service, proceed as follows:

1. Drain oil from bearing housing by removing filler cap (D08) and drain plug (D13). Ensure correct drain plug is removed.
2. Remove air pump components in accordance with Section 5.1.3 Actuator Seal (A18) Instructions 1 and 1, and Section 5.1.4 Actuator Neck Seal (A21) Instructions 2 and 3.
3. Remove 6 nuts (A11), spring washers (A12) & plain washers (A13) securing pedestal (A24) to pedestal (D06).
4. Being careful not to damage the flat sealing faces of housing (A24), carefully withdraw housing complete with its bearing and sealing components from pedestal (D06) and drive rod (D37).
5. Examine condition of wiper seals (A25) together with bearing. If either are worn or damaged, we recommend that a new housing (Part No. 0008905000) complete with seal assembly and bearing (A28) should be ordered and fitted. However, individual components can be renewed in accordance with the following instructions.
6. To replace drive rod bearing (A28) Use service tool PT. No 008168000 to remove old bearing from pedestal HSG (D06) being careful not to damage bores. Install new bearing using service tool PT No. 0008168000. Press bearing flush to HSG with split line as shown in diagrams.
 - a) Insert shouldered end of drift into bush as shown. Support air pump pedestal evenly of face 'x' leaving sufficient clearance for bush to emerge freely. Push out bearing bush by pressing or striking on tool face 'Y'.





7. Ensure that seal components are assembled in accordance with the following instructions.
 - a) The wiper seals (A25) should be pressed in position using insertion tool 0010103000. Ensure seal orientation is correct. See diagram below.



8. 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 5.4.2.
9. 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 Pumps.

10. Reassemble remaining pump components in accordance with Section 5.1.4 Actuator Neck Seal (A21) Instruction 4 and Section 5.1.3 Actuator Seal (A18) Instructions 6 to 9, inclusively.
11. Replace drain plug (D13) 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.

5.2 Separator Maintenance

5.2.1 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 (A41) by loosening hose clip (A42)
2. Remove nuts (A11) and washers (A12) and lift off separator cap (B01) complete with peel valve/upper diffuser assembly, (B01) to (B21) inclusively. Examine condition of float (B11) and replace with new component if punctured or significantly worn.
3. Check condition of peel valve rubber (B21) and bush (B07) replacing them, if necessary, in accordance with advice commencing at Section 5.2.2 Peel Valve (B21).
4. 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 and re-tension hose clip (A42).

5.2.2 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), carefully clean existing parts thoroughly, especially surfaces of port plate (B03), and clamp bars (B19), and position new rubber on plate. 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 Section 5.2.2 Peel Valve (B21) Instruction 5, except that clamp bar seal (B20) is omitted. Again, ensure that the nuts are not over-tightened.
 7. After completing Section 5.2.2 Peel Valve (B21) Instructions 5 and 6, 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 (B35) 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 5.2.1 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). Adjust the position of the float on the operating rod to obtain the correct dimension.
 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 5.2.1 Float (B11) Instruction 6.

5.2.3 Deposits of Solids^{†‡}

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 5.2.1 Float (B11) Instructions 1, 2 and 3, 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, the 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 5.2.2 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 5.2.1 Float (B11) Instruction 6. Any re-assembly work carried out on the peel valve assembly should be in accordance with Section 5.2.2 Peel Valve (B21) commencing at Instruction 1.

5.3 Impeller, Mechanical Seal and Delivery Valve Maintenance

5.3.1 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 (A41) from separator cap (B01), after loosening hose clip (A42).
2. Remove nuts (A11) and washers (A12), and lift off separator cap (B01) complete with peel valve/upper diffuser assembly, (B01) to (B21) inclusively.

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

[‡] Use lower Diffuser (Part No. 0015038000) for other applications where no solids are present which can adhere to the internal surfaces.

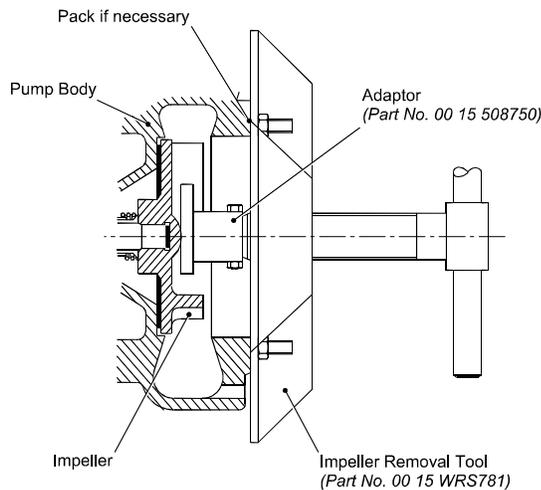
3. Lift separator body (B22) complete with lower diffuser (B24) off suction tube (B27) allowing (dome) nuts (B29) and spring washers (B30) to be released.
4. Withdraw suction tube (B27) and gaskets (B28) after removing nuts (B29) and associated spring washers (B30).
5. Drain oil from flushing chamber by removing filler cap assembly (D08) and drain plug (D13). 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 5.3.2 Mechanical Seal (C08) commencing at Instruction 1.
6. Remove impeller using service tool 0015WRS781. See diagram below for procedure.

Offer up impeller removal tool across front face of pump volute as shown ensuring the correct nose adapter is fitted. Affix by using existing nuts and washers.

Lock shaft if not connected to engine.

Engage adapter in the recesses of the impeller and turn handle anti-clockwise to unscrew impeller.

NOTE: When reassembling impeller ensure threaded end of shaft is coated with **Castrol Rustilo 431 Grease Or Approved Equivalent.**



7. 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.
8. Ensuring that the mechanical seal spring is in position, coat end of drive shaft with Castrol Rustilo 431 Grease Or Approved Equivalent, and refit impeller using service tool 0015WRS781. Screw impeller tightly by hand and give tool handle 2 or 3 sharp taps with copper mallet.

9. Use Rustilo 431 on the inside of the pump register. Fit new gasket (B28), position suction tube on studs, fit washers (B30) and fully tighten nuts (B29).
10. 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 over-tighten.
11. Reposition air hose (A01) on spigot of separator cap (B01) and tighten hose clip (A02).
12. Replace drain plug (D13) 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.

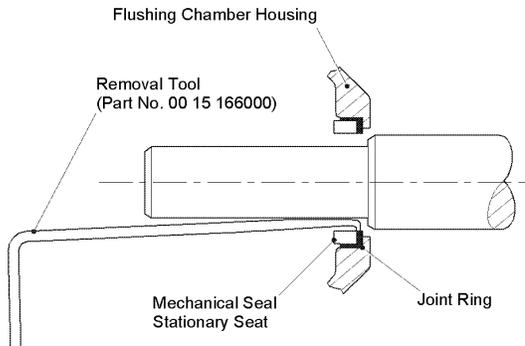
5.3.2 Mechanical Seal (C08)

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 bearing housing (D06).

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 5.4.3 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 HSG section of bearing by removing its filler cap (D08) and drain plug (D06).
2. Remove impeller (C04) in accordance with Section 5.3.1 Impeller (C04) Instructions 1 to 7 inclusively, and remove impeller key (C05).
3. Withdraw shaft sleeve (C06) together with rotating mechanical seal parts and spring. It is likely that (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. (See Section 6.3).
5. Ensure oil is drained from flushing chamber. Remove impeller and shaft sleeve, complete with rotating mechanical seal components.
6. Engage tip of removal tool on inside face of seat. Remove seat by pulling evenly at several peripheral points.
7. Joint ring can then be collapsed and discarded.



8. 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.
9. 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.

10. 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.
11. Smear lubricant on drive shaft diameters and 'O' ring (C07). Position 'O' ring on shaft. 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.
12. Smear lubricant (soft soap) on outside diameter of shaft sleeve (C06) and inside diameter of rubber drive band. Protect the highly polished face of the seal with several layers of clean soft paper, and slide seal assembly onto sleeve using finger pressure only - USE NO TOOLS. The seal must be positioned so that the carbon face is about 3mm past the non-flanged end of the sleeve.

13. Within a few minutes, to ensure that the lubricant has not set, slide sleeve seal assembly onto shaft (seal face towards stationary seat) and press into working position using only the sleeve's flange. This procedure automatically causes the seal head to slide along the sleeve into its correct working position. Ensure that 'O' ring (C07) is correctly trapped in sleeve recess (C06) and that sleeve abuts against shoulder on shaft.
14. Push mechanical seal spring onto location diameter provided on seal head. Ensure that the spring's coils are correctly supported by the flange of sleeve (C06) and will not become trapped between the flange and the impeller (C04). Refit key (C05) and impeller in accordance with Section 5.3.1 Impeller (C04) Instructions 8 to 10.
15. Replace remaining components in accordance with Section 5.3.1 Impeller (C04) Instructions 9 to 14, inclusively.

5.3.3 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), 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 bolt (C34), examine condition of rubber (C27), especially along the hinge line and seating surface. Discard if damaged or mis-shapen.

NOTE: If valve seat has been damaged delivery valve chamber (D18) will need replacement as seat is integral.

5. Reassemble components in reverse order, renewing gaskets (C17) and (C25) if necessary. Ensure that the 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. Ensure roll pins (C30) are in position on inspection panel (C24).

NOTE: lock nut (C31) should be replaced with new item on reassembly.

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

5.4.1 Flushing Chamber (D33)

Leakage of oil through the vent at the bottom of flushing chamber (D06) 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 5.3.1 Impeller (C04) Instructions 1 to 4, inclusively.
3. Remove impeller (using service tool 0015WRS781 as described in section 5.3.1) 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 a 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/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. The flushing chamber lip seal carrier will now be exposed inside bearing housing. To remove for replacement of lip seals and 'o' rings, release 4-M8 hex nuts, & spring washers.

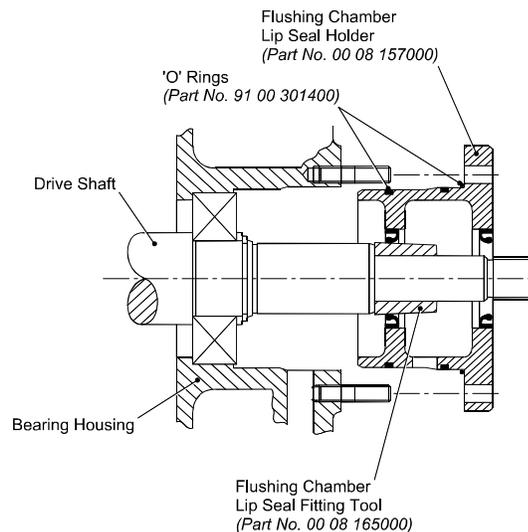
NOTE: 2-M8 tapped holes have been provided to aid removal of carrier. Use suitable length M8 screws to pull lip seal carrier free from bearing housing. Discard lip seals and 'o' rings being careful not to damage relevant surfaces. Thoroughly clean all surfaces and check that drain hole is clear. 'O' rings may now be replaced, follow procedure below for replacement of lip seals.

10. Check that circlip and spacer has been fitted adjacent to bearing, and thoroughly clean exposed shaft surfaces and smear with oil. Check that lip seal fitting tool is internally and externally clean, smear with oil and slide over end of drive shaft as shown.
11. Check that flushing chamber lip seals are correctly orientated and generously lubricate their lips with oil. Check that the outer 'O' rings are fitted and smear the outer surface with oil.

NOTE: Lip seal chamber can only be fitted with drain hole in lower surface.

12. Slide chamber along fitting tool and outer drive shaft, ensuring the lip seals are not deformed or that the 'O' rings are not sheared when feeding the chamber into the bearing housing. Assembly may be aided by slightly tapping the assembly home.
13. Finally retain with washer and nuts M12 (torque to 40 lb ft – 54 Nm).

NOTE: When disassembling, the flushing chamber lip seal holder can be jacked free by the two screwed holes adjacent to the fixing.



14. 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).
15. Using lifting equipment in compliance with the Health and Safety at Work Act, 1975, position pump unit on chassis.

16. 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.
17. 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.
18. Read Section 5.3.2 Mechanical Seal (C08) Instructions 10 to 15, 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, 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.
19. Replace impeller, suction tube and separator components in accordance with Section 5.3.1 Impeller (C04) Instructions 8 to 13, inclusively.

Replace bearing/seal housing assembly and actuator neck seal in accordance with Section 0

20. Drive Rod Seal Assembly and Bearing (A25 and A28) Instruction 9 and Section 5.1.4 Actuator Neck Seal (A21) Instruction 4.
21. Replace remaining air pump components in accordance with Section 5.1.3 Actuator Seal (A18) Instructions 6 and 9, inclusively.
22. Replace drain plug (D13) 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.
23. Repeat this procedure for bearing housing ensuring that level plug (D08) with 'O' ring (D07) are replaced after the correct oil level is attained.

5.4.2 Air Pump Mechanism

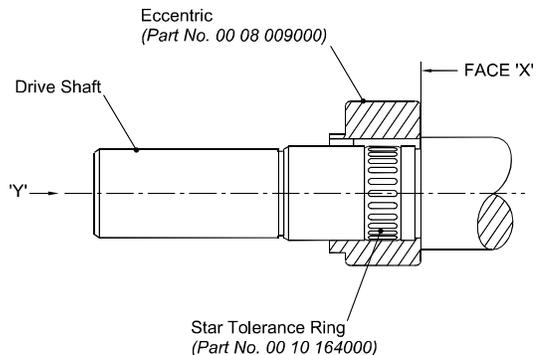
Should actuator (A20) fail to reciprocate when the pump is running, or if other abnormal conditions are suspected, the air pump mechanism should be immediately inspected to minimise the risk of consequential damage.

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).
2. Remove air pump components in accordance with Section 5.1.3 Actuator Seal (A18) Instructions 1 and 1, and Section 5.1.4 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 5.3.1 Impeller (C04) Instructions 2 to 4, inclusively.
5. Carry out Section 5.4.1 Bearing Housing/Flushing Chamber (D06) Instructions 3 to 9 inclusively.
6. Remove circlips (D24) to allow fulcrum pin (D28) to be removed. Drive rod (D37) and connecting rod (D26) may then be withdrawn.
7. The eccentric may now be removed as follows: Position face 'X' of eccentric on clean flat surface allowing for the shaft to emerge through. Press or strike end of shaft with soft faced mallet in direction of arrow 'Y' to push through eccentric. Be sure always to replace the star tolerance ring with a new part when reassembling, and check fit of key. Use identical tools as shown under Section 6.11 when assembling 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. 0008908000).
9. To rebuild mechanism, position new star tolerance ring (D) on drive shaft and push eccentric (D23) into position using service tools in Section 6.11
10. Position connecting rod (D26) on eccentric, thoroughly de-grease tapping in drive rod (D37) and assemble drive rod and fulcrum pin (D28) in connecting rod.
11. Refit circlips (D24) to secure fulcrum pin.
12. Replace flushing chamber and pump on chassis in accordance with Section 5.4.1 Flushing Chamber (D33) Instructions 11 to 17 inclusive.

NOTE: It will be necessary to start at 5.4.1 Flushing Chamber Instruction 10, if lip seals (D30) have to be replaced.

13. Read Section 5.3.2 Mechanical Seal (C08) Instruction 10 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, 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 5.3.1 Impeller (C04) Instructions 8 to 11, inclusively

Replace bearing/seal housing assembly and actuator neck seal in accordance with Section 5.1.5

15. Drive Rod Seal Assembly and Bearing (A25 and A28) Instruction 9 and Section 5.1.4 Actuator Neck Seal (A21) Instruction 4.
16. Replace remaining air pump components in accordance with Section 5.1.3 Actuator Seal (A18) Instructions 6 to 9, inclusively.
17. Replace drain plug (D13) 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.

5.4.3 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 drive end 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 gasket (D05) by removing cap screws (D01) and washers (A06 and A34).
 - 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 gasket (D05). Ensure correct orientation of the lip seal. See Section 6.12
 - d) Refit the components taking care not to damage the lip seal on the sharp edges of the keyway.
 - e) Replace drain plug (D13) in bearing housing (D06). Fill with oil to correct level and replace level plug (D08) and O-ring (D07).
2. For bearing replacement proceed as follows:
 - a) Carry out Section 5.4.2 Air Pump Mechanism Instructions 1 to 8, inclusively.
 - b) Remove lipseal carrier (D03) lipseal (D04) and gasket (D05) by removing capscrews (D01) and washers (A06). If lipseal (D04) is

to be utilised again ensure seal is not dragged over sharp edge of keyway. Refer to section 5.4.1 instruction 9.

- c) Moving to the impeller end of the bearing housing (D06) remove lip seal carrier (D20)
- 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. Press outer face of (D15) bearing from bearing HSG (D06)
- 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 Sections 6.10 and 6.11, 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.
 - 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 engine 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 in Section 6.10 and 6.11.
- 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 5.4.2 Air Pump Mechanism Instructions 9 and 18, inclusively.

5.5 Chassis Maintenance (2 Wheel Site)

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 clean the fuel feed filter positioned towards drawbar end of chassis/fuel tank:
 - a) Disconnect fuel line from filter by loosening hose clip and remove the three screws and washers around filter flange.
 - b) The filter can now be withdrawn from the tank taking care not to damage the mesh element or gasket. Inspect filter element and gasket and if necessary replace with new items.
2. Check and clean fuel tank filler by unscrewing fuel filler cap and lifting filter from filler neck.
3. Fuel tank(integral) may be drained and cleaned by removing tapered plugs: 1x1 1/2" BSP drawbar end, 2x1" BSP opposite end. Before proceeding ensure unit is immobilized and battery is safely disconnected. Also ensure adequate safety & handling provision is made for any fuel spillage and disposal of fuel waste.

NOTE: Before inspecting and/or servicing the following items ensure that integral tank/chassis is safely supported on underside of fuel tank side sections, leaving wheels and prop stands clear of ground.

4. Check both front and rear prop stands are undamaged & free to be raised, lowered and secured in their brackets, DO NOT apply grease to brackets. Check condition of retaining pin in drawbar prop stand i.e. pin should not be bent or excessively worn and tip should freely pivot. Replace any damaged or badly worn items.
5. Wheels may be slid off stub axles by removing split pins & retaining washers. Inspect wheels for damage, bearing & tyre condition and if necessary replace with new items.
6. To remove the lifting eye remove the four set bolts, nuts and spring washers.
7. Reassembly is a reverse of the above, ensuring that the wheel hubs, axles are thoroughly cleaned and liberally greased. Renew the fuel feed filter gasket if necessary.

5.6 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 shackles can be applied to give extra support and stability.

5.7 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.

5.8 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 grubscrew 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.

5.9 Supersilent Canopy – Canopy Refitting

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.

6 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.

6.1 Care of Servicing Tools

Always clean, oil and safely store tools after use.

Complete sets of tools are available by quoting:

Part No. 0010948200 - Seltorque S100 Excluding Impeller Removal Tool Part No. 0015WRS781

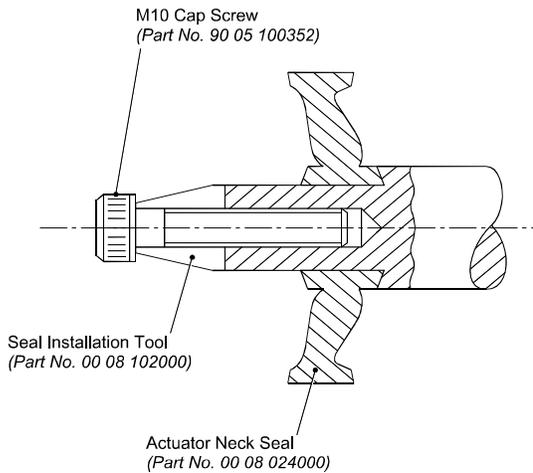
Comprising:

Bearing Assembly Stud	0015172100	1
Assembly Tool Stud	0018172000	1
Bearing and Eccentric Assembly Tool	0018169000	1
Air Pump Drive Rod	0008168000	1

Bearing		
Impeller Thread Adaptor	0008167100	1
Mechanical Seal Seat Removal Tool	0015166000	1
Flushing chamber Lip Seal Fitting Tool	0018165000	1
Air Pump Drive Rod Seal Assembly Tool	0010103000	1
Connecting Rod Seal Installation	0008102000	1
Drive Rod Installation Tool	0008101000	1

6.2 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.



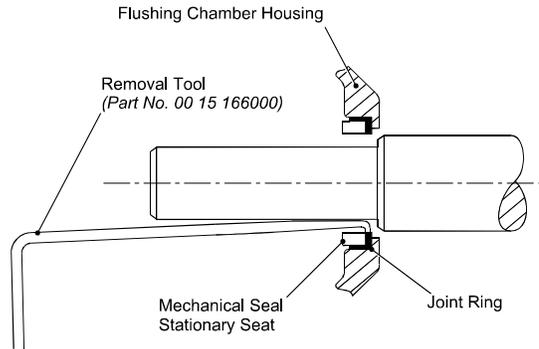
6.3 Removal of Mechanical Seal Stationary Seat and Joint Ring

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.



6.4 Removal of Drive Rod Seal Assembly

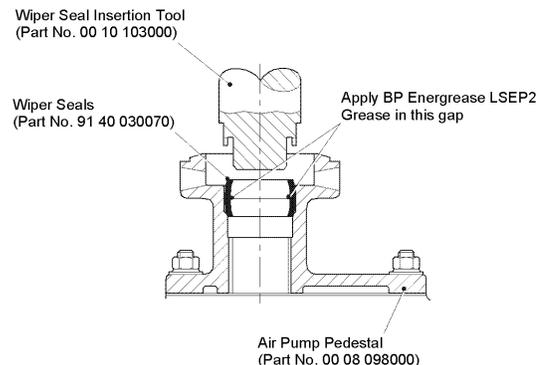
1. Gently tap out seals from rear with suitable punch ensuring bore is not damaged.
2. Replacement of seals may be aided by smearing adjacent surfaces with oil.
3. Gently press in wiper seals into the bore using the wiper seal insertion tool.



IMPORTANT ADVICE

Note correct orientation of lips.

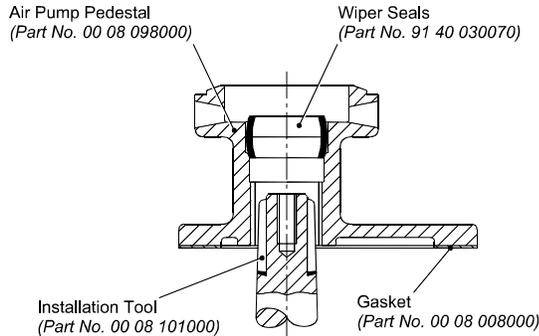
4. Apply BP Energrease LSEP2 grease to the gap as shown.



6.5 To Fit Air Pump Pedestal to Pump

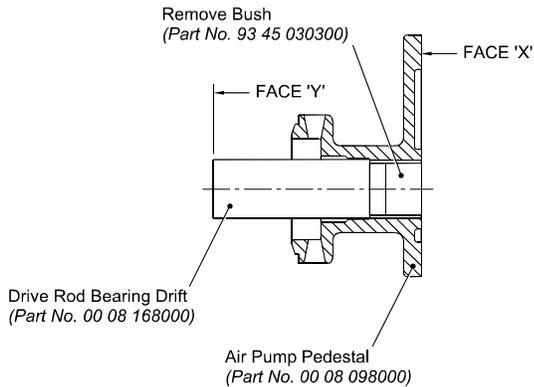
1. Thoroughly clean exposed drive rod surfaces and position installation tool as shown.
2. Ensure gasket is in place.

3. Thoroughly lubricate drive rod bearing, drive rod and installation tool together with the wiper seals with BP Energrease LSEP2 grease and push pedestal assembly along drive rod until it locates on the studs and registers with the corresponding face of the bearing housing.



6.6 Remove Drive Rod Bearing Bush

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



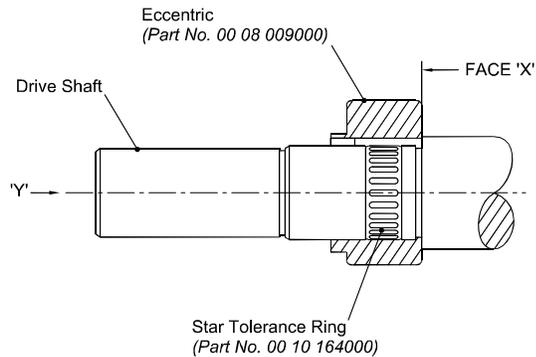
6.6.1 Fit New Bearing Bush

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

6.7 To Remove Eccentric

1. Position face 'X' of eccentric on clean flat surface allowing for the shaft to emerge through.
2. Press or strike end shaft with soft faced mallet in direction of arrow 'Y' to push through eccentric.
3. Be sure always to replace the star tolerance ring with a new part when reassembling, and check fit of key.

4. Use identical tools as shown under Section 6.11 when assembling eccentric.



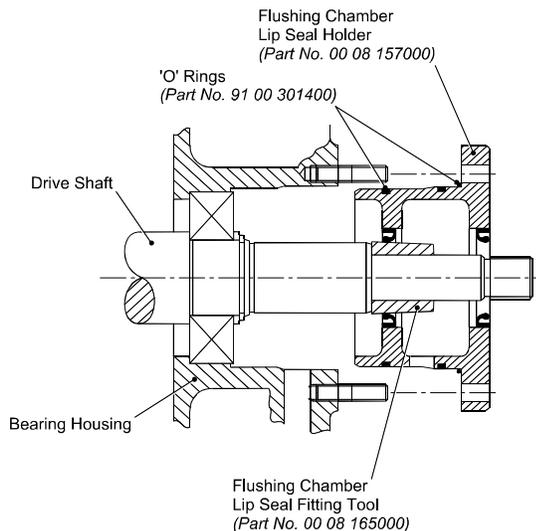
6.8 Assemble Flushing Chamber

1. Check that circlip and spacer has been fitted adjacent to bearing, and thoroughly clean exposed shaft surfaces and smear with oil. Check that lip seal fitting tool is internally and externally clean, smear with oil and slide over end of drive shaft as shown.
2. Check that flushing chamber lip seals are correctly orientated and generously lubricate their lips with oil. Check that's the outer 'O' rings are fitted and smear the outer surface with oil.

NOTE: Check that flushing hole is at bottom.

3. Slide chamber along fitting tool and onto drive shaft, ensuring the lip seals are not deformed or that the 'O' rings are not sheared when feeding the chamber into the bearing housing. Assembly may be aided by slightly tapping the assembly home.
4. Finally retain with washer and nuts M12 (torque to 40 lb ft – 54 Nm).

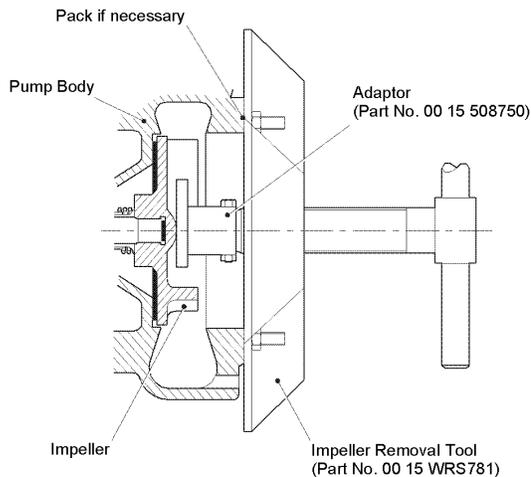
NOTE: When disassembling, the flushing chamber lip seal holder can be jacked free by the two screwed holes adjacent to the fixings.



6.9 Remove Impeller

1. Remove suction piping, suction tube, separator components, suction tube adapter plate together with front wear plate ensuring that the gasket between volute and tube adapter is also removed
2. Offer up impeller removal tool across front face of pump volute as shown ensuring the correct nose adapter is fitted. Affix by using existing nuts and washers.
3. Lock shaft if not connected to engine.
4. Engage adapter in the recesses of the impeller and turn handle anti-clockwise to unscrew impeller.

NOTE: When reassembling impeller ensure threaded end of shaft is coated with **Castrol Rustilo 431 Grease Or Approved Equivalent.**

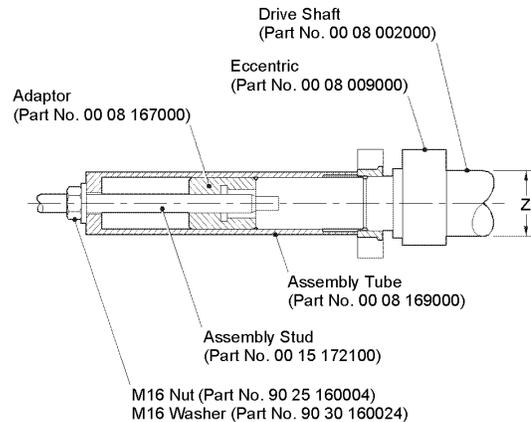


6.10 Fit Replacement Drive End Bearing

1. Remove old bearing taking care not to damage the shaft in any way. This may be facilitated by removing together with the eccentric, see Section 6.7. Fit soft jaws to vice and clamp shaft horizontally on diameter 'Z' leaving the abutment shoulder overhanging.
2. Screw assembly stud Part No. 00 15172100 into shaft end until it bottoms. Thoroughly clean bearing mounting surfaces of shaft and smear with oil.
3. Carefully register inner ring of bearing on shaft ensuring it is not contaminated by foreign matter. Screw on adapter Part No. 0018167000. Position assembly tube Part No. 0015169200 plus adapter Part No. 0018181000 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 the distance sleeve of the eccentric.

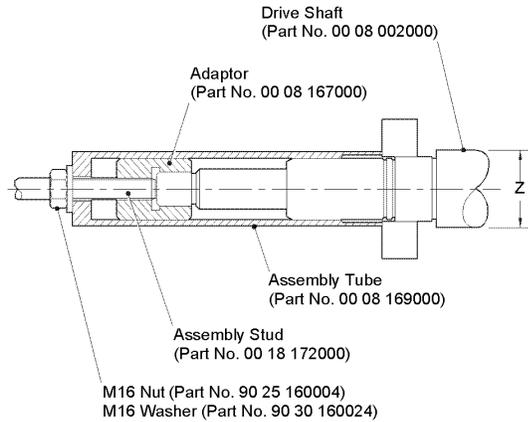
NOTE: Bearings may be replaced by using the assembly tools in conjunction with a press only, thus eliminating stud and nut.



6.11 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 adapter (Part No. 00 18167000) onto shaft end until it bottoms and into this screw the assembly stud (Part No. 0018172000) until that bottoms also. Thoroughly clean bearing mounting surfaces of shaft and smear with oil.
3. Carefully register bearings on shaft, ensuring that they are not contaminated by foreign matter and position assembly tube (Part No. 0015169200) as shown.
4. Ensuring that the bearing is square to the shaft and the assembly tool is concentric to the shaft centre line, push bearings onto shaft by applying steady and continuous screwing torque to the M16 nut and washer.
5. Check that the inner ring of bearing is touching abutment shoulder and ensure that the two bearings are tight together.
6. Finally 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 nut.



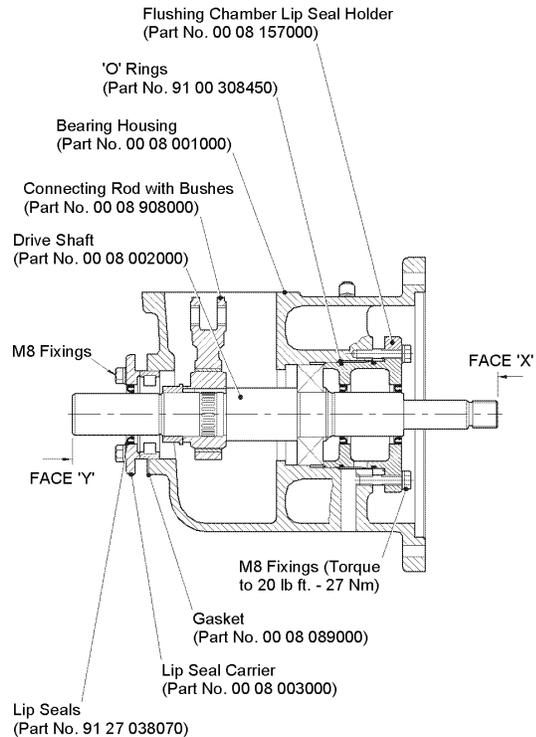
6.12 Assembly of Drive Shaft with Bearings into Housing

1. Remove assembly by releasing the 3 x M8 fixings holding the flushing chamber lip seal holder Part No. 0008157000. This can be 'jacked' free by the two screwed holes adjacent to the fixings. Remove the lip seal carrier at the other end Part No. 0008003000, taking care not to drag lip over keyway edge, and press on face 'Y' to withdraw bearings with drive shaft.
2. When assembling, all parts are to be scrupulously clean and bearing mounting surfaces smeared with oil.
3. The outer race of the drive and bearing is inserted by carefully drifting or pressing the race into the housing. Alternatively, the lip seal carrier, Part No. 0008003000 may be utilised, 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.
4. Position bearing housing on its feet in the normal horizontal attitude.
5. Position drive shaft assembly tube Part No. 0018169000 at drive end of housing and retain with a single M8 fixing. Screw assembly stud Part No. 0018172000 into shaft end until it bottoms.
6. Be sure to thread shaft through connecting rod Part No. 0008908000 when assembling.
7. Ensure shaft with bearings is inserted into the bearing housing so that it is concentric and parallel to the mating surfaces, through the assembly tube and retained with M16 nut and washer. Pull assembly into housing by applying steady and continuous screwing torque to the M16 nut and washer.

8. Ensure assembly is fully 'home' by assembling the flushing chamber lip seal holder Part No. 0018157000, making sure the lip seals and 'O' rings are in good condition before bolting up.

NOTE: This operation will require temporary longer bolts or studs and the use of the lip seal fitting tool Part No. 0008165000 - see para 6.8.

9. Finally assemble lip seal carrier at the drive end ensuring seal is kept clear of keyway edge and making sure the 'O' ring is in good condition before bolting up.



7 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 MUST BE DRAINED 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 ₂ 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 VERY 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 Major Servicing: Section 5.2 for advice. 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 Major Servicing: Section 5.3.2 for advice.
8 Examine valves and flexing seals in air pump assembly and check that castings are not cracked.	Refer to Major Servicing: Section 5.1 for advice.

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: 2000rpm.
3 Check that delivery valve, discharge branch of casing, and pipework are free from blockages.	Obstructions down-stream 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 Selwood D100 – 192mm dia

LIQUID IS BEING PUMPED OUT OF AIR PUMP, I.E. WATER CARRY-OVER IS OCCURRING

ACTION	COMMENT
1 Check condition of separator assembly.	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 Major Servicing: Section 5.2 for instructions.
2 Check condition of valves and flexing seals in air pump.	On rare occasions, malfunction of the air pump seals in air pump can cause the separator float to move erratically. Refer to major Servicing: Section 5.1 for instructions.

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

ACTION	COMMENT
1 Drain flushing chamber to check contents.	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 Major Servicing: Section 5.3.2.

OIL LEAKING OUT OF FLUSHING CHAMBER VENT BELOW VOLUTE

ACTION	COMMENT
1 Top up both oil reservoirs, and run pump under supervision for say 30 min to determine from which reservoir leakage is occurring.	Replace faulty lip seal in accordance with instructions given in Major Servicing: Section 5.4.

OIL LEAKING FROM VENTS BELOW AIR PUMP

ACTION	COMMENT
1 Check that mechanism reservoir has not been overfilled with oil.	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.
2 Check conditions of air pump drive rod and associated seal.	Refer to Major Servicing: Section 5.4 for instructions.

OIL LEAKING FROM ENGINE-END OF PUMP ASSEMBLY

ACTION	COMMENT
1 Check that mechanism reservoir has not been overfilled with oil.	Although unlikely, incorrect filling may be responsible for the problem.
2 Replace lip seal in bearing housing lip seal carrier.	Refer to Major Servicing: Section 5.4 for instructions.

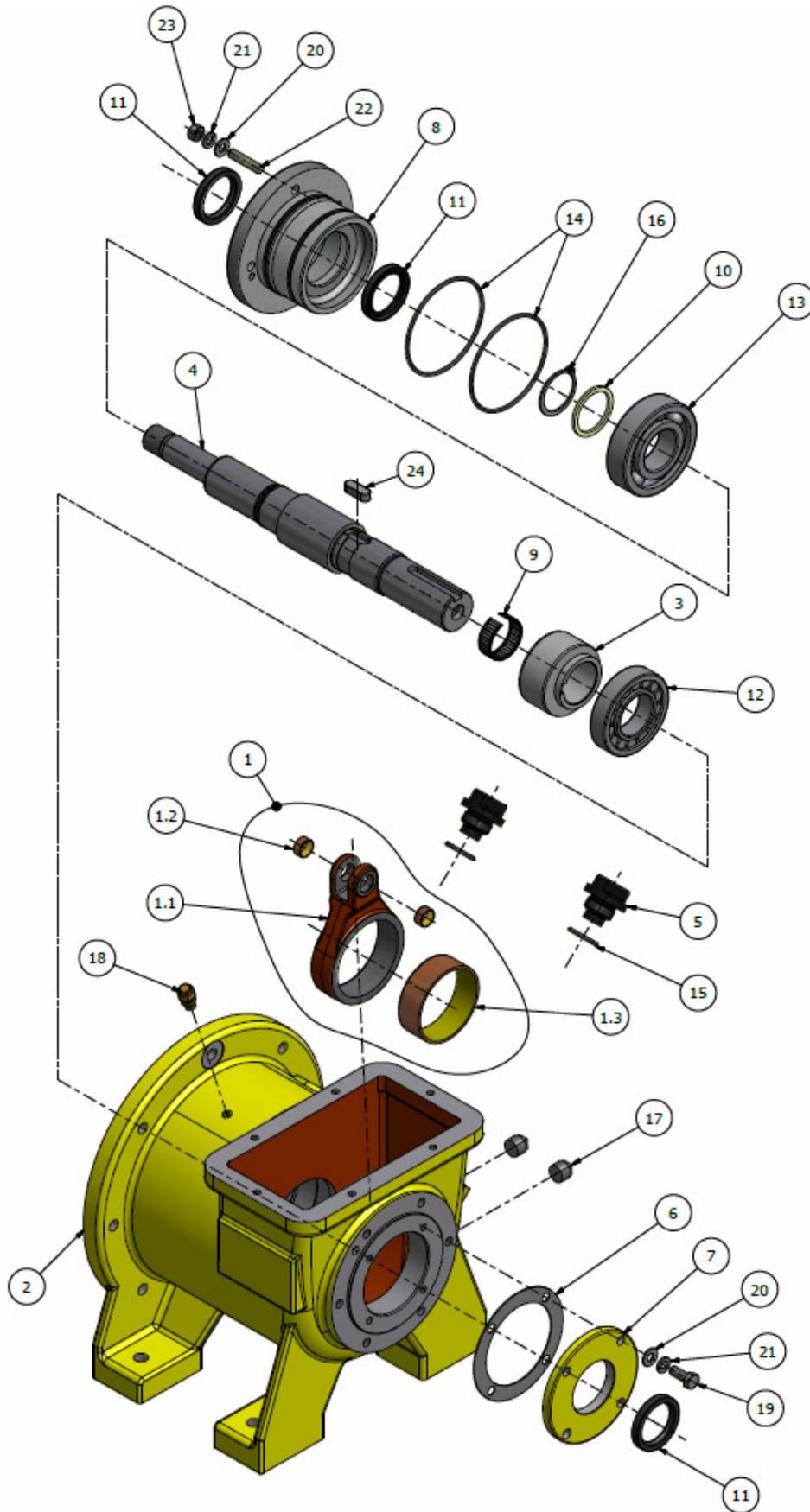
PUMP CANNOT BE ROTATED BY HAND BY MEANS OF STARTING HANDLE, FOR EXAMPLE

ACTION	COMMENT
1 Check for ice in air pump or volute.	In cold weather, ice can form in these chambers if they have not been drained. Eliminate by means of hot water.
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 Major Servicing: Section 5.1 for instructions.
3 Check that impeller and drive shaft are free to rotate.	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 Major Servicing: Section 5.3 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 Major Servicing: 5.1 for instructions.
3 Check that air pump mechanism is not faulty.	Excessively worn connecting rod bearings, or an under-sized eccentric or fulcrum pin, could cause this problem. Refer to Major Servicing: 5.4

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



8 PARTS LIST

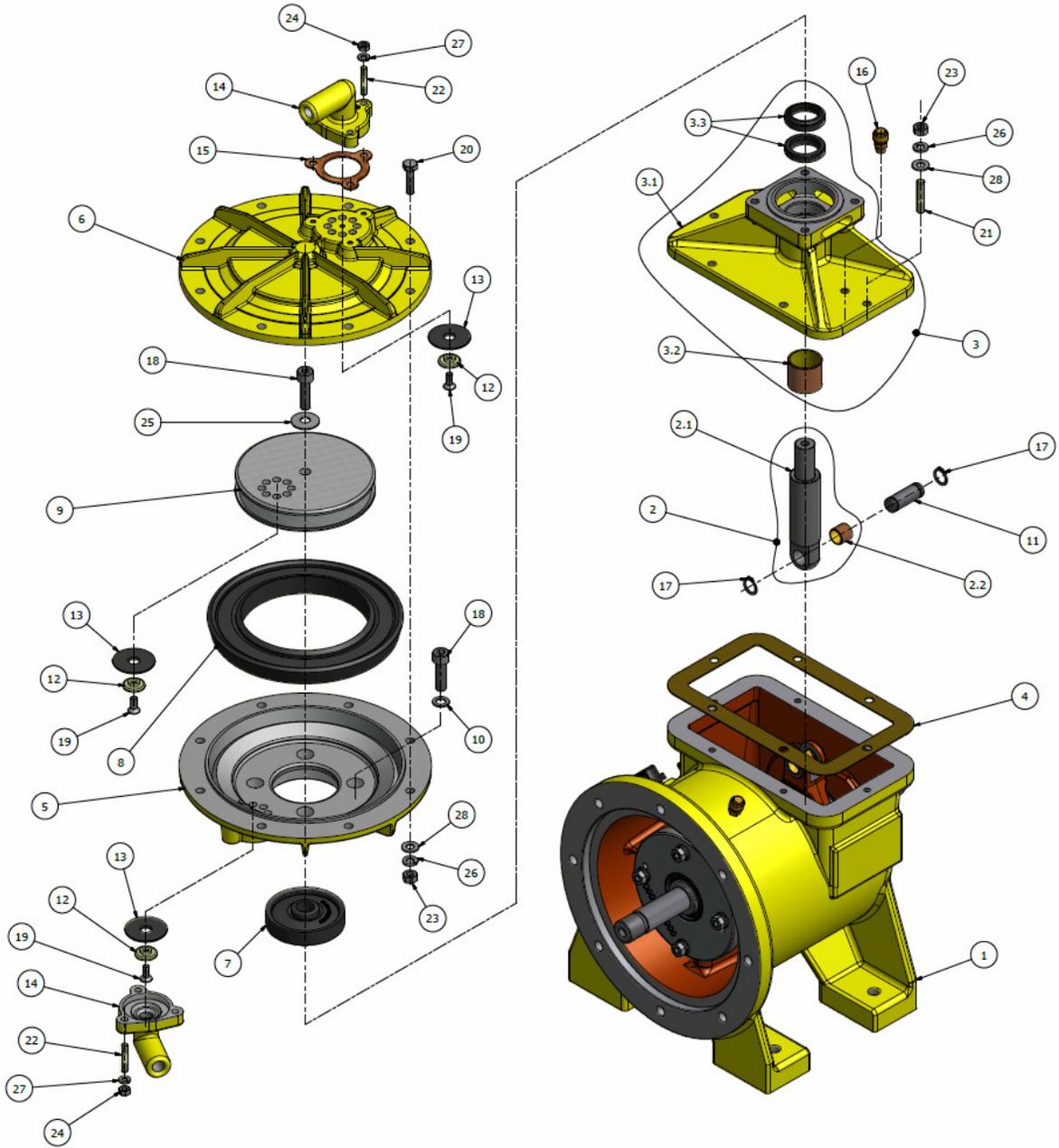
8.1 Bearing Housing Assembly - 0809090000

ITEM	DESCRIPTION	PART NUMBER	QTY
1*	Connecting Rod Assembly	0008908000	1
1.1	Connecting Rod	0008006000	1
1.2	Small End Bush	0008065000	2
1.3	Big End Bush	0008066000	1
2	Bearing Housing	0808225000	1
3	Eccentric	0008009000	1
4	Drive Shaft D80/D100	0008002100	1
5	Oil Filler Plug	0015186000	2
6	Gasket	0008089000	1
7	Lip Seal Carrier	0008003000	1
8	Flushing Chamber Lip Seal Holder	0008157000	1
9	Star Ring Assy	0010164000	1
10	Bearing Spacer	0008005000	1
11	Lip Seal DPSM 38527	9127038070	3
12	Roller Bearing NJ 208 C3	9309J20830	1
13	earing 6308 C3	9300630830	1
14	'O' Ring 84.5 ID x 3 Section	9100308450	2
15	'O' Ring 24.5 ID x 3 Section	9100300250	2
16	Circlip – External ϕ 40	9401000401	1
17	Plug 3/8" BSPT	9522P00301	2
18	1/8" BSP Breather Valve	9528001000	1
19	Hex Head Screw – M8 x 20 LG	9000080201	4
20	Plain Washer – M8 x 17 O/D	9030080024	8
21	Spring washer – M8 Rect. Sect.	9030080229	8
22	Screwed Stud M8 x 25 LG	9036080254	4
23	Hex Full Nut – M8	9025080004	4
24	Ecc Key 10 x 8 x 28	9041102823	1

*Item 1 contains items 1.1, 1.2 & 1.3.

When ordering spares, please state:

PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART



8.2 Air Pump & Drive Assembly - 0809091000

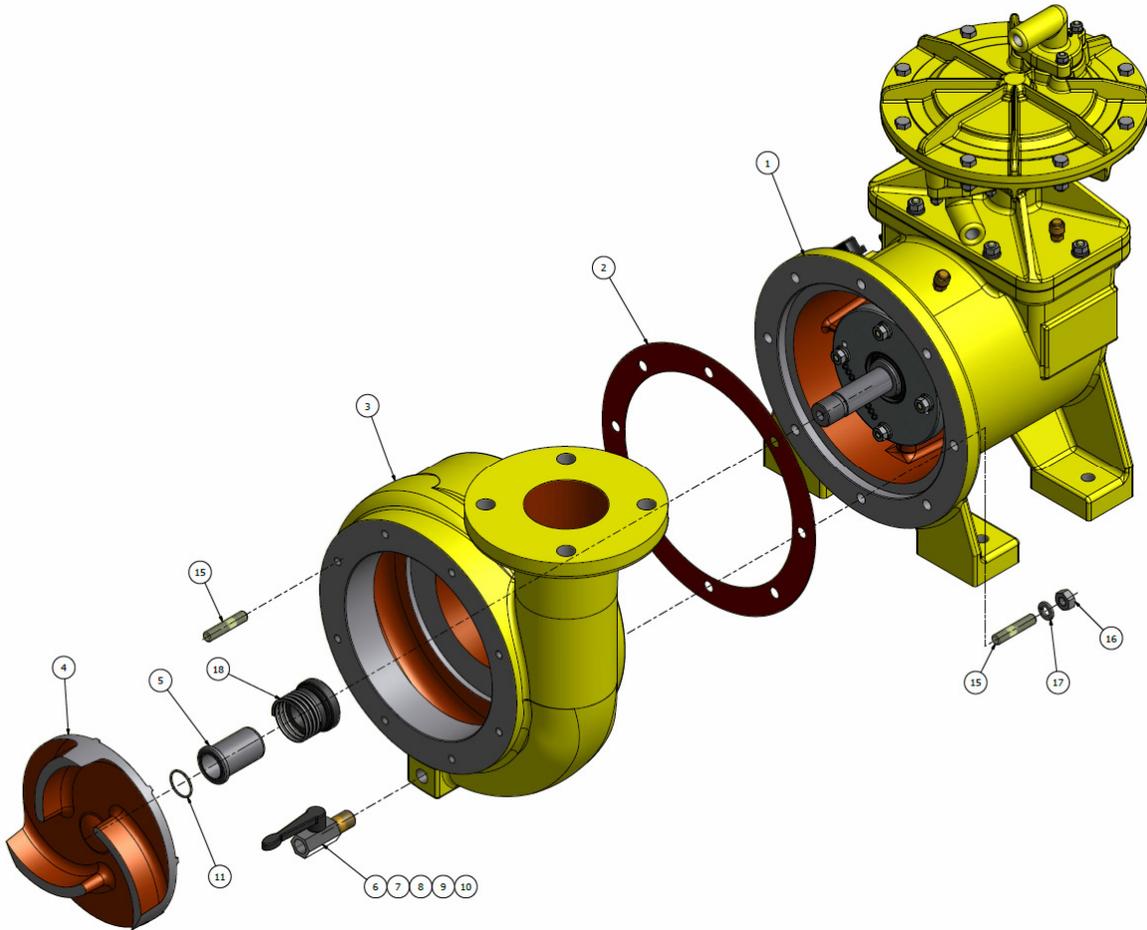
ITEM	DESCRIPTION	PART NUMBER	QTY
1	Bearing Housing Assembly	0809090000	1
2*	Drive Rod Assembly	0008910000	1
2.1	Drive Rod	0008018000	1
2.2	Glacier Bearing 15 ID x 15	9345015150	1
3**	Pedestal Assembly	0008905000	1
3.1	Air Pump Pedestal	0008098000	1
3.2	Glacier Bearing 30 ID x 30	9345030300	1
3.3	Wiper Seal 40 OD x 30 ID x 7	9140030070	2
4	Gasket	0008008000	1
5	Inner Air Pump Body	0008014100	1
6	Outer Air Pump Body	0008015100	1
7	Neck Seal	0008024000	1
8	Actuator Seal	0008023000	1
9	Actuator	0008016100	1
10	Cap Screw Washer	0008100000	4
11	Fulcrum Pin	0008007000	1
12	Air Pump Valve Clamp	0008209000	3
13	Air Pump Valve (Viton)	0008021100	3
14	Exhaust Hose Adaptor	0891081000	2
15	Gasket – Hose Adaptor	0008022000	1
16	1/8" BSP Breather Valve	9528001000	1
17	Circlip – External Diameter 15	9401000151	2
18	Hex Soc. Cap Screw M10 x 35 – Wedge Lok	9005100352	5
19	Hex Soc. Countersunk Screw M6 x 16	9009060160	3
20	Hex Hd. Screw M8 x 30	9000080301	8
21	Stud M8 x 25 Nom.	9036080254	6
22	Stud M6 x 20 Nom.	9036060204	6
23	Hex Full Nut M8	9025080004	14
24	Hex Full Nut M6	9025060004	6
25	Belleville Washer 28 OD x 10.2 ID	9030100359	1
26	Spring Washer M8 Rect. Sect.	9030080229	14
27	Spring Washer M6 Rect. Sect.	9030060229	6
28	Plain Washer M8 x 17 O/D	9030080024	14

*Item 2 contains items 2.1 & 2.2.

**Item 3 contains items 3.1, 3.2 & 3.3.

When ordering spares, please state:

PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART

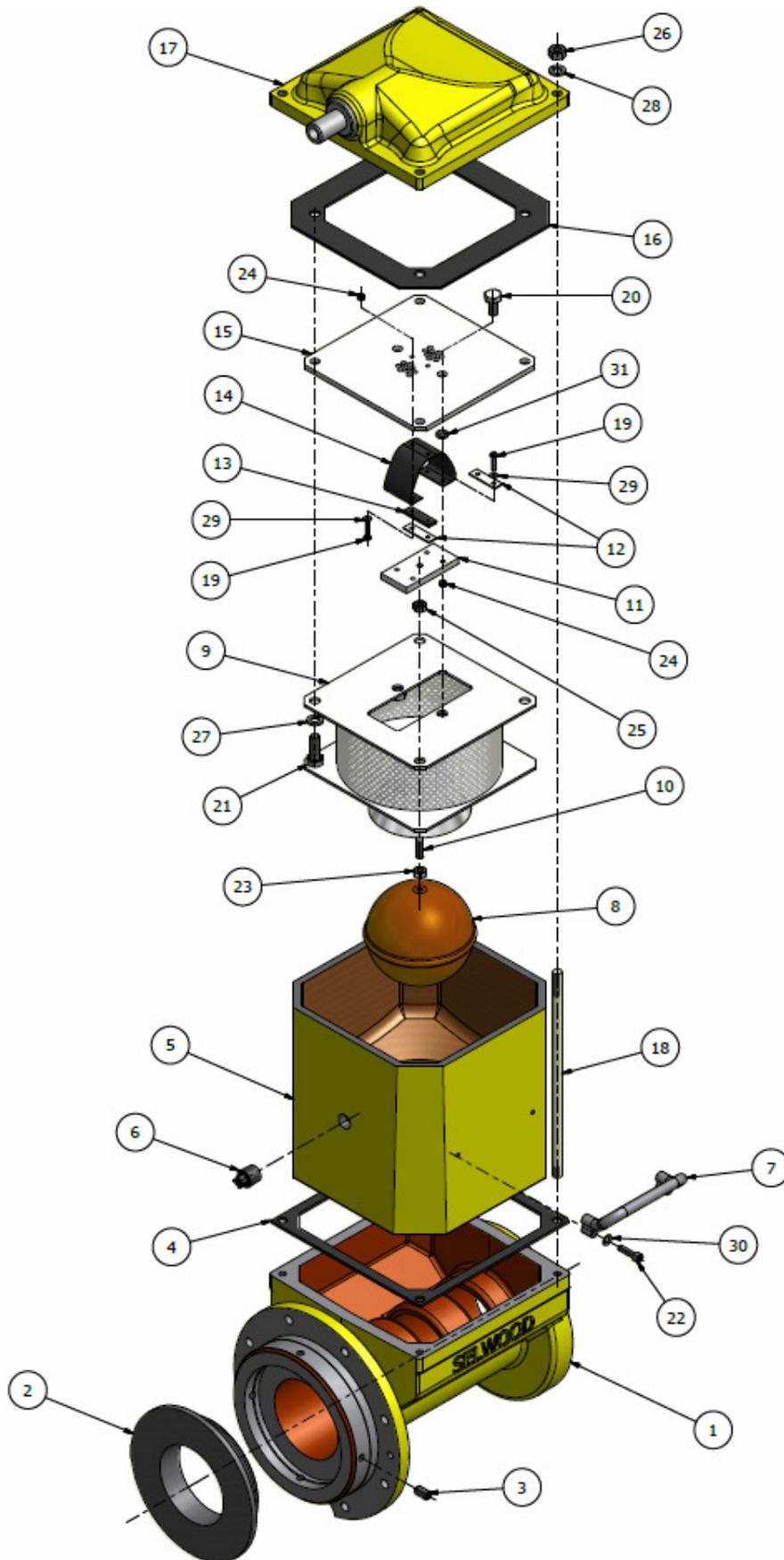


8.3 Basic Unit Assembly - 0809092000

ITEM	DESCRIPTION	PART NUMBER	QTY
1	Air Pump & Drive Assembly	0809091000	1
2	Gasket – Bearing Housing / Pump Body	0008011000	1
3	Body – D80	0008010101	1
4	Impeller – 192 Selflow	0008012200	1
5	Shaft Sleeve	0008161000	1
6	Drain Tap 450	9520003000	1
7	Straight Hobbs Connector	9534M00305	1
8	Hobbs Coned Locknut	9534M00304	1
9	Hobbs Seal	9534M00303	1
10	Sealing Washer	9534M00301	1
11	'O' Ring 25.1 I/D x 1.6 Secn.	9100162510	1
12	Screwed Stud M10 x 35	9036100354	16
13	Hex Full Nut M10	9025100004	8
14	Spring Washer M10 Rect. Secn.	9030100229	8
15	Mechanical Seal (D80)	9110032000	1

When ordering spares, please state:

PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART



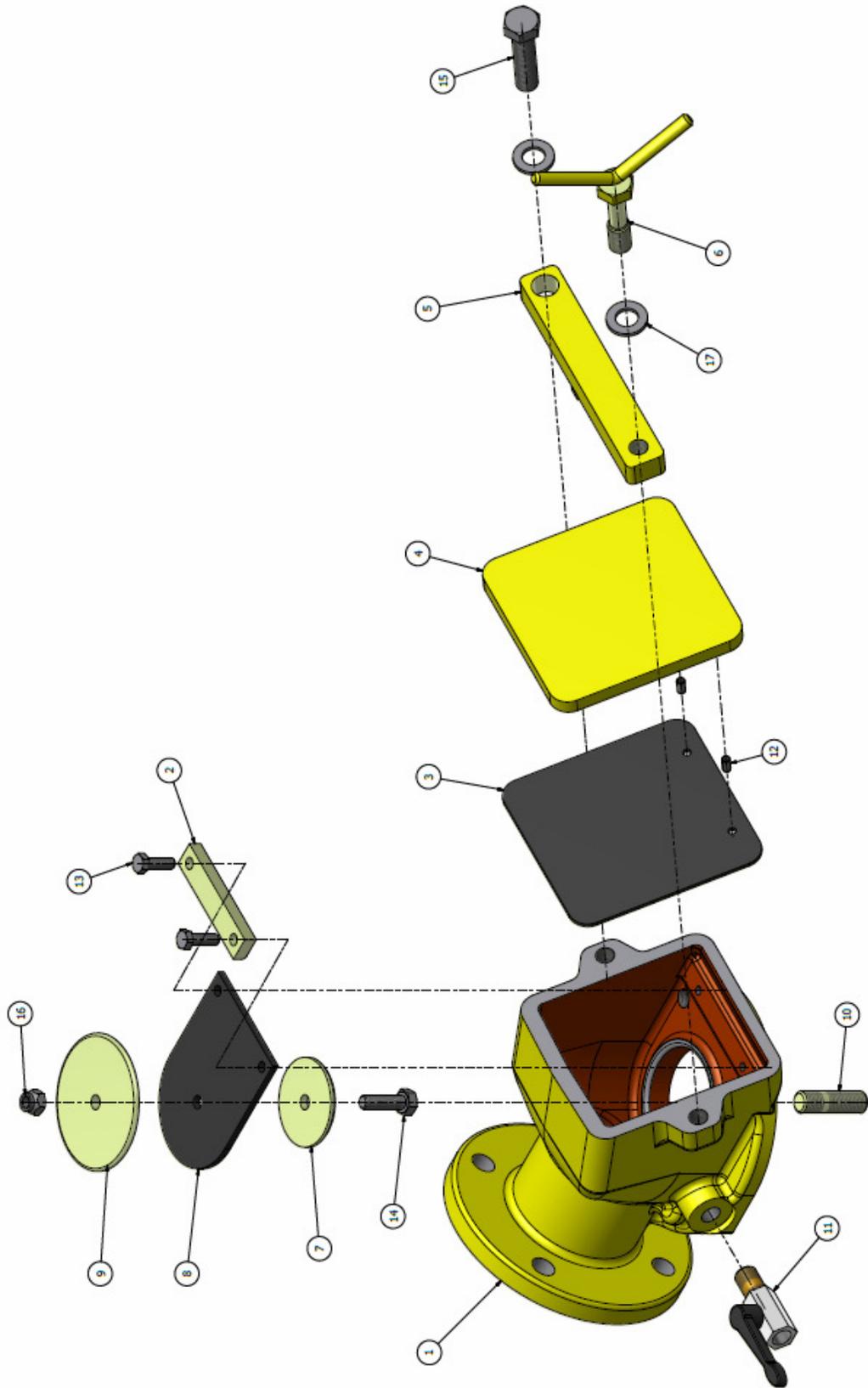
8.4 Suction Tube & Separator Assembly - 0809098000

ITEM	DESCRIPTION	PART NUMBER	QTY
1	D80/D100 Suction Tube	0809106000	1
2	Wear Plate – (4" Version) D100	0904022000	1
3	Hex Soc Setscrew Cone Point M10 x 20 SS	9007100207	4
4	Separator Body Gasket	0015044000	1
5	Separator Body	0015033000	1
6	½" BSPT Plug	9522004000	1
7	Separator Handle	1507264000	2
8	Float Assy	9565001000	1
9	Upper Diffuser Assembly	0015037000	1
10	Peel Valve Rod	0015090000	1
11	Operating Plate S.S.	0015085000	1
12	Peel Valve Clamp Bar	0015084000	3
13	Peel Valve Clamping Bar Seal	0015183000	1
14	Peel Valve Rubber	0015039000	1
15	Port Plate Drilled S/S	0015036000	1
16	Top Cap Gasket	0015043000	1
17	Sep Top Cap Spigot Mod	1092065000	1
18	Tie Rod Plated	0015045000	4
19	M4 x 20 Pan Head Mach Screw S/S	9018040207	6
20	M10 x 20 LG Hex Head Sets S/S	9000100207	2
21	M10 x 30 LG Hex Head Sets S/S	9000100307	4
22	M6 x 25 Hex Socket Hd Capscrew	9005060250	4
23	5/16" BSW SS Full Nut	0006741030	1
24	M4 Hex Self Lock Nut SS	9025040307	6
25	M8 Hex Full Nut SS	9025080007	1
26	M10 Hex Full Nut	9025100004	4
27	M10 Spring Washer Sq Sect SS	9030100207	4
28	M10 Spring Washer Rect Sect	9030100229	6
29	M4 x 9.0 x 0.8 Plain Washer SS	9030040027	4
30	M6 x 12.5 Plain Washer S/S	9030060027	4
31	M10 x 12.5 Sealing Washer	9030100289	2

*Items 4 – 31 are Separator Assembly - 1092066000

When ordering spares, please state:

PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART

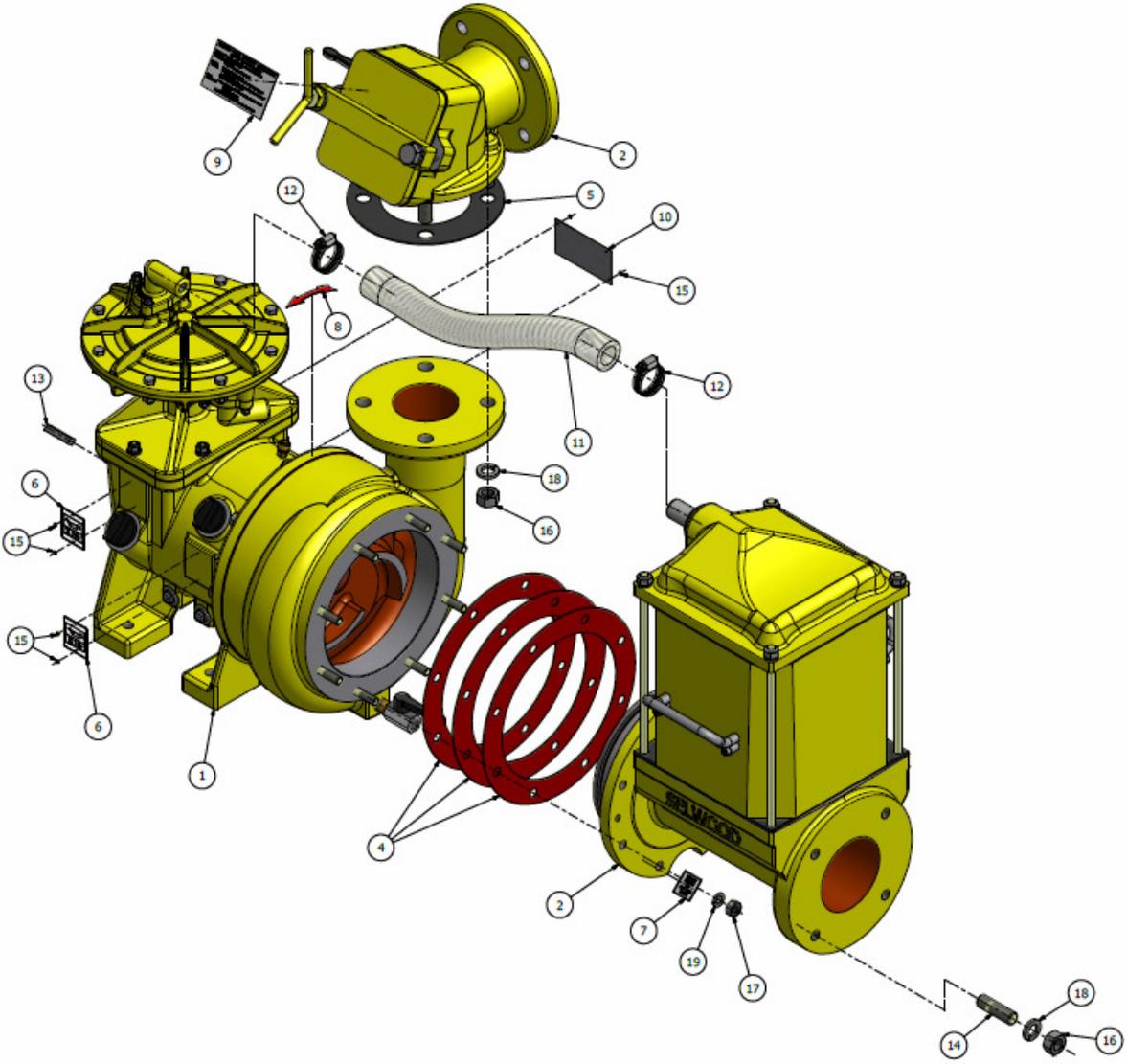


8.5 Delivery Valve Box Assembly - 0904015000

ITEM	DESCRIPTION	PART NUMBER	QTY
1	Delivery Valve Chamber	0903377000	1
2	Valve Clamp Bar	0008027000	1
3	Gasket	0008028000	1
4	Inspection Panel	0008029000	1
5	Inspection Panel Locking Bar	0008030000	1
6	'T' Handle Clamp Bar Bolt	0008031000	1
7	Lower Valve Plate	0008032000	1
8	Delivery Valve	0008037000	1
9	Upper Valve Plate	0008046000	1
10	Screwed Stud M16 x 40 Nom	9035160404	4
11	Drain Tap 3/8" BSP	9520003000	1
12	Roll Pin 6 Dia x 12 Long	9042060120	2
13	Hex Head Setscrew M8 x 25	9000080251	2
14	Hex Head Bolt M10 x 35	9001100351	1
15	Hex Head Bolt M16 x 65	9001160651	1
16	Hex Self Locking Nut M10	9025100344	1
17	Plain Washer M16 – Class B	9030160024	2

When ordering spares, please state:

PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART

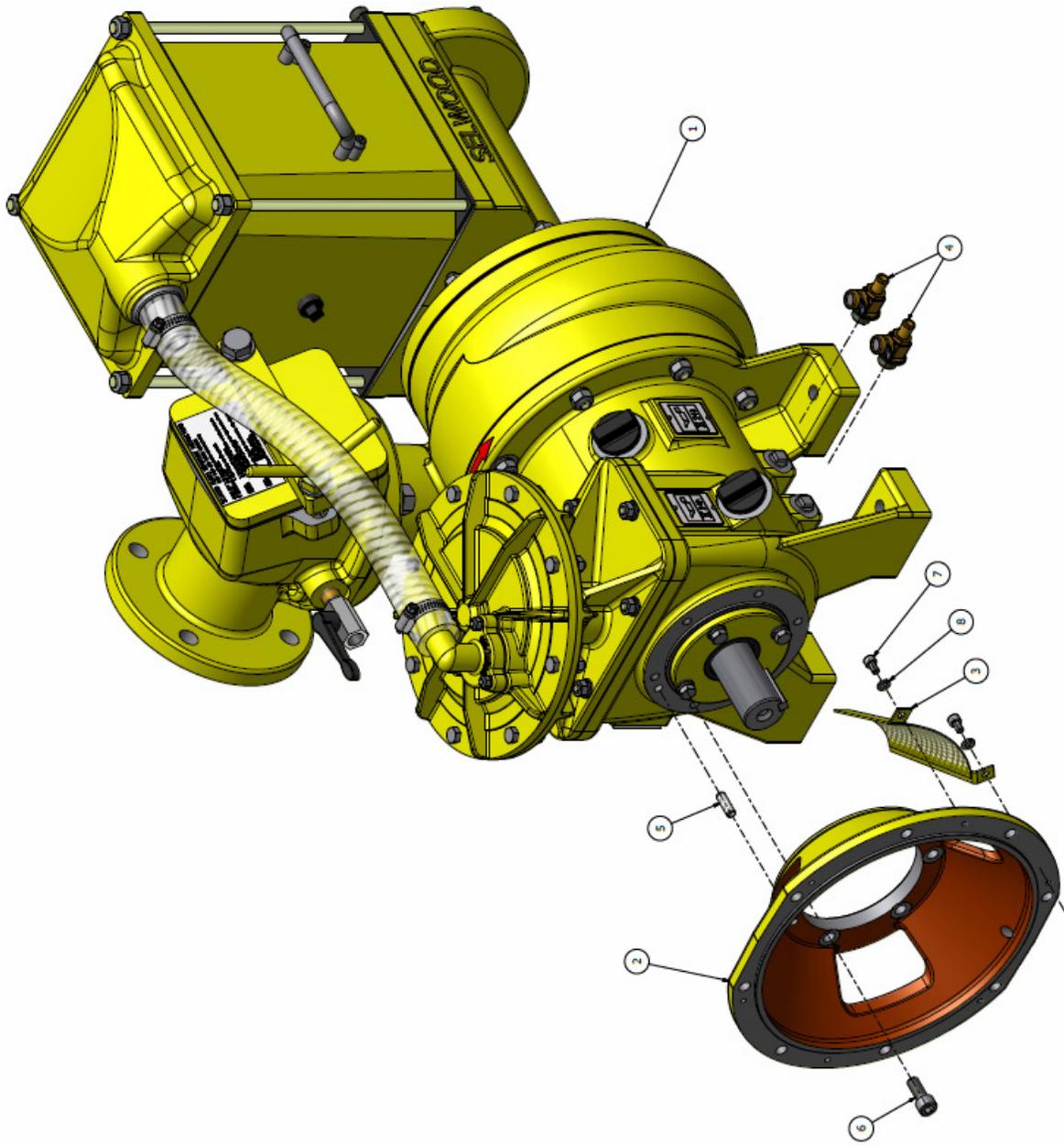


8.6 D100 Pump Assembly - 0909095000

ITEM	DESCRIPTION	PART NUMBER	QTY
1	Basic Unit Assembly	0809092000	1
2	Suction Tube / Separator Assembly	0809098000	1
3	Delivery Valve Box Assembly	0904015000	1
4	Gasket – Pump Casing / Suction Tube	0008048000	3
5	Gasket – Pump Casing / Delivery Valve	0008047000	1
6	Label – Oil Check	0015229000	2
7	Label – Impeller	0018080000	1
8	Label – Direction Arrow	0015078000	1
9	Label – Instructions	0008072000	1
10	Label – Manufacturer	0015071000	1
11	Suction Hose 25 ID	9542000001	1
12	Worm Drive Hose Clip	9505030004	2
13	Key 10 x 8 x 60	9000099-16	1
14	Stud M16 x 45 Nom.	9001650-01	4
15	Hammer Drive Screw	9045002259	6
16	Hex. Full Nut M16	9025160004	8
17	Hex. Full Nut M10	9025100004	8
18	Spring Washer M16 Rect Secn	9030160229	8
19	Spring Washer M10 Rect Secn	9030100229	8

When ordering spares, please state:

PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART



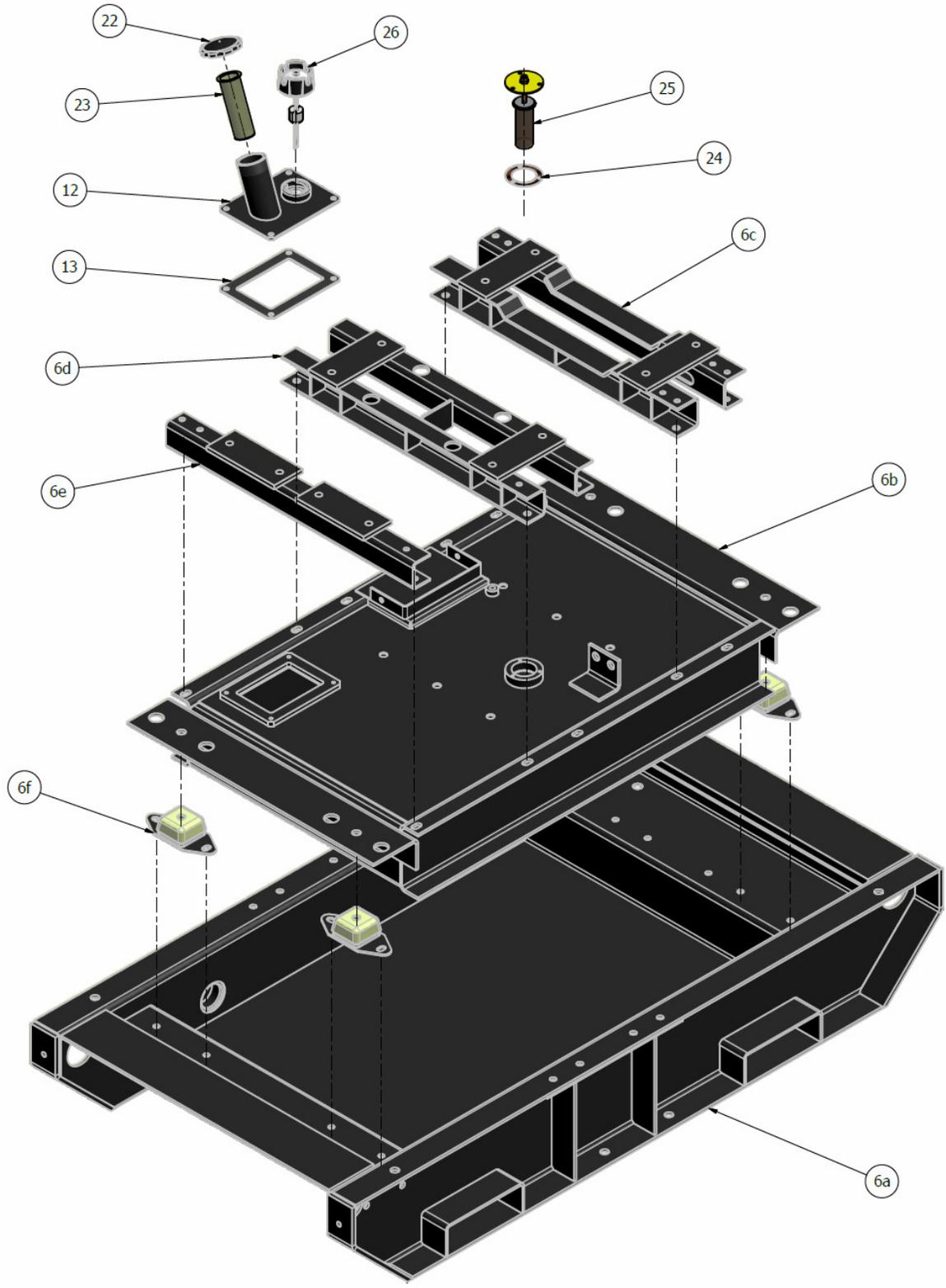
8.7 D100 Pump Assembly Close Coupled - 0909096000

ITEM	DESCRIPTION	PART NUMBER	QTY
1	D100 Pump Unit Assembly	0909095000	1
2	D80 Bell Housing	0808240001	1
3	Vent Cover	0809046000	3
4	Engine Oil Drain Valve	9520P00301	2
5	Dowel Pin 8 x 20	9000869-01	1
6	Hex. Soc. Capscrew M10 x 25	9005100250	6
7	Hex. Soc. Capscrew M6 x 8	9005060080	6
8	Spring Washer M6	9030060229	6

*Existing drain plugs to be replaced with drain taps (item 4)

When ordering spares, please state:

PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART

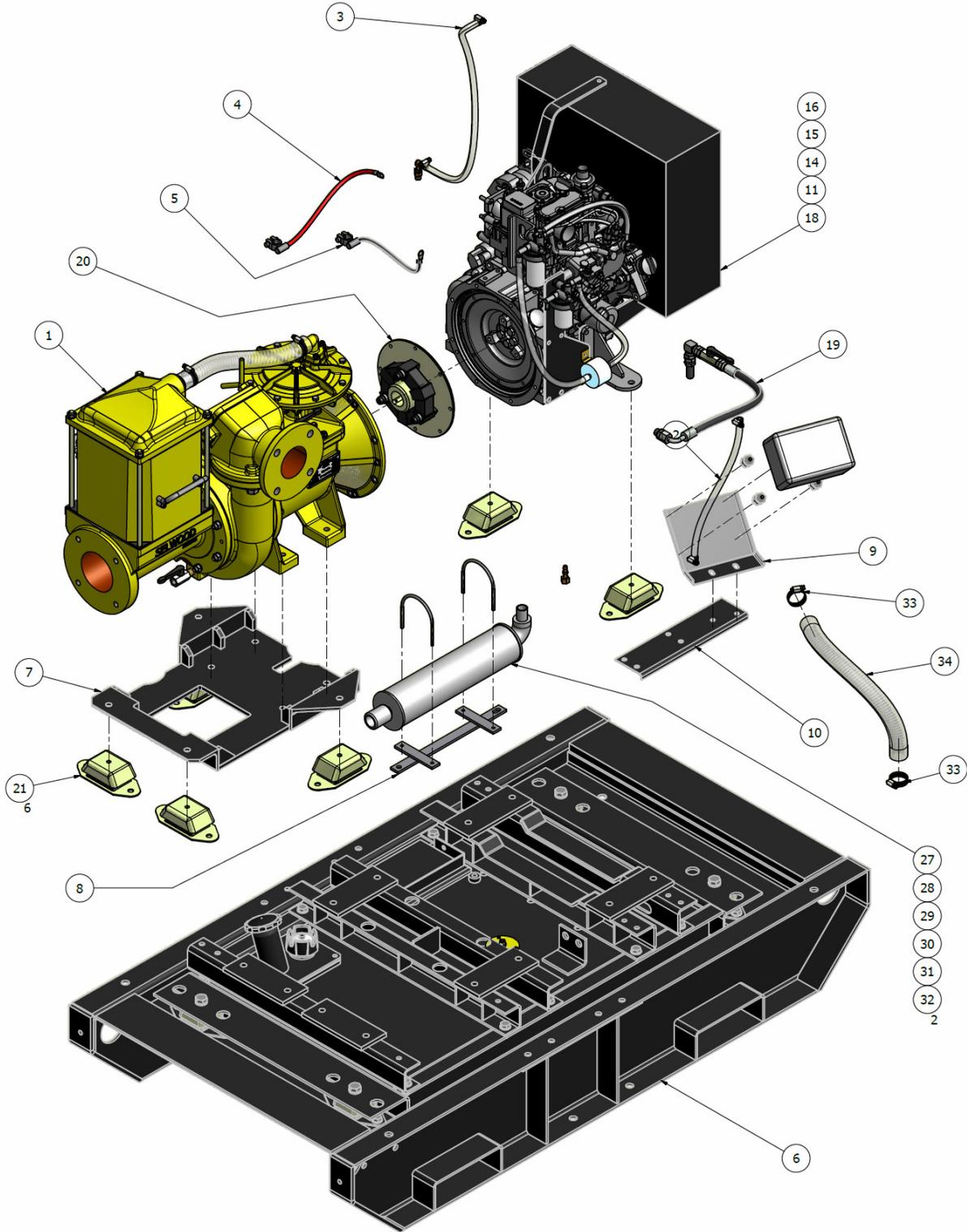


8.8 D100 / Isuzu 2CA1 Core Build – 0912156C00

ITEM	DESCRIPTION	PART NUMBER	QTY
1	D100 Body Unit Close Coupled	0909096000	1
2	Fuel Line Assembly – Tank to Fuel Pump	1506175000	1
3	Fuel Line – Leak Off to Tank	1001196000	1
4	Battery Lead Positive (600mm Long)	1590153000	1
5	Battery Lead Negative	1500302000	1
6	Skid Base Tank Assembly – Including:	0811221000	1
6a	D80/D100 Isuzu 2CA1 Skid	0812137000	1
6b	D80/D100 Isuzu 2CA1 Fuel Tank	0812138000	1
6c	D80/D100 Isuzu 2CA1 Engine Subframe	0812139000	1
6d	D80/D100 Isuzu 2CA1 Pump Subframe	0812140000	1
6e	D80/D100 Isuzu 2CA1 Rear Subframe	0812141000	1
6f	Anti-Vibration Mount	9680M00011	4
7	Pump Mounting Bracket	0809080000	1
8	Air Silencer Support Bracket	0809251000	1
9	Isuzu Control Panel Bracket	0811211000	1
10	Isuzu Control Panel Base	0811201000	1
11	Alternator Belt Guard	0811212000	1
12	Fuel Filler Plate & Bayonet	1501279000	1
13	Fuel Filler Plate Gasket	1501280000	1
14	Pump Mounting Plate	0811325000	1
15	Watertrap Spacer	0811326000	1
16	Fuel Pump Link Lead	0813014000	1
18	Isuzu 2CA1 Diesel Engine	92005-0004	1
19	Remote Oil Drain Assembly	92700-0226	1
20	Centa Coupling – 38 Bore	9600M00015	1
21	Anti-Vibration Mount	9680M00046	6
22	Fuel Filler Cap	9550004000	1
23	Filter for Tank Neck	0004463000	1
24	Gasket	0015063000	1
25	Fuel Feed Filter	0803199000	1
26	Fuel Gauge	9590K04801	1
27	Air Pump Silencer	9395000001	1
28	Equal Elbow	9517P00804	1
29	1" x 3/4" Hex Reducing Bush	9517P00803	1
30	Spigot 3/4" BSP	1590109000	1
31	Socket 1"	9517P00801	1
32	Exhaust 'U' Bolt	0004509170	2
33	Hose Clip	9505030004	2
34	Hose 25mm Nom Bore	9542000001	0.45m

When ordering spares, please state:

PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART

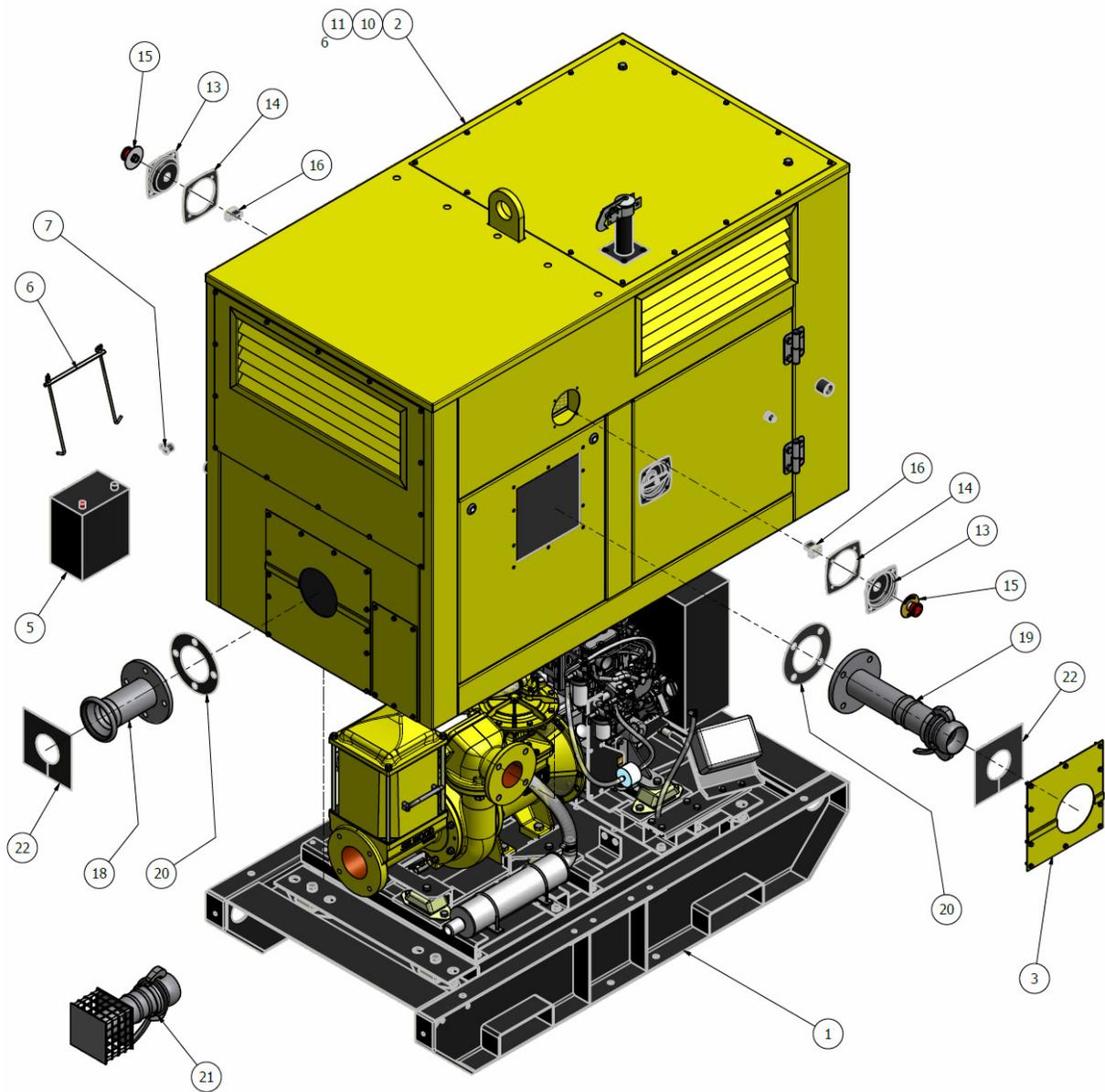


D100 / Isuzu 2CA1 Core Build – 0912156C00

ITEM	DESCRIPTION	PART NUMBER	QTY
1	D100 Body Unit Close Coupled	0909096000	1
2	Fuel Line Assembly – Tank to Fuel Pump	1506175000	1
3	Fuel Line – Leak Off to Tank	1001196000	1
4	Battery Lead Positive (600mm Long)	1590153000	1
5	Battery Lead Negative	1500302000	1
6	Skid Base Tank Assembly – Including:	0811221000	1
6a	D80/D100 Isuzu 2CA1 Skid	0812137000	1
6b	D80/D100 Isuzu 2CA1 Fuel Tank	0812138000	1
6c	D80/D100 Isuzu 2CA1 Engine Subframe	0812139000	1
6d	D80/D100 Isuzu 2CA1 Pump Subframe	0812140000	1
6e	D80/D100 Isuzu 2CA1 Rear Subframe	0812141000	1
6f	Anti-Vibration Mount	9680M00011	4
7	Pump Mounting Bracket	0809080000	1
8	Air Silencer Support Bracket	0809251000	1
9	Isuzu Control Panel Bracket	0811211000	1
10	Isuzu Control Panel Base	0811201000	1
11	Alternator Belt Guard	0811212000	1
12	Fuel Filler Plate & Bayonet	1501279000	1
13	Fuel Filler Plate Gasket	1501280000	1
14	Pump Mounting Plate	0811325000	1
15	Watertrap Spacer	0811326000	1
16	Fuel Pump Link Lead	0813014000	1
18	Isuzu 2CA1 Diesel Engine	92005-0004	1
19	Remote Oil Drain Assembly	92700-0226	1
20	Centa Coupling – 38 Bore	9600M00015	1
21	Anti-Vibration Mount	9680M00046	6
22	Fuel Filler Cap	9550004000	1
23	Filter for Tank Neck	0004463000	1
24	Gasket	0015063000	1
25	Fuel Feed Filter	0803199000	1
26	Fuel Gauge	9590K04801	1
27	Air Pump Silencer	9395000001	1
28	Equal Elbow	9517P00804	1
29	1" x ¾" Hex Reducing Bush	9517P00803	1
30	Spigot ¾" BSP	1590109000	1
31	Socket 1"	9517P00801	1
32	Exhaust 'U' Bolt	0004509170	2
33	Hose Clip	9505030004	2
34	Hose 25mm Nom Bore	9542000001	0.45m

When ordering spares, please state:

PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART

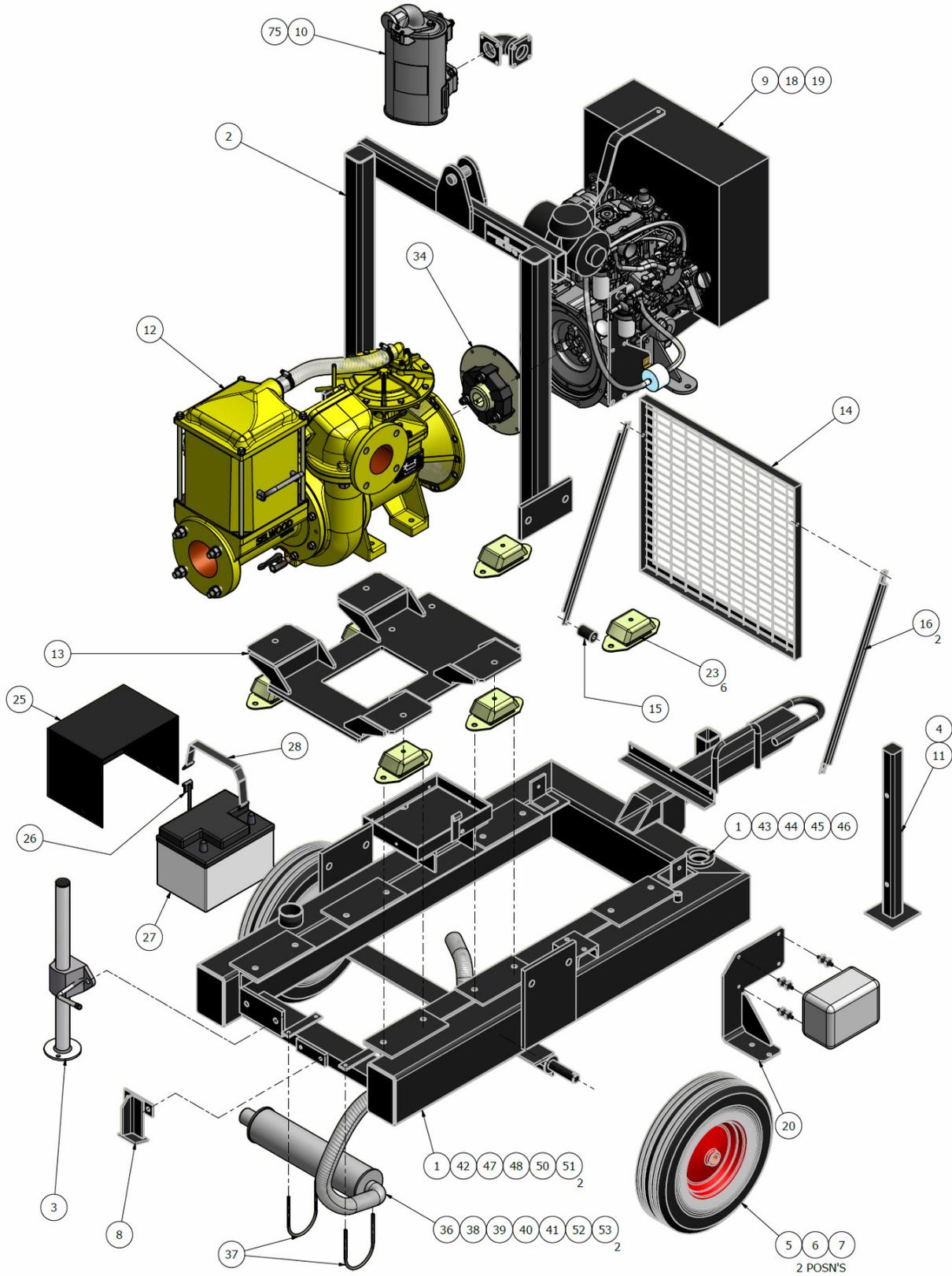


8.9 D100 / Isuzu 2CA1 Super Silent – 0912156S40

ITEM	DESCRIPTION	PART NUMBER	QTY
1	D100 / Isuzu 2CA1 Core Build	0912156C00	1
2	Canopy Assembly c/w Exhaust System	0811222000	1
3	D100 Joggle Delivery Plate	0905295000	1
5	Battery 12V	92700-0313	1
6	Battery Clamp Set	9297500000	1
7	Terminal Boot	92800-0008	1
10	Emergency Stop Wiring Loom	0904134000	1
11	Cable Clip Self Adhesive	9705003000	6
13	Black Coated Dish Pan	9728-00045	2
14	Gasket	9728-00046	2
15	Mushroom Push Button	92800-0054	2
16	Contact Block	92800-0055	2
18	100mm Female Bauer Flanged PN6	0010095000	1
19	100mm Flanged Male Bauer PN6	0904017000	1
20	100mm Flange Gasket	0010079000	2
21	Bauer Strainer	0008156000	1
22	Bauer Surround Gasket for 100mm	1003165000	2

When ordering spares, please state:

PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART

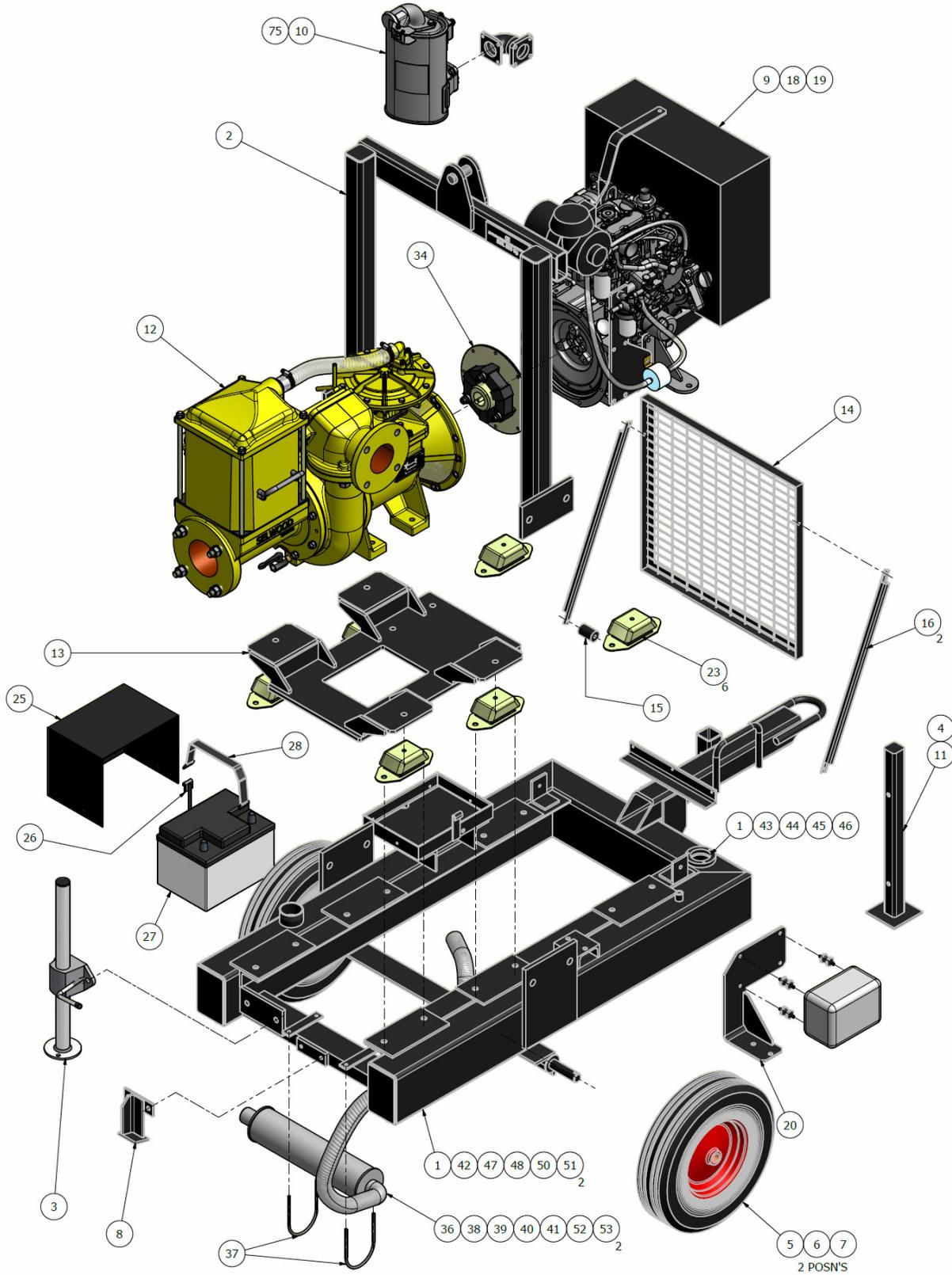


8.10 D100 / Isuzu 2CA1 2 Wheel Site - 0912153000

ITEM	DESCRIPTION	PART NUMBER	QTY
1	Chassis Tank	0810344000	1
2	Lifting Frame	0810340000	1
3	Propstand & Bracket	9728-00048	1
4	Sword Pin Modified	0805100000	1
5	Wheel 80mm Pump	9620540525	2
6	Washer 1 x 1.7/8 x 15G	0003382000	2
7	¼ x 1.¾ Split Pin	0006667000	2
8	Rear Foot	0810353000	1
9	Isuzu 2CA1 Diesel Engine	92005-0004	1
10	Exhaust Silencer Kit	92700-0350	1
11	Prop Stand	0803220000	1
12	D100 Body Unit Close Coupled	0909096000	1
13	Saddle	0811312000	1
14	Radiator Guard	0811314000	1
15	Radiator Guard Spacer	0811315000	1
16	Radiator Stay	0810345000	2
17	Fuel Pump Link Lead	0813014000	1
18	Pump Mounting Plate	0811325000	1
19	Watertrap Spacer	0811326000	1
20	Control Panel Bracket	0811323000	1
23	Anti-Vibration Mount	9680M00046	6
25	Battery Cover	0810347000	1
26	Battery Strap Hook	0810348000	1
27	Battery 12V	92700-0320	1
28	Battery Strap 12"	92700-0351	1
29	Battery Lead – Positive	1300145000	1
30	Battery Lead – Negative	1500310000	1
31	Battery Clamp Boot	92800-0005	1
32	Terminal Boot	92800-0008	1

When ordering spares, please state:

PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART



D100 / Isuzu 2CA1 2 Wheel Site - 0912153000

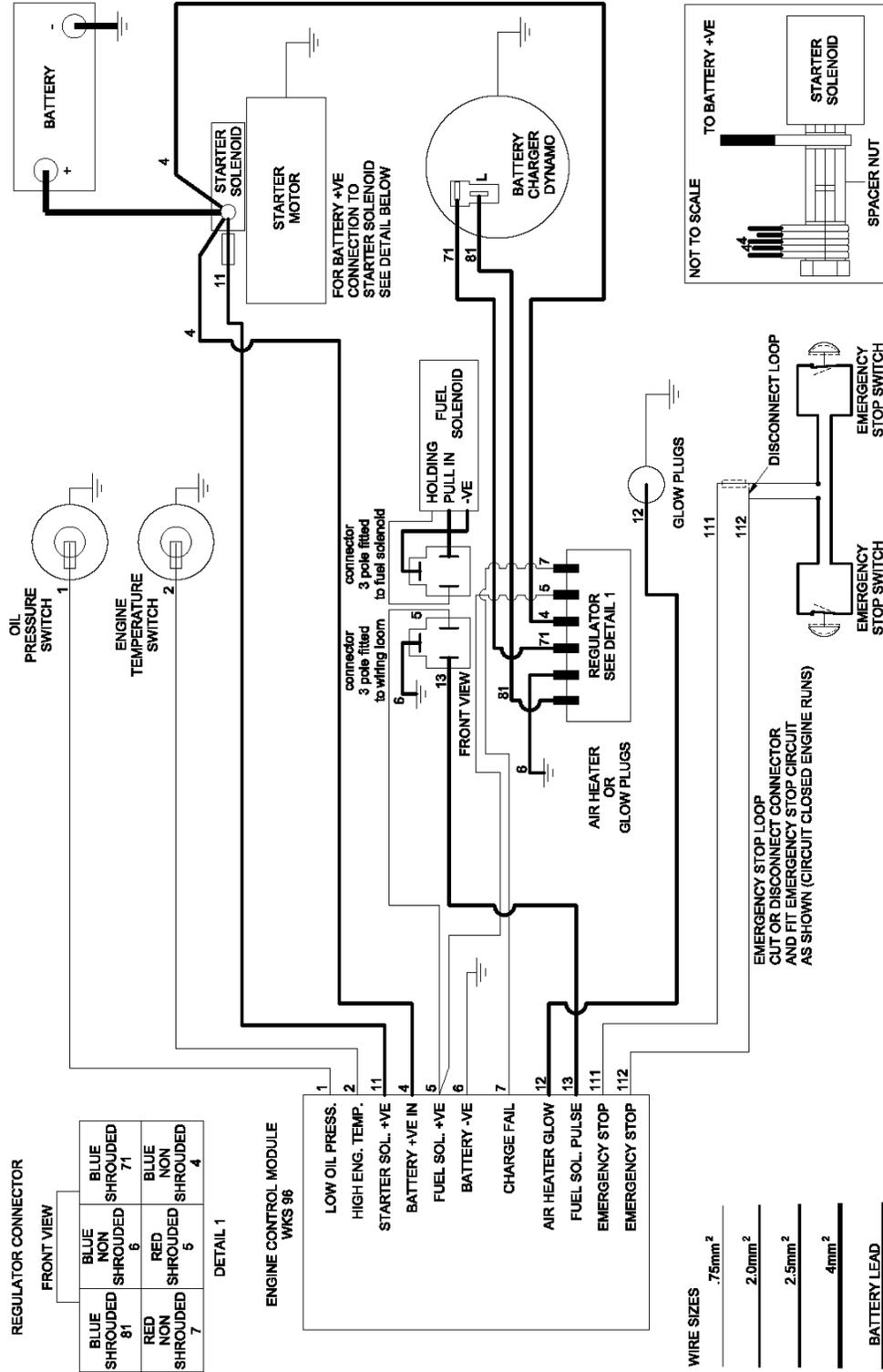
ITEM	DESCRIPTION	PART NUMBER	QTY
34	Centa Coupling 38 Bore	9600M00015	1
36	Air Pump Silencer	9395000001	1
37	'U' Bolt – 90mm I/D	0811085000	2
38	Equal Elbow	9517P00804	1
39	1" x 3/4" Hex Reducing Bush	9517P00803	1
40	Spigot 3/4" BSP	1590109000	1
41	Socket 1"	9517P00801	1
42	Plug 1.1/2" BSP Taper	9522P01201	1
43	Fuel Filler Cap	9550004000	1
44	Filter for Tank Neck	0004463000	1
45	Fuel Feed Filter	0803199000	1
46	Gasket	0015063000	1
47	Fuel Line – Leak Off to Tank	1001196000	1
48	Fuel Line – Tank to Lift Pump	1001195000	1
49	Battery Terminal Clamp Cover – Red	92800-0158	1
50	Griflex Hose	9508001000	A/R
51	Plug 1" BSP Taper	9522P00801	2
52	Hose 25mm Nom Bore	9542000001	A/R
53	Hoseclip	9505030004	2
75	Exhaust Insulating Blanket	0912154000	1

When ordering spares, please state:

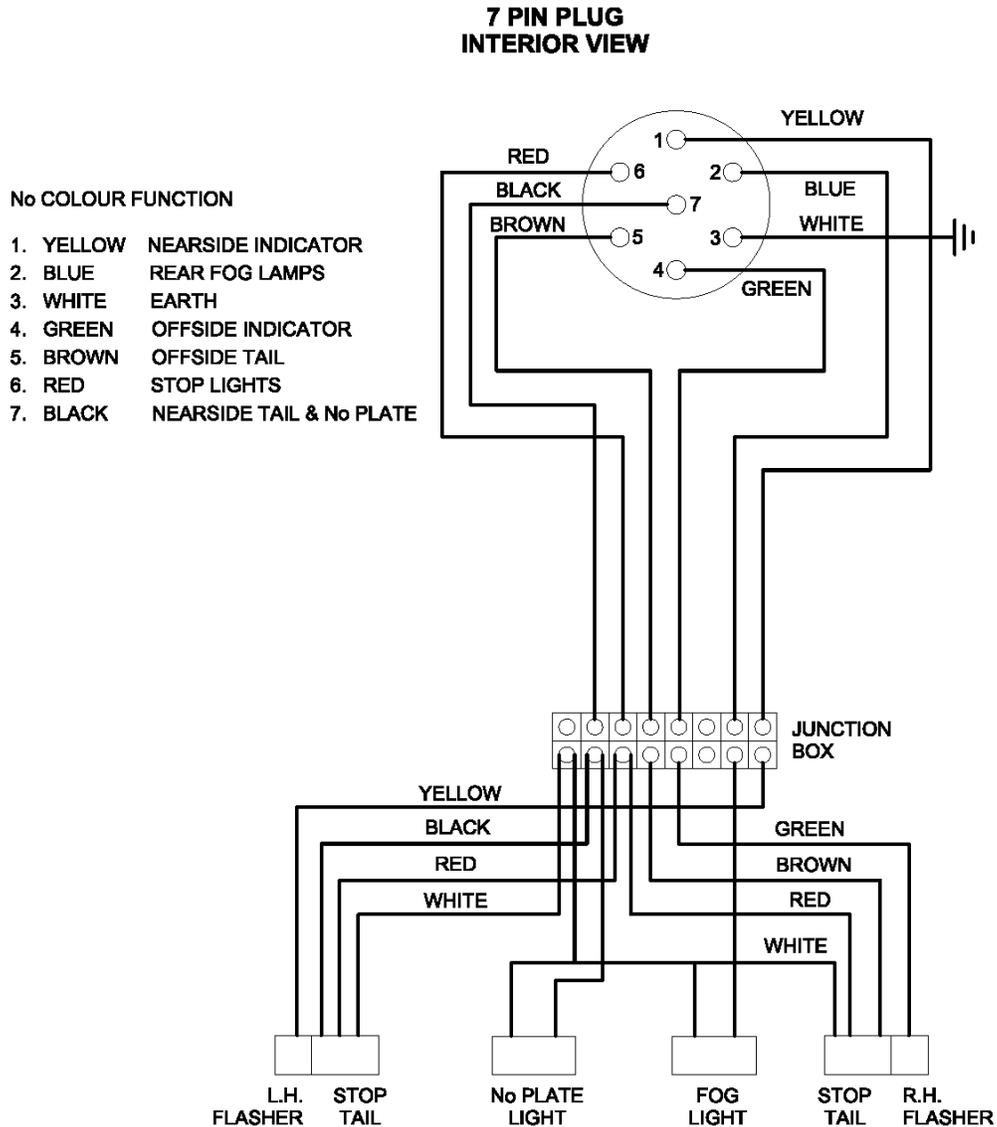
PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART

9 WIRING DIAGRAMS

9.1 Isuzu 2CA1 Super Silent



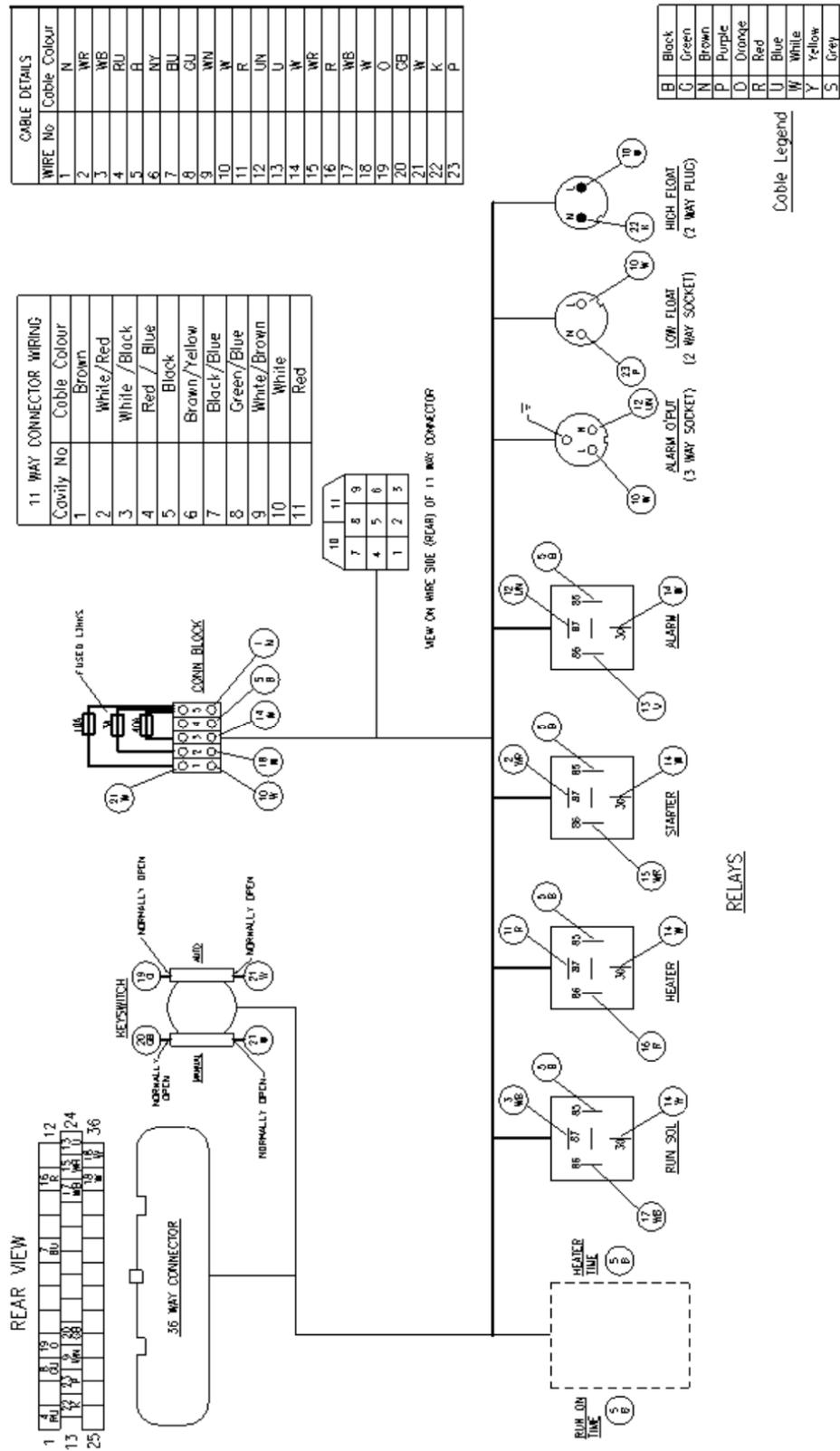
9.2 Fast Tow trailer Lighting Circuit



NOTE:

Front marker lights are for twin axle assemblies only

9.3 Auto Stop / Start Panel



10 TECHNICAL DATA – AUTO STOP START & TELEMETRY

Driver type to be fitted to:	All 12v power units
Available Voltages	12v DC ONLY
Engine control	ECM
Telemetry control	METRON
Sim Card	Data enabled / Pin disabled
Service Provider:	Not specific
Alarm Message Delivery	SMS only

10.1 General Information

The Selwood auto stop / start unit has 3 modes: Manual start, Auto start and Off. Each of the 3 modes is selected with the 3 position keyswitch. The panel has a replaceable electronic control module which is intended to be field replaceable in the event of damage or failure. Inbuilt are emergency stop and magnetic pickup diagnostic LED's to assist in field diagnosis of faults.

When the keyswitch is in the central "off" position, the electronics are in a low power shutdown mode but are still drawing a very small current. If the pump is not to be used for a long period of time, it is good practise to isolate the battery to stop this small current drain and preserve the charge of the battery.

Starting modes, "manual start" the engine will begin its start sequence immediately and begin cranking within a few seconds. In "auto start" the engine start sequence will not begin until the "high" float switch closes to show that there is sufficient fluid to pump.

When going from "off" to either manual or auto mode, all the LED's on the front face briefly flash red then green. This is to indicate that the electronics is primed and will now either start the engine, or will start when required, depending on mode selected.

The auto stop start panel is designed to operate in conjunction with a Metron telemetry device from Powelectrics. This is a separate plug in system which is self powered and takes signals from the auto stop start panel and sends SMS alarms in the event of high water temp/ low oil pressure/ fail to start or high float level.

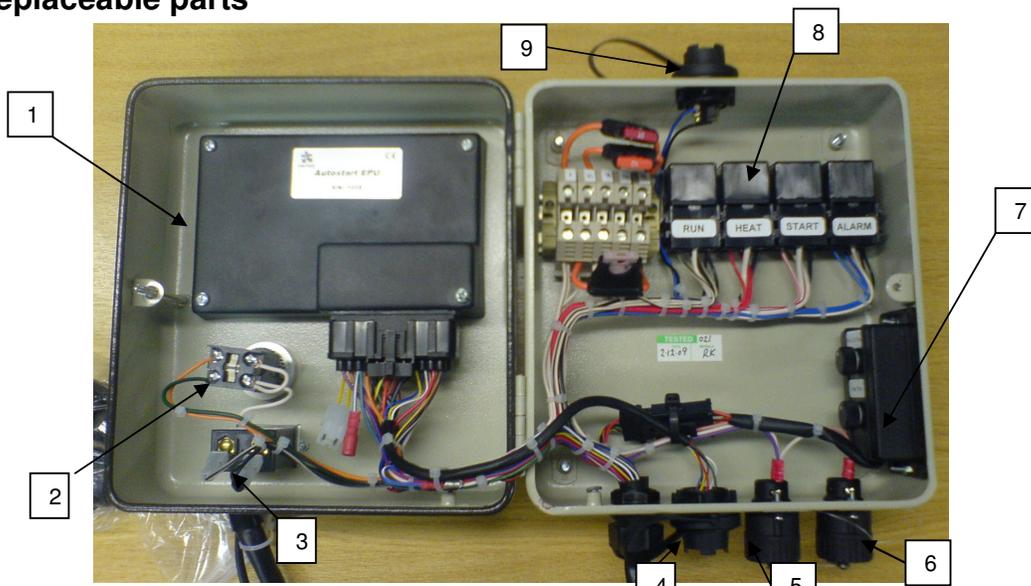
10.2 Installation when used with Telemetry

1. **Attention!** The pump should be placed on a level area of ground and installed in accordance with company recommendations and best practice.
2. The Telemetry system can accept four mobile phone numbers which it will dial in the event of an alarm being triggered. Setting up of these is covered in a later section. For hire fleet use it is recommended that the depot on call phone is entered into memory location 4, reserve 1,2 & 3 for customers requirements.
3. The positioning of the unit can and will affect the degree of signal strength and it is advised that the unit be operated and tested on site in situ to confirm that the unit operates and dials out successfully. A test can be performed with the Metron to obtain the degree of signal strength available at the location. Heavily built up areas, operation within steel framed buildings/ structures and rural area operation in hilly country (or deep quarries) can affect signal strength and operation. **If in doubt Always test before handover.**
4. When operating in auto mode with floats there is a pre set timer which will allow the unit to run on, after the low float has signalled a stop command to the unit. This period is set at 30 min and is variable down to a min 10 minutes. This range was determined at the design stage as the optimum when operating on small sumps to prevent repeated starts flattening batteries or damaging starter motors.
5. The High / High float position may be used in either auto or manual and connects directly with the Metron device and is independent of the auto stop start system.
6. The pump assembly is always supplied with a strainer that should be fitted to the end of the suction pipe work. Failure to fit the strainer may result in severe damage to the pump and could ultimately invalidate the warranty.

10.3 Maintenance

1. There are no maintenance procedures that can be applied to the system other than checking the integrity of the floats and ensuring that they are wired correctly. The floats and their corresponding plugs on the pump unit are fitted with waterproof covers. It is advised that these are used to prevent water/ dirt ingress when not in use.
2. Where problems occur with the auto stop start unit it is possible to replace the main black box as an assembly on site. This negates the need to return the pump to a repair centre for repair or replacement.
3. Ad hoc wiring repairs or alterations can and have caused damage to the operation of panels and boxes. Major problems have caused panels to be scrapped as not economic to repair.
4. Replacement parts; Only the manufacturers or factory-approved components should be used as replacement parts.
5. All maintenance work must be carried out with the pump and engine/motor stationary.

10.4 Replaceable parts



ITEM	DESCRIPTION	PART NUMBER	QTY
1	Autostart unit	92700-0326	1
2	Keyswitch Assembly	92700-0327	1
3	Hourmeter	92700-0289	1
4	Telemetry input plug.	92700-0328	1
5	Chassis Socket 3-way (low)	92800-0081	1
	Socket Dust Cap	92800-0082	
6	Chassis Socket 3-way (high)	92800-0081	1
	Socket Dust Cap	92800-0082	
7	Heater Plug and run on timer module	92700-0329	1
8	Relays	92700-0288	4
9	Plug for Optional Audible alarm	92700-0330	1
10	Spare Key (Not pictured)		1

11 INSTRUCTIONS FOR OPERATION – AUTO STOP START

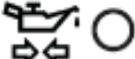
See Section 10.1

On the front of the panel there is a 3 position key switch. These are clearly labelled:

OFF
MANUAL

AUTO

There is also a series of LED's to indicate the status of the engine and various alarms. These are as follows;

Engine running			Oil Pressure
Engine Preheat			Coolant temperature
Engine start failure			Battery charge warning
RPM (Magnetic pickup sensor)			Emergency stop

The above are dual colour LED's and will appear red or green depending on current panel status.

11.1 Basic Panel starting sequence

The starting sequence for the pump is as follows (same procedure regardless of mode selected):

- 1) **Preheat / warning.** During this stage the red start fail LED will flash to show the control unit is attempting to start the engine. The red Heater LED will also be lit to show that the engine glow plugs are being used. The audible sounder if connected will sound to provide a pre-start warning. This stage is adjustable in length from 5 to 10 seconds using the pot inside the control cabinet.
- 2) **Cranking.** During this stage the control unit is trying to start the engine. The red start LED will still be flashing to show the engine is trying to start. The control unit will be looking at the rpm sensor (magnetic pickup) to see if the engine is turning fast enough. As this sensor picks up pulses it flashes the RPM LED. The RPM LED is either red if the pulses are too slow, i.e. the engine is not yet running, or green if the sensor is seeing enough fast pulses to determine the engine is running. The crank stage is exited in one of 2 ways, either the RPM sensor picks up fast enough pulses to decide the engine is now running, OR, 5 seconds has elapsed since the unit started cranking. If the engine is now running then the control unit goes to stage 4) if the engine is not running then the unit goes to stage 3
- 3) **Resting.** During this stage the control unit is allowing the engine to rest before attempting to crank again. The red start fail LED will still be flashing to show that the unit is trying to start the engine. The unit will allow the engine to rest for 10 seconds in this stage and will then attempt to crank the engine again. Note the control unit will allow the engine 3 crank / rest cycles before deciding the engine is not going to start and will cease all attempts. At this point the control unit will go to the fault stage 5)
- 4) **Running.** To get to this stage the control unit will have cranked the engine and seen sufficient fast pulses from the magnetic pickup RPM sensor to decide the engine is now running. The green engine running LED will be lit, as will the green RPM led. During the first 16 seconds of this stage if there are any problems with the engine, e.g. low oil pressure, coolant temperature or charge warning, then the relevant LED will light red on the control unit as a warning. Once this 16 second "settling" stage has elapsed, if there is still a problem with the engine then the engine will be stopped to protect it, the control unit will enter the fault stage 5). Otherwise the engine will continue to run until it is either switched off (manual or auto mode), or the low float switch opens (auto mode only). Note in auto mode there is also a user adjustable run-on time that the pump will continue to run for

after the low float has opened. This time is set from 10->27 minutes by adjusting the control pot inside the control cabinet.

- 5) **Fault.** This stage is when the engine will either not start or has been stopped by the control unit due to a problem. The red start fail LED will be flashing and other LED's will also be lit red to show the cause of the problem, e.g. RPM LED is red showing that insufficient pulses were detected during cranking for the control unit to decide whether the engine was running or not. If the control unit is in this stage because an ESTOP button has been pressed then the red ESTOP LED will be lit red.

11.2 Key Switch in Off

In OFF the engine will not run.

11.3 Key Switch in Manual

When turned to MANUAL the engine will pre heat and start. The start sequence is automated with the glow plugs being switched on and off by the panel.

Once the engine is running the green Engine Running LED will be permanently on.

The unit will continue to run until the switch is returned to the OFF position or an alarm occurs.

If the unit fails to start then it will have 2 more attempts automatically. If the engine still fails to start then the start failure LED will illuminate. Switch from MANUAL to OFF to clear this alarm. An SMS text will also be sent if the optional Metron unit is fitted.

11.4 Key Switch in Auto

When turned to AUTO the unit is controlled by 2 float switches (plugged into the connection manifold on the side or end of the Selwood unit).

The engine will start automatically when the HIGH level is reached and continue to run until the LOW level is reached. In order to prevent the battery running low over repeated starts the unit has a variable run on timer from a minimum of 10 > 30 minutes after activation of the stop float, unless the switch is moved from AUTO to OFF or an alarm occurs.

The float switches must be wired normally open.

If the unit fails to start then it will have 2 more attempts automatically. If the engine still fails to start then the start failure LED will illuminate and if fitted with the optional Metron unit it will send an SMS text indicating failure to start, you will need to switch from AUTO to OFF to clear this alarm.

11.5 Alarms

Local indication is provided on the front of the panel for High Temperature alarm, Low Oil Pressure alarm, Service Due, High/ High Level and Start failed. As well as this local indication the unit sends text messages.

If an alarm occurs (except service due and High/ High Level) the engine will stop. In order to clear the alarm the switch will need to be moved from the MANUAL or AUTO position, back to the OFF position, wait for approximately 3 seconds then restart the original sequence.

In order to clear the service due indication you need to send a text message to the unit. (see below)

11.6 Remote SMS Configuration

Communicating by text message.

Text messages will be sent when a Low Oil Pressure alarm, a High Temperature Alarm, High/ High alarm, the unit has failed to start or when a service is due. The number these are sent to can be changed by sending the following text message to the unit:

The data number of the telemetry unit fitted to individual pumps can be obtained from the hire screen under immobiliser details for hire fleet units or by contacting Selwood Ltd for all others. Send the following message to this number inserting the number to which you want the alarms sent where you see 07xxxxxxx

...;.mem 1 07xxxxxxx

...;.mem 2 07xxxxxxx

...;.mem 3 07xxxxxxx

(please substitute the number required)

In order to clear the Service Due LED send the following message to the unit:-

...;.exe 18

By default the Service Due comes up every 200 hours. At this point the internal counter automatically resets itself to zero.

11.7 Telemetry BASIC FAULT FINDING

On the following page is a wiring schematic for the unit. This can be used for basic fault finding for individual components. If a major failure occurs then contact Selwood Ltd for technical advice and solutions.

In most cases the faults can be traced to simple things like battery voltage being too low, Incorrect wiring of floats- where these have been changed from those supplied or poor signal strength at the installed location. Positioning of the pump set will affect the signal strength being received by the system and will reduce the effectiveness of the unit.

Current is drawn by the system, even when in the off position. Battery voltage should be periodically checked and the engine run for at least 30 minutes to maintain charge. Failure to start is likely when the battery voltage reaches 11.65 volts. Adverse temperature conditions may affect this limit.

Selwood recommend operating the high/high alarm to confirm that the text alarm is working at every installation and that signal can be sent/ received. At peak times and in built up areas delays in text messaging can occur. These are not a fault of the unit and are entirely outside of our control.

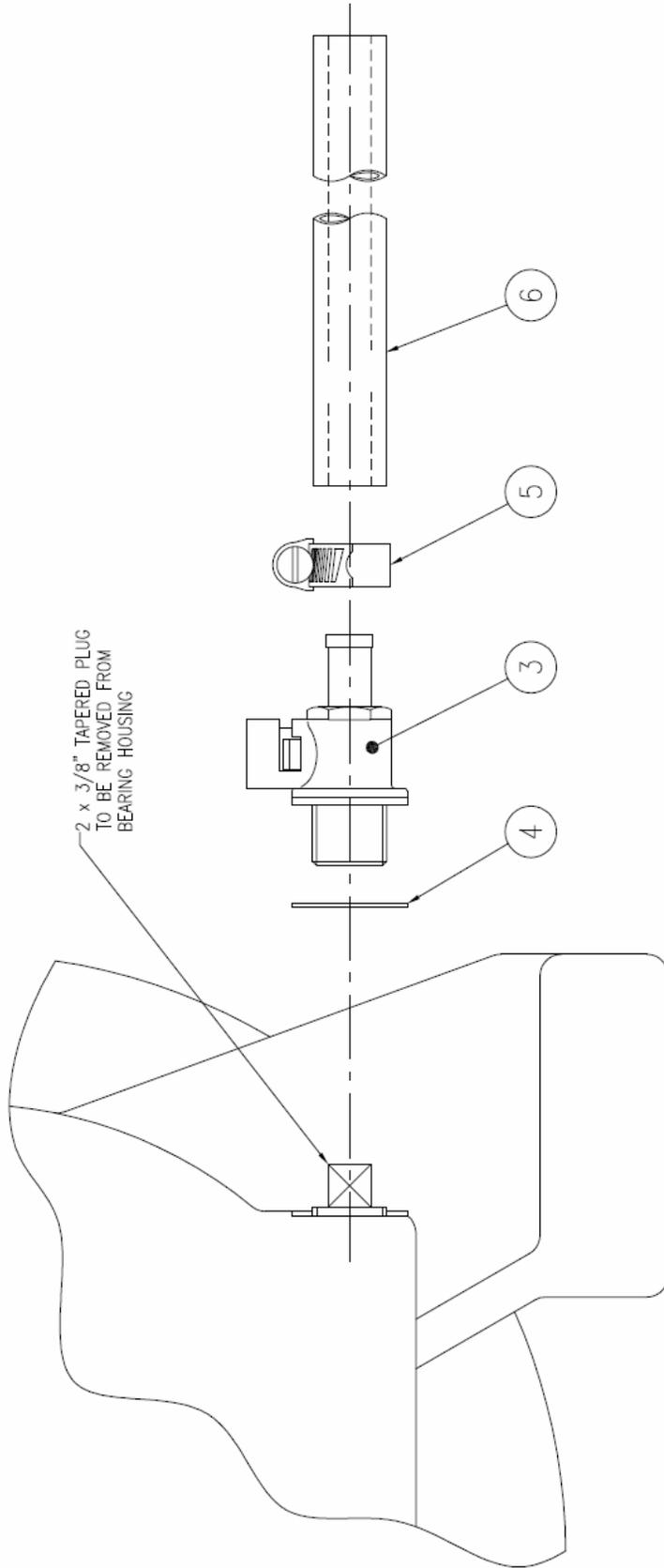
When contacting Selwood in relation to this system please have the following data available, for reference insert the details below.

Box data number.....

Box serial number.....

Machine serial number.....

Fleet number (if applicable)..



12 OPTION KITS

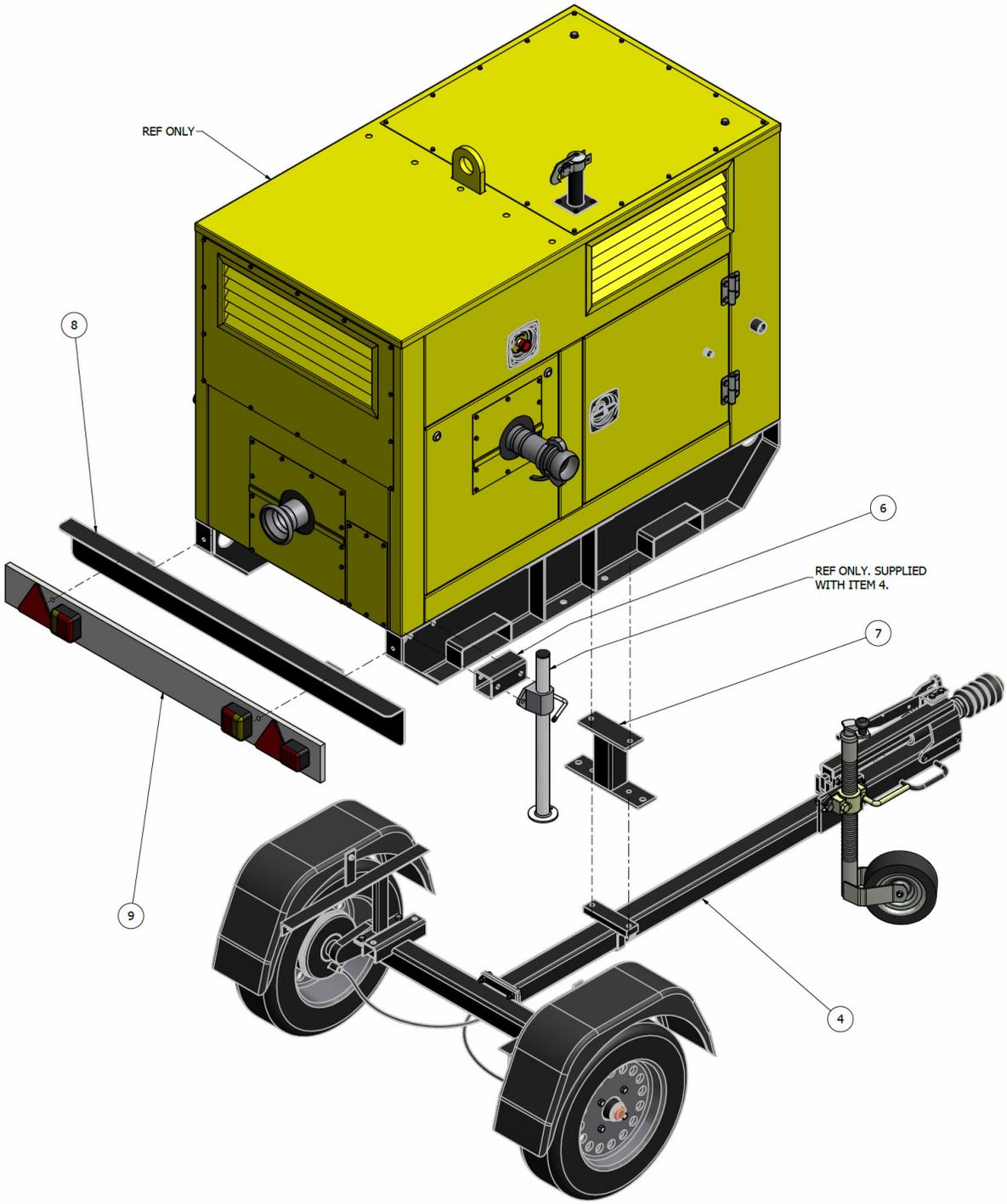
12.1 Oil Drain Extension Kit 0907051000

2 x Oil Drain Extension Kits Required for D80 Super Silent Builds

ITEM	DESCRIPTION	PART NUMBER	QTY
3	Oil Drain Tap 3/8" BSP with Hose Spigot	9520P00301	1
4	Drain Tap Spacer/Sealing Washer	7599323000	1
5	Hose Clip	9505816907	1
6	Multi-Purpose Tube 10 I/D	9507K00301	1

When ordering spares, please state:

PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART

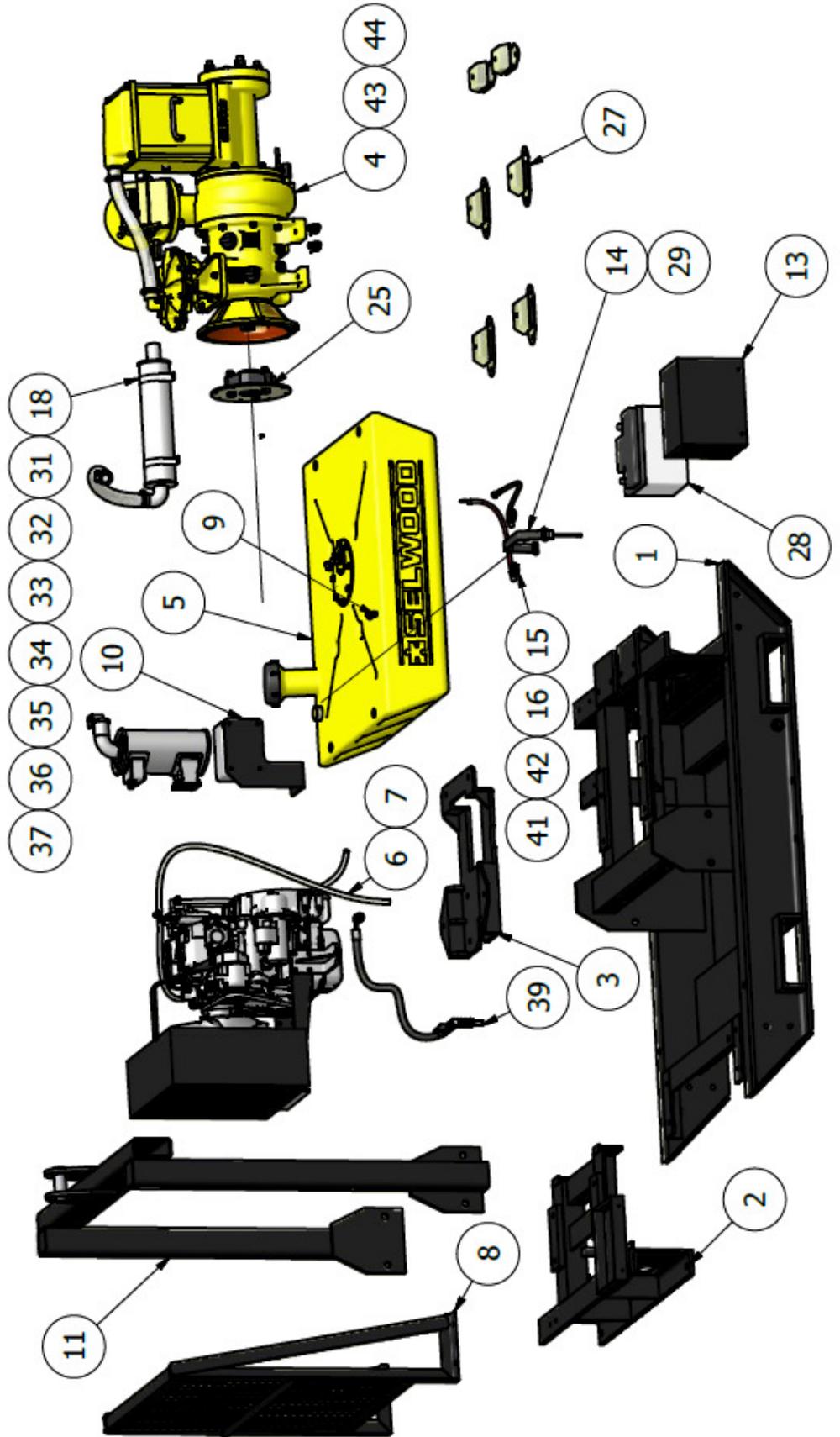


12.2 D80 / D100 Fast Tow Trailer Kit – 0803391000

ITEM	DESCRIPTION	PART NUMBER	QTY
4	T-Chassis – 1300kg	9729-00016	1
6	Prop Stand Bracket	1503061000	1
7	Front Mounting Post	1503114000	1
8	Lighting Board Bracket	0803390000	1
9	1.4m Long Lighting Board	9730001000	1
33	Label – Rating Plate (Not Shown)	1594154000	1
36	12V / 24V Label (Not Shown)	1509025000	1
38	Lifting Warning Label (Not Shown)	2006276000	2
REF	D80 / Isuzu 2CA1 Super Silent	0811202S40	1

When ordering spares, please state:

PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART

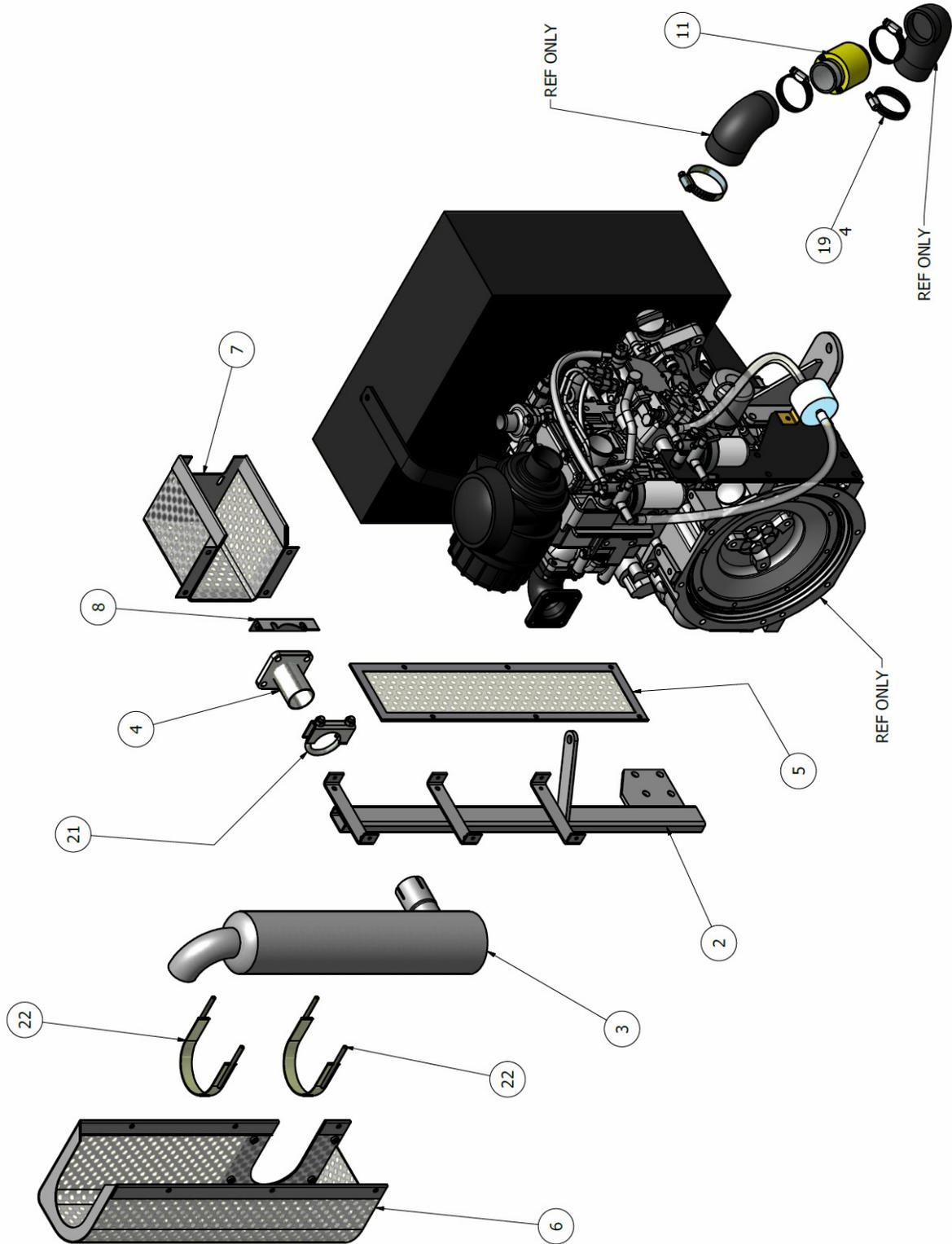


12.3 D100 / Isuzu 2CA1 Skid – 0912228000

ITEM	DESCRIPTION	PART NUMBER	QTY
1	D100 Isuzu 2CA1 Skid Chassis	0912229000	1
2	D100 Isuzu 2CA1 Engine Sub Frame	0912230000	1
3	Pump Mounting Bracket	0809080000	1
4	D100 Body Unit Close Coupled	0909096000	1
5	Plastic Fuel Tank Assy (105Ltr)	1502478000	1
6	Fuel Line Assembly - Feed	1001195000	1
7	Fuel Line Assembly - Return	1508180000	1
8	Radiator Guard	1508250000	1
9	Hose Adaptor Assembly	2009033000	1
10	Control Panel Bracket	0912231000	1
11	Lifting Frame	1002213000	1
12	Fuel Pump Link Lead	0813014000	1
13	Battery box	0810347000	1
14	Battery Strap Hook	0810348000	1
15	Battery Lead +VE	1590153000	1
16	Battery Lead -VE	1500302000	1
18	Clamp 90 ID	0912232000	2
21	Exhaust Cover	0810343000	1
24	Exhaust Silencer	92700-0350	1
25	Centa Coupling – 38 Bore	9600M00015	1
27	A/V Mount	9680M00046	6
28	Battery – 60 A/h	92700-0320	1
29	Battery Strap	92700-0351	1
31	Air Pump Silencer	9395000001	1
32	90 Degree Elbow 1" BSP Equal	9517P00804	1
33	Hex Reducing Bush 1" x3/4" BSP	9517P00803	1
34	Spigot 3/4" BSP	1590109000	1
35	Socket 1" BSP Equal	9517P00801	1
36	Hose 25mm Nominal Bore	9542000001	1
37	Hose clip	9505030004	2
39	Remote Oil Drain Kit	92700-0226	1
40	Battery Clamp Boot	92800-0005	1
41	Terminal boot - Red	92800-0158	1
42	Terminal Boot	92800-0008	2
43	Label – Rating Plate	1594154000	1
44	Hammer Drive Screw	9045002259	2

When ordering spares, please state:

PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART

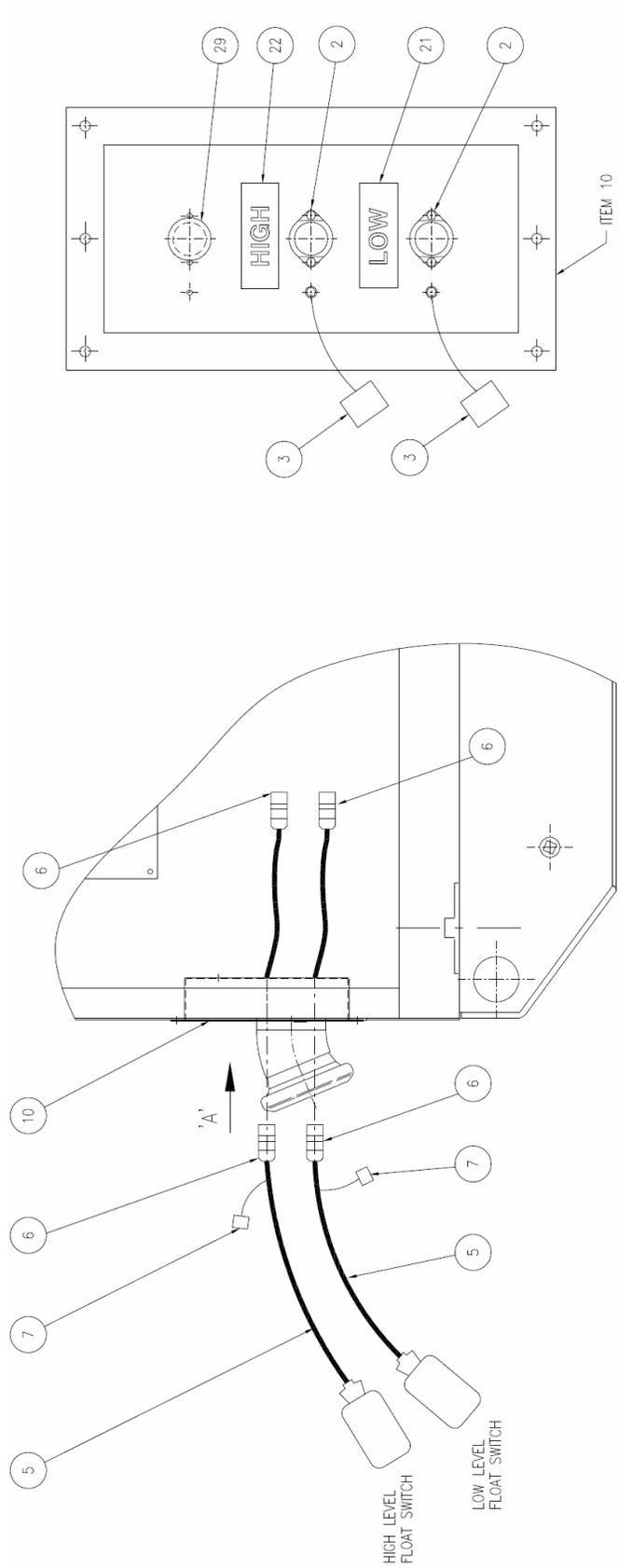


12.4 Isuzu 2CA1 Chalwyn Valve & Spark Arrestor Kit - 0912148000

ITEM	DESCRIPTION	PART NUMBER	QTY
2	Spark Arrestor Support Bracket	0912142000	1
3	Spark Arrestor	0912149000	1
4	Spark Arrestor Inlet Spigot	0912150000	1
5	Spark Arrestor Back Guard	0912147000	1
6	Spark Arrestor Guard	0912143000	1
7	Exhaust Manifold Guard	0912144000	1
8	Manifold Guard Bracket	0912146000	1
11	Chalwyn Valve D30-45	92700-0410	1
19	Size 3 Clip	9505007004	4
21	Exhaust Clamp 45mm	9506134000	1
22	Clamp Bracket	0912145000	2

When ordering spares, please state:

PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART

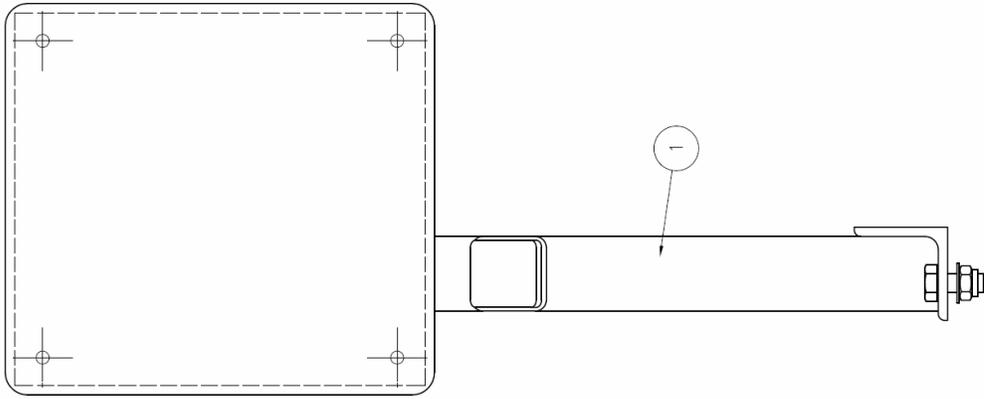


12.5 Auto Stop / Start Kit - 0812165000

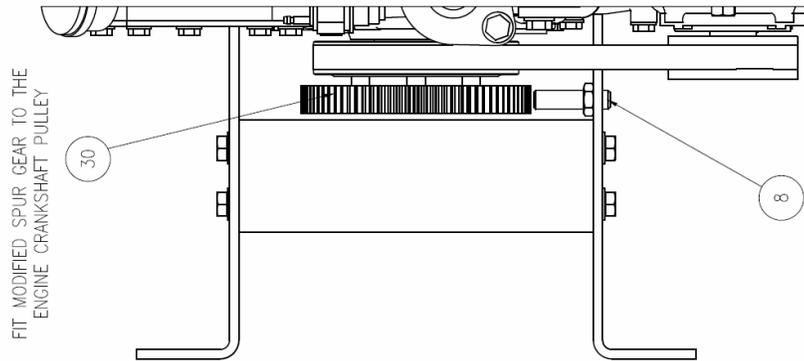
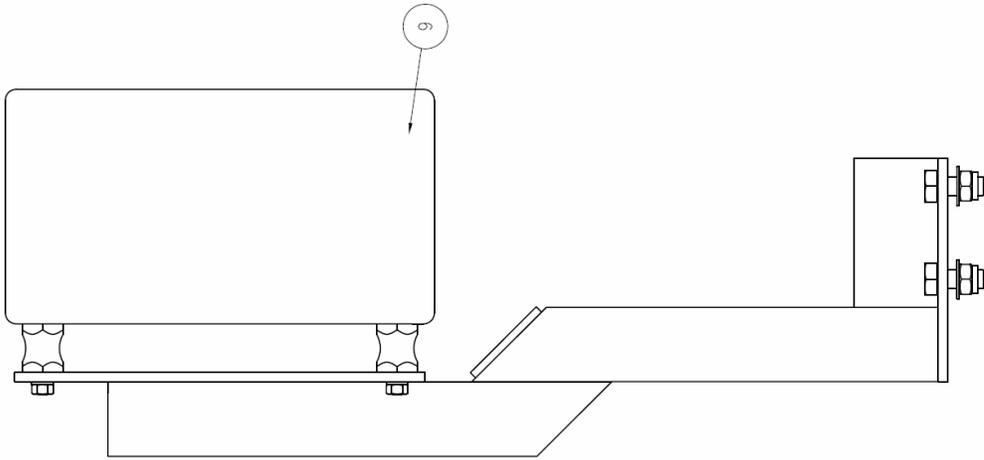
ITEM	DESCRIPTION	PART NUMBER	QTY
1	Auto Stop / Start Mounting Bracket	0812162000	1
2	Chassis Socket – 3 Way	92800-0081	2
3	Socket Dust Cap	92800-0082	2
5	Float Level Switch + 20m Cable	92900-0033	3
6	Cable Plug – 3 Way	92800-0083	4
7	Plug Dust Cap	92800-0084	2
8	Magnetic Pickup	92800-0180	1
9	Auto Stop / Start / Telemetry Panel	92800-0182	1
10	Float Plug Panel	1004100000	1
15	Engine Side Loom	92800-0207	1
21	Label Float Connector (Low)	1505176000	1
22	Label Float Connector (High)	1505175000	1
24	Label – Warning (Not Shown)	1505173000	3
25	Isolation Warning Label (Not Shown)	1506020000	3
26	Warning Label (Not Shown)	1305335000	2
27	Isolation Warning Label (Not Shown)	1506025000	2
28	Cable Tie Nylon (Not Shown)	9705002000	6
29	Blanking Plug 22 Dia.	92800-0085	1
30	Modified Spur Gear – Isuzu 2CA1	0812163000	1

When ordering spares, please state:

PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART



AUTO STOP START PANEL & BRACKET



FIT MODIFIED SPUR GEAR TO THE
ENGINE CRANKSHAFT PULLEY

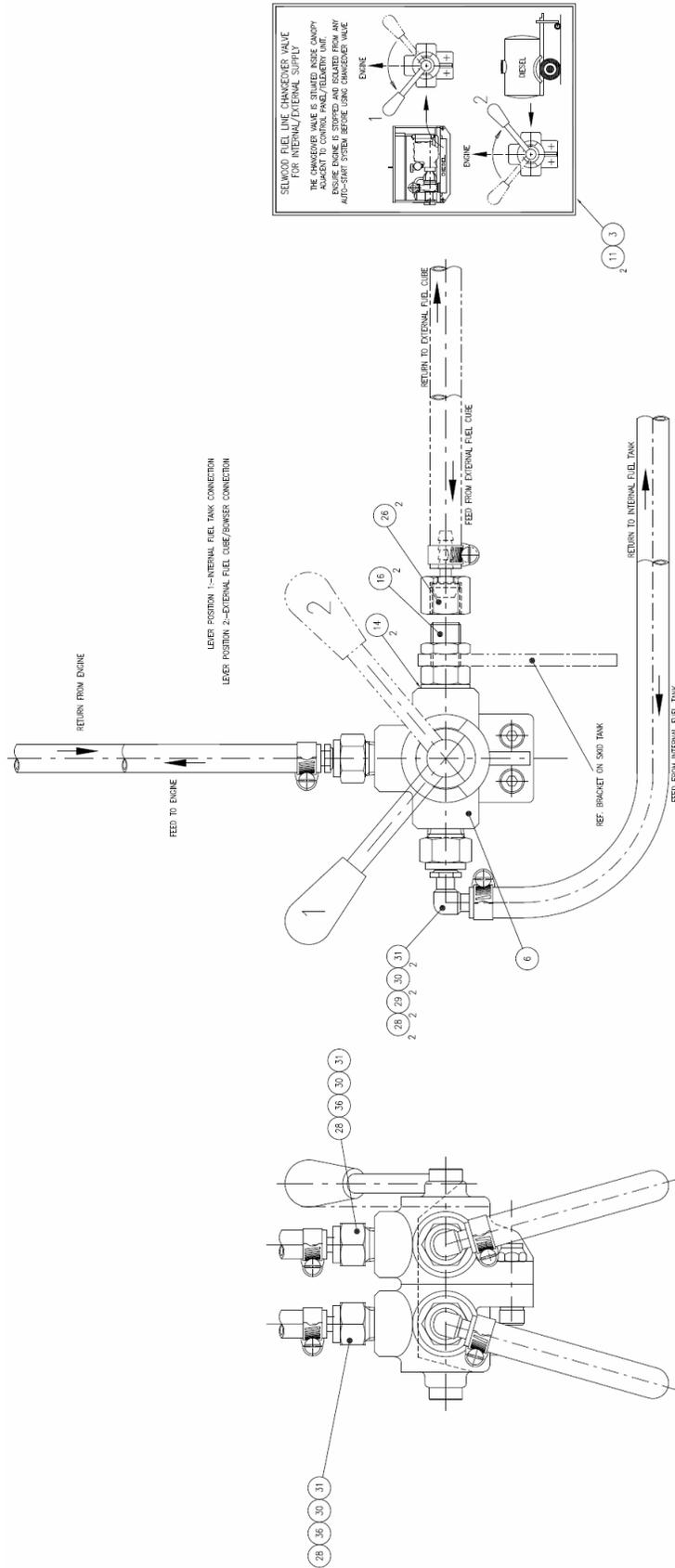
VIEW OF CRANKSHAFT PULLEY
RADIATOR ASSEMBLY
REMOVED FOR CLARITY

Auto Stop / Start Kit - 0812165000

ITEM	DESCRIPTION	PART NUMBER	QTY
1	Auto Stop / Start Mounting Bracket	0812162000	1
2	Chassis Socket – 3 Way	92800-0081	2
3	Socket Dust Cap	92800-0082	2
5	Float Level Switch + 20m Cable	92900-0033	3
6	Cable Plug – 3 Way	92800-0083	4
7	Plug Dust Cap	92800-0084	2
8	Magnetic Pickup	92800-0180	1
9	Auto Stop / Start / Telemetry Panel	92800-0182	1
10	Float Plug Panel	1004100000	1
15	Engine Side Loom	92800-0207	1
21	Label Float Connector (Low)	1505176000	1
22	Label Float Connector (High)	1505175000	1
24	Label – Warning (Not Shown)	1505173000	3
25	Isolation Warning Label (Not Shown)	1506020000	3
26	Warning Label (Not Shown)	1305335000	2
27	Isolation Warning Label (Not Shown)	1506025000	2
28	Cable Tie Nylon (Not Shown)	9705002000	6
29	Blanking Plug 22 Dia.	92800-0085	1
30	Modified Spur Gear – Isuzu 2CA1	0812163000	1

When ordering spares, please state:

PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART

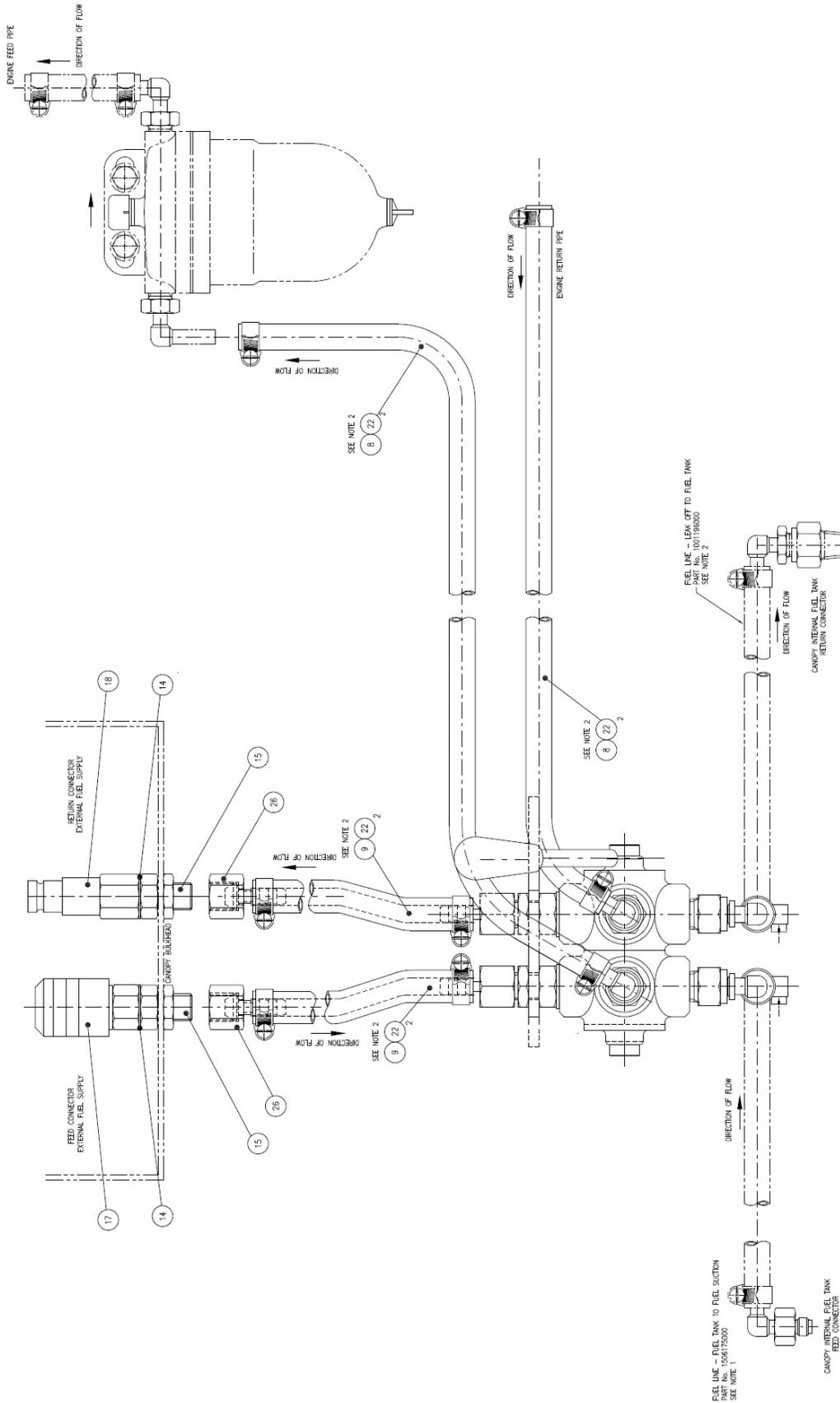


12.6 Bulk Fuel Kit - 0812161000

ITEM	DESCRIPTION	PART NUMBER	QTY
3	Instructions Label	1507255000	1
6	Diverter Valve – 3/8" BSP	9530K00301	1
8	Griflex Hose	9508001000	A/R
9	Oil Resistant Hose 3/8" Bore	9508K00301	A/R
11	Cable Tie Nylon	9705002000	2
14	3/8" Bonded Seal Washer	9532P00307	4
15	3/8" BSPP Extended Bulkhead	9532P00303	2
16	3/8" BSPP Bulkhead	9532P00313	2
17	Hydraulic Coupling Connector	9532P00301	1
18	Hydraulic Plug Connector	9532P00302	1
22	Worm Drive Hose Clip	9505M02001	10
26	Swivel Nut & Hosetail – 3/8" BSPP x 3/8"	9532P00311	4
28	Straight Adaptor 3/8" BSPT x 5/16"	9534P00315	4
29	5/16" Universal Stem Elbow	9534029205	2
30	Tube Sleeve 5/16"	9534027805	4
31	Enot Tube Nut	9534027905	4
36	Stem Tailpiece Adaptor 5/16"	9534P00209	2
39	Plastic Grommet Strip	9700-00018	0.35m

When ordering spares, please state:

PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART

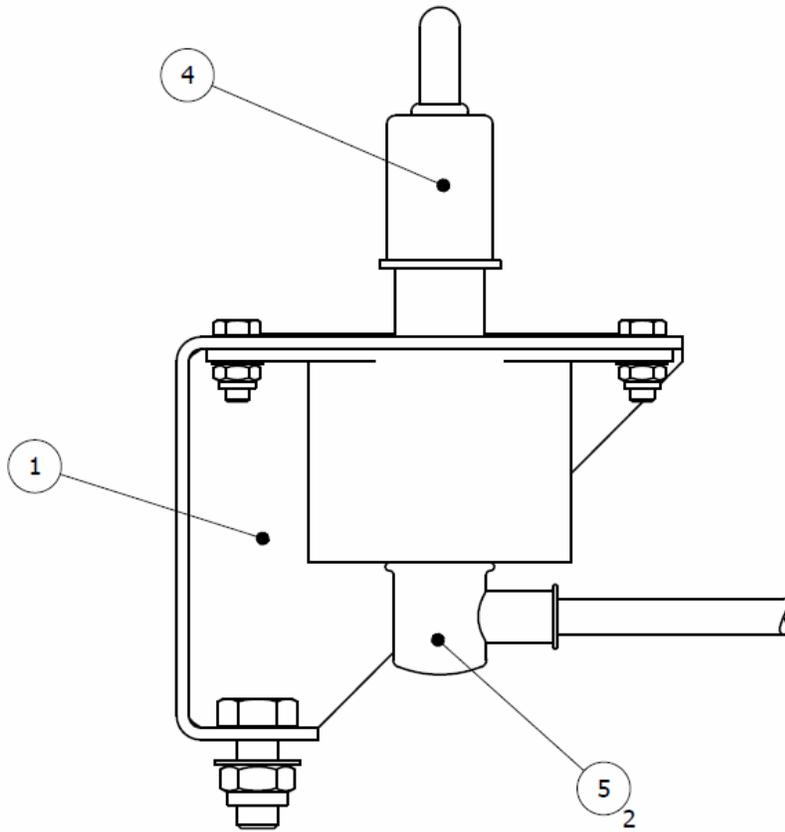
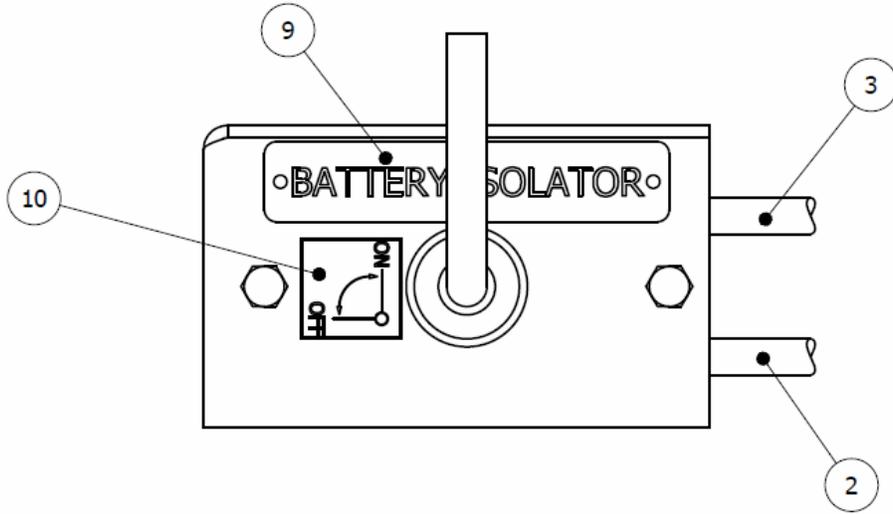


Bulk Fuel Kit - 0812161000

ITEM	DESCRIPTION	PART NUMBER	QTY
3	Instructions Label	1507255000	1
6	Diverter Valve – 3/8" BSP	9530K00301	1
8	Griflex Hose	9508001000	A/R
9	Oil Resistant Hose 3/8" Bore	9508K00301	A/R
11	Cable Tie Nylon	9705002000	2
14	3/8" Bonded Seal Washer	9532P00307	4
15	3/8" BSPP Extended Bulkhead	9532P00303	2
16	3/8" BSPP Bulkhead	9532P00313	2
17	Hydraulic Coupling Connector	9532P00301	1
18	Hydraulic Plug Connector	9532P00302	1
22	Worm Drive Hose Clip	9505M02001	10
26	Swivel Nut & Hosetail – 3/8" BSPP x 3/8"	9532P00311	4
28	Straight Adaptor 3/8" BSPT x 5/16"	9534P00315	4
29	5/16" Universal Stem Elbow	9534029205	2
30	Tube Sleeve 5/16"	9534027805	4
31	Enot Tube Nut	9534027905	4
36	Stem Tailpiece Adaptor 5/16"	9534P00209	2
39	Plastic Grommet Strip	9700-00018	0.35m

When ordering spares, please state:

PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART

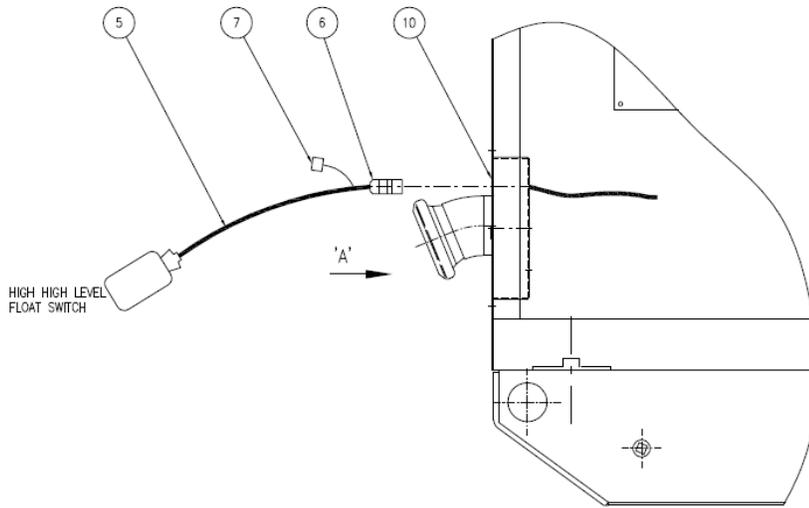
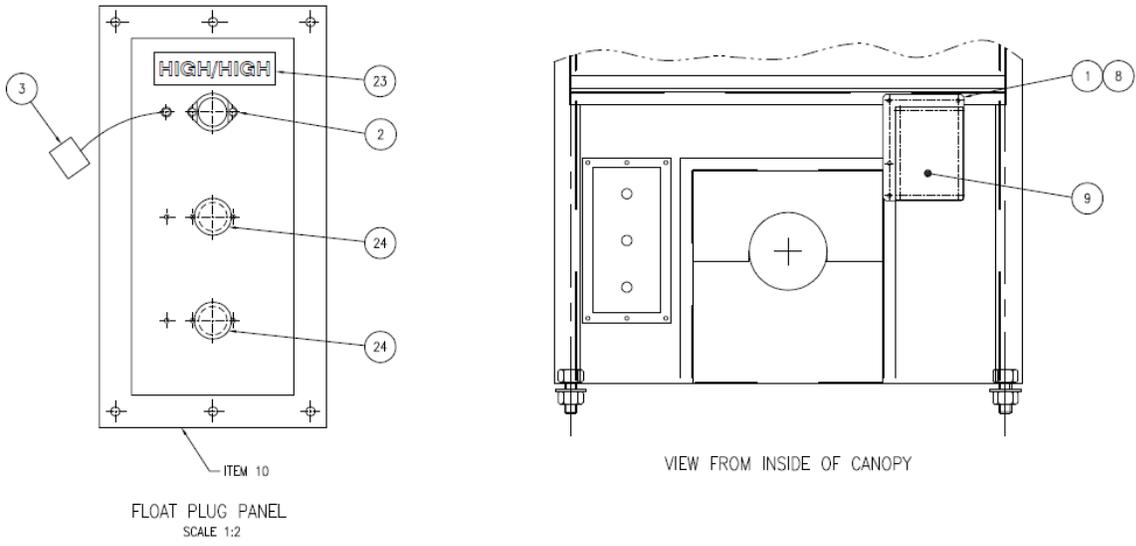


12.7 Battery Isolator Kit - 0812159000

ITEM	DESCRIPTION	PART NUMBER	QTY
1	Battery Isolator Bracket	0812160000	1
2	Battery Lead – Positive	0295310000	1
3	Link Lead – Positive	1507103000	1
4	Battery Isolator Switch	92800-0154	1
5	Terminal Boot	92800-0008	2
6	Battery Terminal Clamp Cover – Red (Not Shown)	92800-0158	1
7	Battery Clamp Boot (Not Shown)	92800-0005	1
9	Label – Battery Isolator	1306091000	1
10	Isolator Switch Label – On / Off	1507105000	1

When ordering spares, please state:

PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART



12.8 Telemetry (Metron) Kit - 0908241000

ITEM	DESCRIPTION	PART NUMBER	QTY
1	Mounting Plate – Metron Unit	0908207000	1
2	Chassis Socket – 3 Way	92800-0081	1
3	Socket Dust Cap	92800-0082	1
5	Float Switch + 20m Cable	92900-0033	1
6	Cable Plug – 3 Way	92800-0083	1
7	Plug Dust Cap	92800-0084	1
8	Aerial	92800-0176	1
9	Metron Unit	92800-0178	1
10	Float Plug Panel	1004100000	1
21	Cable Assembly (Between Metron & Stop/Start)	92800-0183	1
22	A/V Mounts	9680M00006	3
23	High/High Label	1505174000	1
24	Blanking Plug	92800-0085	2

When ordering spares, please state:

PUMP NUMBER - PART NUMBER - DESCRIPTION OF PART

12.8.1 IN4MA Metron Description

1. The IN4MA Metron is a battery powered telemetry device which uses a GSM mobile phone network to send text messages to preloaded contact numbers.
2. When fitted to a D100 SuperSilent canopy build, it is programmed to allow remote monitoring of the pump by informing the contact numbers if the water level is approaching the pump.
3. A float switch and cable is connected, via the chassis “High High” socket, to the Metron unit, and sends a signal to the unit when the water level reaches the float, which in turn forwards a pre-programmed text message.

12.8.2 Programming

4. The Metron unit is supplied pre-programmed to carry out the function of sending high water level alarm messages. The only further requirement for programming is to input the designated contact numbers into its phone book.
5. A total of four different contact numbers can be programmed into the phone book at any one time, and is achieved by sending text messages to the Metron unit from a mobile phone.
6. Full instructions on how to enter numbers into the phone book can be found at Appendix A of this manual.

Further information and advanced programming details of the IN4MA Metron High Level Alarm unit can be found in the “Technical Manual And Specification” at the following website;

<http://www.powelectrics.co.uk/content/pdf/METUM%20ENG%20Metron%20User%20Manual%20v099b%200908.pdf>

13 NOTES