



**BRENDON**  
**POWERWASHERS**  
BUILT TO LAST ... DESIGNED TO PERFORM  
[www.powerwashers.co.uk](http://www.powerwashers.co.uk)



## EC Declaration of Conformity

Brendon Powerwashers of Units 1-5 Station Road Industrial Estate,  
Wiveliscombe, Taunton, Somerset, TA4 2LX.

Declare that:

**Equipment: Engine Driven High Pressure Water Powerwasher**

**Model: 30KLN+ES**

**Serial No**

In accordance with the following Directives:

98/37/EC     The Machinery Directive (and its amending directives)

2000/14/E    The Low Noise Directive (and its amending directives)  
C

89/336/EEC   The Electromagnetic Compatibility Directive (and its amending  
directives)

I hereby declare that the equipment named above has been designed and  
manufactured to comply with all essential requirements of the Directives.

Signed by:



Mr. R J Hendy Technical Director

Signed at Station Road Factory address as named above on 01.09.2007

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## Introduction

Thank you for purchasing a Brendon Powerwasher. The purpose of this manual is to show you how to use, maintain and service your powerwasher and covers the Brendon 30KLN+ES. It cannot be overstressed that the life of any machine with moving parts is dictated to a degree by the following factors:

**Length of Operation**

**Regular Maintenance**

**User Abuse**

Please read this manual fully before operating your machine, if you are unsure of any of the instructions please phone our factory Help line Tel. 01984 624500.

Please check that your machine has been delivered with the following:

- 1 x Brendon Powerwasher
- 1 x High Pressure Hose
- 1 x Two Piece Lance and Gun
- 1 x Instruction Manual
- 1 x Suction Strainer

And any extras you have ordered (see delivery note)

If you find any of the above are missing or any damage has occurred due to transit/carrier please contact us within 3 working days of delivery.

**Please note the following symbols:**

Caution, Warning

Chemical Hazard

## Warranty Conditions

We, Brendon Ltd, undertake that if within twelve months of the date of delivery this BRENDON product or any part thereof is proved to be defective by reason only of faulty workmanship or materials, the company will at its option, repair or replace the same FREE OF CHARGE for labour, materials or carriage on the condition that:

- A) The machine has been correctly installed, and used in accordance with the supplied instructions/operation manual.
- B) The machine has been serviced by a competent person as per the Brendon and engine manufacturer's instructions.
- C) The machine is still in the possession of the original purchaser.

To make a claim please phone the Brendon Technical Department and ask for WARRANTY PROCEDURE form WPF01. This form can be faxed to you and will explain the correct procedure required to verify your claim.

### **This Warranty is void if:**

- 1) The machine is used with a damaged or without the "Brendon Suction Strainer".
- 2) The machine is used with dirty or contaminated water.
- 3) The engine throttle screw is tampered with causing the engine and pump to run to fast
- 4) The engine has been used with dirty or contaminated fuel
- 5) The machine is used with the wrong nozzle
- 6) The machine has been connected and used with a water supply that exceeds an inlet pressure of 55 PSI / 4 BAR
- 7) The machine is used with chemicals/accessories/parts not approved by Brendon

- 8) The machine has been adapted or technically altered without prior written authorization from the Brendon Technical Department
- 9) The machine has been obviously mistreated or has had no basic maintenance

## Specifications

|                   | 30KLN+ES               |
|-------------------|------------------------|
| Engine            | 10HP Yanmar            |
| Pump              | Cat Pump 45            |
| Drive             | Vee Belt               |
| Nozzle size       | NZ15045                |
| Max pressure      | 3000 psi / 207 bar     |
| Water consumption | 3.3 gpm / 15.0 lpm     |
| Dimensions        | 1050mm x 680mm x 800mm |
| Dry weight (kg)   | 150kg                  |

## Unpacking Instructions

The machine is delivered ready for use (UK ONLY) and has been filled with the necessary pump lubricant however check the lubricant levels before using the machine.

Please make a visual check of your machine for any transit damage. If any damage is found please advise us immediately.

### Important Warning!

In the winter months (November - March) the machine will be delivered with a 25% Anti-freeze solution in the pump and hoses, GREAT CARE must be taken to dispose of this mixture safely in compliance with the relevant COSHH regulations. (See the COSHH Safety certificate on page )



## Setting Up

The following instructions will help you set up your 30KLN+ES powerwasher correctly. Firstly we need to identify and become familiar with some of the components on your machine.

### Key Components



1. Pump Oil Level Gauge - Make sure that oil can be seen and that level is just above the red dot
2. Pump Oil Filler Cap
3. Unloader Valve - Allows the water to by-pass back to the pump when the gun is closed
4. Inline water filter
5. Chemical Injector with Adjustable Regulator - Allows the operator to adjust the amount of chemical used (on reverse of canopy)

## Key Engine Components



1. Fuel Valve
2. Oil Filler cap
3. Throttle control lever
4. Decompression switch

## 5. Starter button

## Starting the engine – Electric start

1. Turn on fuel valve
2. Set the throttle to half
3. Flip the decompression switch
4. Press the starting switch and hold until the engine starts

*Note: If the engine fails to start after 10 seconds let the engine rest for 30 seconds and try again. If the engine still fails to start please ring the Brendon help line on 01984 624500*

5. Position the Throttle Lever to the desired engine speed

## Starting the engine – Recoil start

1. Turn on fuel valve
2. Set the throttle to half
3. Flip the decompression switch
4. Grip the starter handle and pull with a large firm pull

Make sure the area around you is free of obstructions

## Stopping the engine

1. Set the Throttle right back to its lowest setting.
2. Turn off fuel valve.

# Fast-Track Spares





**AFTY20**



**FTCY20**



**FTKY20**

**NOTE:**  
FUEL TANK DOES NOT INCLUDE CAP  
OR MOUNTING BRACKETS.



**FFTY20**



**RSTR20KYD**



**STMY20**



**STRDY20**



**STRH02**

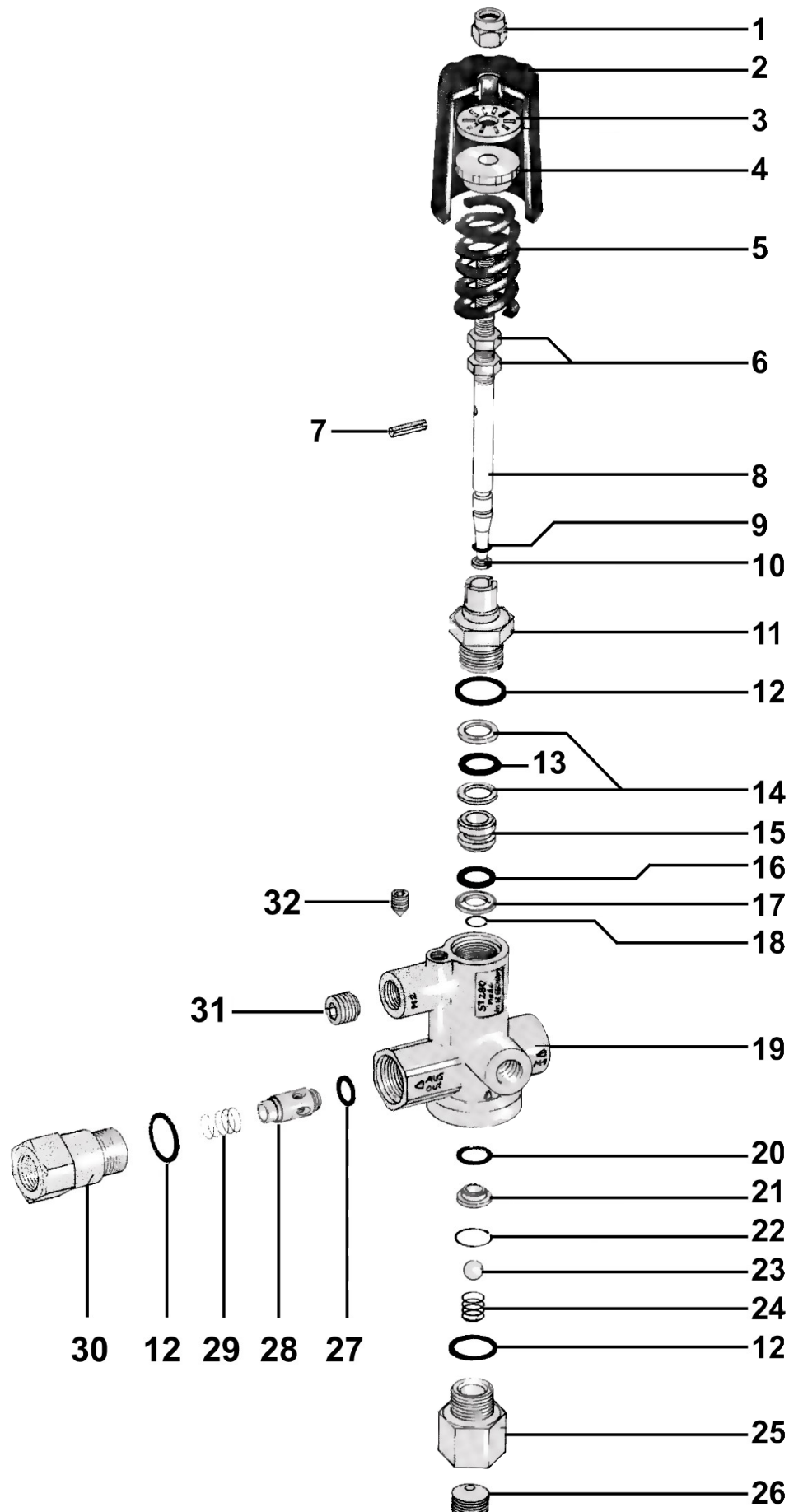


## Ceramics

45783



# Key Unloader Components



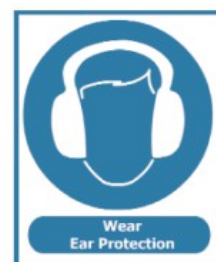
## Health & Safety Information

- Never** Point the gun at any person, pet or animal - even if the machine is switched off
- Never** Direct the spray on any electrical machinery
- Never** Work from a ladder or rooftop
- Never** Use without a safety shut off gun or with the gun trigger locked in the open position
- Never** Tamper with any of the settings on the relief valves
- Never** Run or operate the machine with the canopy in the raised position
- Never** Use the machine indoors or in a confined space
- Never** Run the pump dry of water
- Always** Release the residual pressure in the gun after use and when the gun is left unattended
- Always** Wear the correct protective clothing
- Always** Check that the high-pressure hose and all connections are in good service order before each use
- Always** Make sure that the machine is on level ground. Else **SERIOUS** engine and pump damage can occur due to lack of lubrication







### ALWAYS



### ADVISABLE TO



## Operating Precautions

- A) Ensure the surface to be cleaned is suitable for high pressure cleaning.
- B) Ensure any chemical used is approved by Brendon Powerwashers.
- C) Ensure that the chemical will not damage the surface to be cleaned.
- D) Keep the machine out of reach of children.
- E) High pressure water jets are dangerous if used incorrectly. In particular, the jet must not be directed against persons or animals, electrical equipment or the machine itself.
- F) Do not operate the machine when persons and/or animals are within the reach of the jet.
- G) The user must operate the machine in safe conditions and situations avoiding any likelihood of potential danger to their self or other persons. In particular the user will have to:
  -  Avoid operating in unstable balance conditions.
  -  Remember that the high pressure jet generates a recoil reaction when the gun is opened.
  -  Use adequate protective clothing.
  -  Wear protective goggles and anti-slip rubber shoes.
  -  Avoid contaminating the environment with polluting, toxic or harmful substances.
  -  Read and comply with the following Health & Safety Instructions

**Warning** - High-pressure water can be dangerous if subject to misuse. This machine is safe if it is used for the purpose for which it was designed. Brendon Powerwashers cannot be liable if the machine is used in a poor state of repair or if any parts of the machine are tampered with or modified in any way.

## Using the Powerwasher

Before using the machine make sure you have read the Operating Precautions (Page ) and the Health and Safety Information (Page ) and that the machine is in a good state of repair.

### Starting the machine:

- 1) Put the suction hose into a clean water supply or connect the machine to a direct feed with adequate supply (relative to the GPM of the machine).
- 2) Check the Gun, Lance and Hose are connected properly.
- 3) Start the engine according to the instructions
- 4) Pull back on the trigger until water pressure is obtained from the nozzle.

If no water pressure is achieved after 15 seconds, switch off the engine and check the water supply.

**Warning:** There is a recoil action when the trigger is opened.

**Warning:** High-pressure water can damage and erode some surfaces. Always check suitability before use.

## Using Chemical/Detergent

**Warning:** Only use chemicals approved by Brendon. Using unapproved chemicals may cause damage to the pump and could VOID your warranty.

The 30KLN+ES use a metered injection system to add the chemical. This allows the operator to adjust the amount of chemical being used.

### To use the chemical system:

Place the chemical hose into the chemical container and adjust the chemical regulator (See picture below) until the desired chemical dosage is achieved.

Photo Here

*Brendon offers a full range of Traffic Film Removing Chemicals. For more information please ring our sales office on 01984 624500.*

**Warning:** Make sure you wear EYE PROTECTION when cleaning with any chemicals.

**Caution:** Ensure that any chemical that you use is BIODEGRADABLE. If you are in any doubt, do not use until you have checked with the chemical manufacturer.


## Frost Protection

To protect your powerwasher from frost damage:

- 1) Mix a 25ltr drum of anti-freeze solution 25% Anti-Freeze to 75% water (This may need to be increased for severe frost periods e.g. 50% anti-freeze to 50% water)
- 2) Place the suction hose into the anti-freeze mixture.
- 3) Remove the gun from the delivery hose and position the free end so that it runs into the anti-freeze mixture
- 4) Start the unit in the normal way but keep the engine speed low
- 5) Run the unit until you see the 'blue' anti-freeze solution coming out of the delivery hose.

Your powerwasher should now be frost protected.

**Remember,** keeping you powerwasher in a garage, warehouse, shed or van will not protect it from frost damage!

 **Warning:** Anti-freeze is toxic. Ingestion can be fatal! **DO NOT INDUCE VOMITING.** Seek urgent medical attention.

**Important:** Read the Anti-freeze COSSH certificate at the back of this manual

## Powerwasher Maintenance

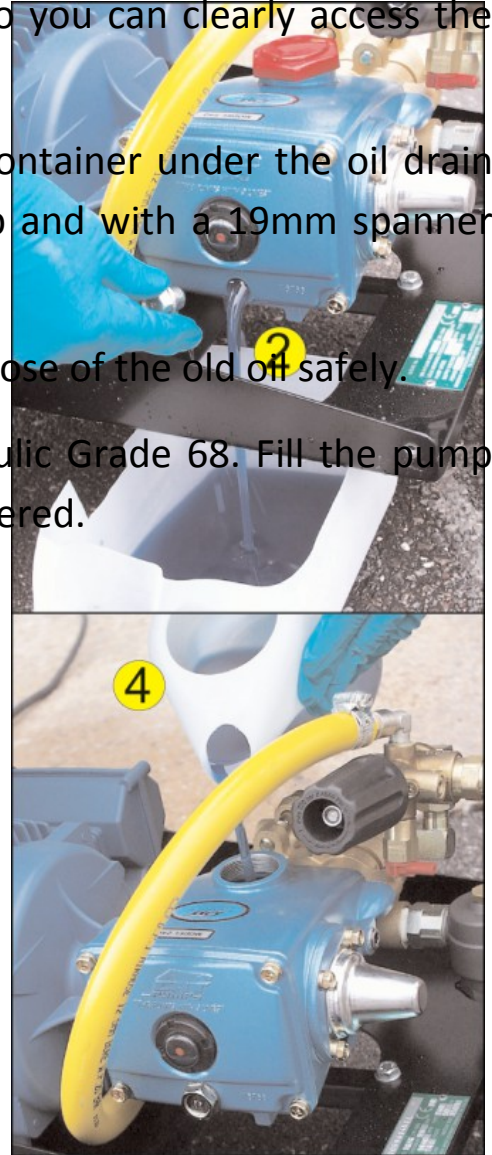
Warning: Make sure that the engine is switched off before attempting any maintenance work.

We recommend the following service schedule:

| Service Item     | Before Use | 1 <sup>st</sup> Month | 6 Months | 12 Months |
|------------------|------------|-----------------------|----------|-----------|
| Pump Oil         | Check      | Change                | Check    | Change    |
| Water Filter     |            |                       | Clean    | Clean     |
| Suction Strainer | Check      |                       | Clean    | Clean     |
| Delivery Hose    | Check      | Check                 | Check    | Check     |
| Nozzle           |            |                       |          | Change    |
| Engine Oil       | Check      | Change                | Check    | Change    |

## Changing the Pump Oil

- 1) Undo the canopy clip and raise the canopy so you can clearly access the pump.
- 2) Wearing protective gloves, place a suitable container under the oil drain plug of the pump. Remove the red oil filler cap and with a 19mm spanner remove the pump drain plug.
- 3) Replace and tighten the oil drain plug and dispose of the old oil safely.
- 4) Refill with Cat Pump Oil or equivalent Hydraulic Grade 68. Fill the pump until the red dot on the crankcase window is covered.





## Fault Finding

### Pump Fails To Prime Or Build Up Pressure:

- 1) Check the Nozzle, Gun and Lance are clear of obstructions.
- 2) Remove the Gun and the suction strainer. With a low-pressure water supply force the water through the pump until there is an even flow obtained from the high-pressure hose.

*NOTE: Replace the strainer; failing to do so could void your warranty!*

- 3) Remove the manifold and inspect the pump seals and ceramics. Renew any damaged parts.

*(New parts and full technical support can be obtained by ringing Brendon - 01984 624500)*

**ALWAYS** prime the pump (Action 2) after replacing any internal parts of the pump; failing to do so can cause farther damage.

### Pressure Pulsating or Uneven Flow:

- 1) Check vee belt tension - Tighten if required.
- 2) Check suction and inline filters are not clogged - Clean/Renew if required.
- 3) Check all suction joints are tight and that there are no holes, kinks or knots in the suction hose.
- 4) If the unit is directly connected to a mains water supply, check there is enough water to supply the pump.
- 5) Examine all pump manifold valves to see if they are worn or blocked open.
- 6) Re-torque the valve plugs to 75 lb/ft.
- 7) Remove pump manifold and inspect the pump seals.

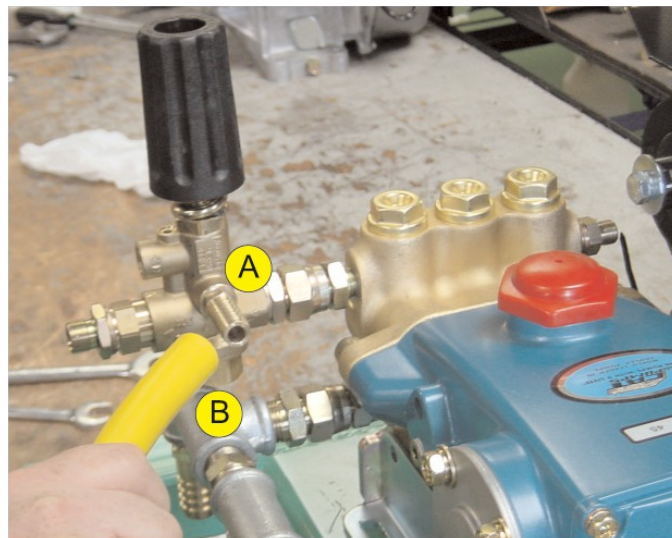
### Low pressure:

- 1) Check suction and inline filters are clean.

- 2) Check vee belt tension.
- 3) Fit a new high pressure nozzle. **Important:** Correct size must be fitted
- 4) Carry out By-Pass test on the unloader valve
- 5) Remove the pump manifold and inspect the seals and ceramics and replace if necessary.

## Unloader By-Pass Test:

- 1) With the machine switched off, remove the by-pass hose from the unloader (A) and plug the hose (B).
- 2) Close the canopy and start as normal.
- 3) Water should now be coming out of the unloader (A)
- 4) Open the gun in a safe position
- 5) When the gun is open water should stop coming out of the unloader (A).



### Is the unloader leaking water when the gun is open?

- Yes:** Order a new unloader valve from Brendon Powerwashers (Tel: 01984 624500 Part Number: PUV25)
- No:** The unloader is working correctly. Turn the machine off and release the pressure in the gun and reconnect the hose (B) to the unloader (A)

**⚠ Warning:** NEVER work on the machine while it is running!

**⚠ Important:** Always tighten the jubilee clips

## Inline Pressure Test

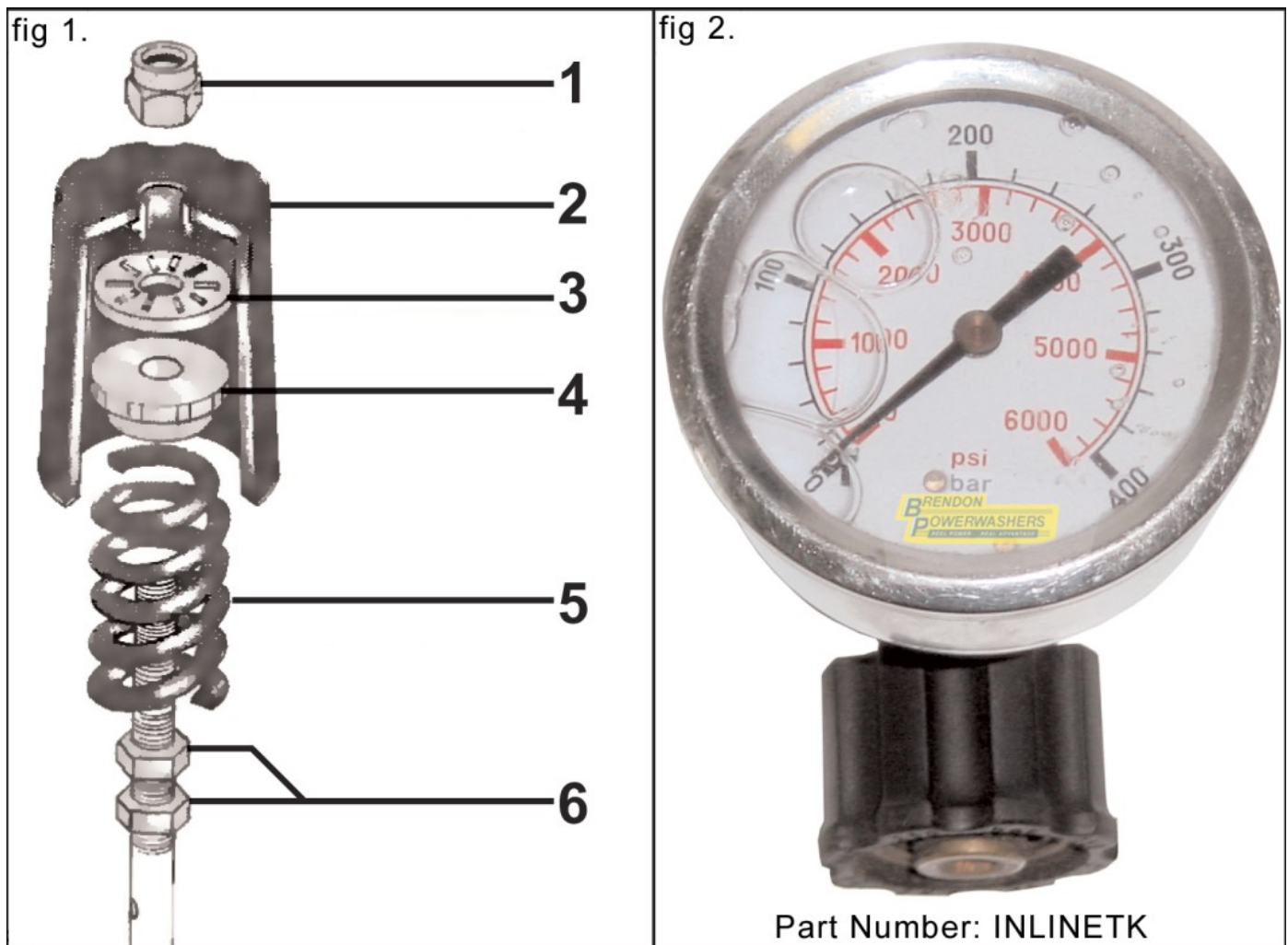
- 1) With the unit switched off - Fit the inline gauge (fig 2 – Part INLINETK) between the delivery hose and gun
- 2) Start the unit in the normal way
- 3) With the gun shut read the inline pressure settings on the gauge
- 4) Is the pressure correct? The reading on the gauge should be between 3600psi and a maximum of 4000psi.

**Too high:** Move the lock nuts up (No. 6 fig 1)

**Too Low:** Move the lock nuts down (No. 6 fig 1)

Repeat the test until the pressure is correct

- 5) Switch the unit off in the normal way and remove the inline gauge





## Quick Fault Finding

| Fault                 | Probable Cause   | Solution  |
|-----------------------|--|---|
| Low Pressure          | <ul style="list-style-type: none"> <li>• Worn nozzle.</li> <li>• Insufficient water flow feeding the pump</li> <li>• Suction leak</li> <li>• Blocked water filter</li> <li>• Blocked nozzle</li> <li>• Worn pump seals</li> <li>• Worn pump valves</li> <li>• Leaking hose or joints to the gun</li> </ul> | <ul style="list-style-type: none"> <li>• Renew nozzle</li> <li>• Try using another water supply</li> <li>• Tighten suction hose joints</li> <li>• Clean filter</li> <li>• Clean out nozzle</li> <li>• Renew pump seals</li> <li>• Renew valves</li> <li>• Rectify cause of the leaks</li> </ul> |
| Pulsation             | <ul style="list-style-type: none"> <li>• Restricted water supply</li> <li>• Air entering the system</li> </ul>   | <ul style="list-style-type: none"> <li>• Check all filters and clean as needed</li> <li>• Check fittings and use PTFE tape for airtight connections</li> </ul>  |
| Engine Will Not Start | <ul style="list-style-type: none"> <li>• Clogged fuel filter</li> <li>• Fuel line not open</li> <li>• Flat battery</li> <li>• Faulty control box</li> <li>• (Electric Start units only)</li> </ul>   | <ul style="list-style-type: none"> <li>• Clean filter and replace if necessary</li> <li>• Check steps 1-4 of "Starting the engine" (pages )</li> <li>• Charge or replace the battery</li> <li>• Use the recoil start. If the engine starts replace the control box</li> </ul>                   |

If the problem persists or is not listed please ring the Brendon Help-Line on 01984 624500

# Pump Servicing

## Servicing the Valves

- 1) Remove the hex Valve Plugs (top discharge, bottom inlet). (Fig. A)
- 2) Examine the O-Ring under the Valve Plug for cuts or distortion and replace if worn. Lubricate new O-Rings before installing.
- 3) Grasp Valve Retainer by tab at the top with pliers and remove from valve chamber (Fig. C). Usually the valve assembly will remain together while being removed. To separate the valve assembly, insert a screwdriver into the side of the Retainer and press on the back side of the Valve to begin separation, then between the Retainer and Valve Seat to separate completely. If the valve assembly separates during removal, remove the spring and Valve with needle nose pliers. Then, with reverse pliers, remove the Valve Seat from the manifold chamber.
- 4) Examine all valve parts for pitting, gouges or general wear and replace with pre-assembled Valve Assembly in service kit containing Retainer, spring, Valve, Valve Seat, O-Ring and Back-up-Ring. (Fig. D)

NOTE: Inlet and discharge valve parts are interchangeable. Two Valve Kits are needed for complete valve change.

- 5) Grasp new Valve Assembly by tab at top with pliers, immerse in oil and push into valve chamber. (Fig. E) Be certain Valve Assembly is completely seated in valve chamber.

NOTE: For certain applications apply liquid gasket to the O-Ring crevices and seal surfaces. See Tech Bulletin #053 for model identification.

NOTE: For Corrosion Resistant Models remember to install the Coil Spring between the Valve Plug and Retainer. Refer to Tech Bulletin #046 for model identification.

- 6) Apply Loctite 242 to the threads of the Valve Plug, thread into manifold port and torque per chart.





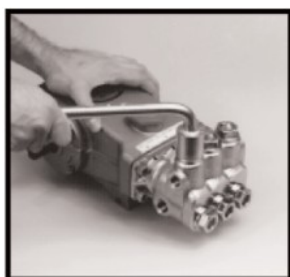


Fig A

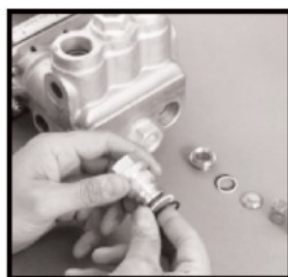


Fig B



Fig C

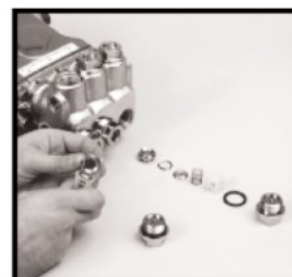


Fig D



Fig E

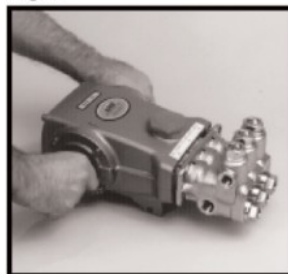


Fig F



Fig G



Fig H



Fig I



Fig J

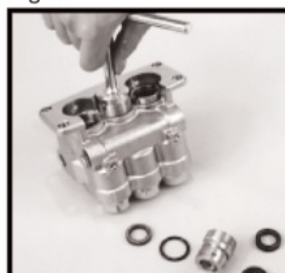


Fig K

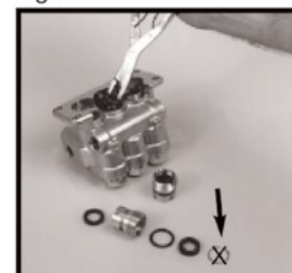


Fig L

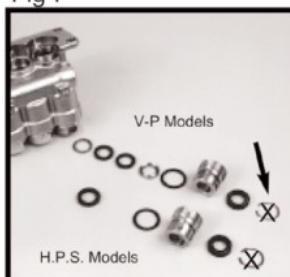


Fig M



Fig N



Fig O

## Torque Chart

| Pump Item            | Thread | Tool Size       | In.lbs | Ft.lbs | Nm  |
|----------------------|--------|-----------------|--------|--------|-----|
| Plunger Retainer     | M5     | M12 Hex         | 55     | 4.4    | 6.2 |
| Manifold Bolt        | M10    | M8 Allen        | 220    | 18.1   | 25  |
| Valve Plugs          | M25    | M24 Hex         | 520    | 43.4   | 59  |
| Bearing Cover Screws | M8     | M13 Hex.        | 115    | 9.4    | 13  |
| Crankcase Cover      | M6     | M10 Hex./Phill. | 50     | 4.0    | 6   |
| Bubble Oil Gauge     | M28    | Oil Gauge Tool  | 45     | 3.6    | 5   |
| Mounting Bolts       | M8     | M13 Hex         | 115    | 9.4    | 13  |

## Servicing the pumping section

### Disassembly

- 1) Using an M8 allen wrench on the 5 Frame pumps, a M14 hex tool on the 7 Frame pumps, or a M17 hex tool on the 15 Frame pumps, remove the two Socket Head Screws, and two Lockwashers or four Flanged Nuts.
  - 2) Rotate Crankshaft by hand to start separation of Manifold head from crankcase. (Fig. F)
  - 3) Insert two flat head screwdrivers on opposite sides to further separate Manifold Head from Crankcase or support the underside of the Manifold Head and tap lightly with a mallet on the backside of the Manifold Head. (Fig. G)
- CAUTION:** KEEP MANIFOLD PROPERLY ALIGNED WITH CERAMIC PLUNGERS WHEN REMOVING TO AVOID DAMAGE TO EITHER PLUNGERS OR SEALS.
- 4) Remove Oil Pan and slide out Seal Retainer with Wick. (Fig. H)
  - 5) Examine Ceramic Plunger for cracks or scoring and refer to Servicing Plungers if replacement is needed.

### Reassembly

- 1) Generally Plungers do not need to be replaced. Clean Plungers and remove any foreign material with a nonabrasive cleaner.
- 2) Saturate new Wick by soaking in oil, place Wick in Rear Seal Retainer and snap Retainer Adapter onto Rear Retainer. Slip Retainer with Wick over Ceramic Plungers with tab down and wick out. (Fig. H) If new Plungers are installed, do not lubricate Wicks. Operate for 24 hours to allow grease from seals to penetrate plunger surface, then lubricate wicks.
- 3) Replace Oil Pan.
- 4) Turn shaft by hand to line up plungers so end plungers are parallel.
- 5) Lightly lubricate the Plungers and carefully slide the Manifold Head onto the plungers supporting from the underside to avoid damaging the plungers.

On the high pressure V-Packing models or larger manifolds, it may be necessary to gently tap with a soft mallet until the manifold is flush with the crankcase.

6) Replace two Lockwashers, two Socket Head Screws or four Flanged Nuts and torque per chart.

## Servicing the plungers

### Disassembly

1) Remove the Manifold Head as described in the Servicing the Pumping Section.

2) To service the plungers, first remove the Oil Pan then the Seal Retainers with Wicks. The seal retainer is a two piece item that can easily be separated.

3) Using an M12 hex tool on the 5, 7 and 15 Frame pumps, or an M11 hex tool on the OEM 5, and 7 Frame pumps, loosen the Plunger Retainer about three to four turns. Push the Plunger back to separate it from the Retainer and finish unthreading the Plunger Retainer by hand.

4) Unthread the Plunger Retainer, O-Ring, Back-up-Ring and Gasket. Stud may stay on Plunger Rod or come off with Plunger Retainers. (Fig. J)

5) Remove the Ceramic Plunger, Keyhole Washer and Barrier Slinger from Plunger Rod.

### Reassembly

1) Visually inspect Crankcase Seal for deterioration or leaks and contact factory for assistance with replacement. Replace Barrier Slinger if damaged and slide onto Plunger Rod with concave side away from crankcase.

2) Examine Ceramic Plunger for scoring or cracks and replace if damaged. Ceramic Plunger can only be installed in one direction (front to back). Do not force onto rod.

- 3) Examine O-Ring and Back-up-Ring on Plunger Retainer and replace if cut or worn. Lubricate O-Ring for ease of installation and to avoid damage to the o-rings. Install NEW Gasket, then O-Ring, then Backup- Ring onto Plunger Retainer.
- 4) NOTE: OEM models have a longer Stud for the Plunger Retainer.
- 5) Apply Loctite 242 to exposed threads of Stud and thread Plunger Retainer onto Plunger Rod. Torque per chart.
- 6) Install the two-piece Seal Retainer with NEW Wick onto each rod with tab down and wick out.
- 7) Proceed with servicing the seals or remounting of Manifold Head as described.

## Servicing the Seals and V-Packing

### Disassembly

- 1) Remove the Manifold Head as described in servicing the Pumping Section.
- 2) Using reverse pliers, remove the Lo-Pressure Seal from the Seal Case.
- 3) With crankcase side of manifold facing up, unscrew the Seal Case from the manifold using a seal case removal tool. (Fig. K)
- 4) Remove O-Ring from O.D. of Seal Case.
- 5) Remove Snap Ring and Lo-Pressure Seal from the Seal Case. Seals are generally removed easily without any tools. (Fig. L) Discard snap ring on 5FR and 7FR pumps.
- 6) Hi-Pressure Seal Models: The Hi-Pressure Seal is generally easily removed from the manifold without any tools. If extremely worn reverse pliers may be used. (Fig. M, lower set of seals)
- 7) V-Packing Models: The Female Adapter, V-Packings and Male Adapter are easily removed from manifold without tools. If extremely worn reverse pliers may be used. (Fig. M, upper set of seals)

## Reassembly

### *V-Packing Models:*

- 1) Lubricate seal chamber in the manifold.
- 2) NOTE: For certain applications apply liquid gasket to the O-Ring crevices and seal surfaces. See Tech Bulletin #053 for model identification.
- 3) Insert Male Adapter with notches down and “v” side up and press completely into chamber by hand (Fig. N).
- 4) Lubricate V-Packings and install one at a time with grooved side down.
- 5) Next install Female Adapter with grooved side down. (Fig. O)
- 6) Examine Seal Case O-Ring and replace if worn. Lubricate new O-Rings before installing.
- 7) Thread Seal Case into manifold and tighten with special seal case tool. See Tech Bulletin #053.

## ***Hi-Pressure Seal Models:***

1) Lubricate seal chamber in manifold.

NOTE: For certain applications apply liquid gasket to the o-ring crevices and seal surfaces. See Tech Bulletin #053 for model identification.

2) Carefully square Hi-Pressure Seal into position by hand with the grooved side down (metal back facing out) (Fig. O).

3) Examine Seal Case O-Ring and replace if worn. Lubricate new O-Ring before installing.

4) Next secure Hi-Pressure Seal into position by threading Seal Case into manifold. Tighten Seal Case with special seal case tool.

## ***Lo-Pressure Seal-All Models:***

1) Examine Lo-Pressure Seal for wear or broken spring and replace if necessary.

2) Install Lo-Pressure Seal in seal case with garter spring down.

3) Next install Seal Retainer w/wick over plungers with wick out and tab down. If new plungers are installed, do not lubricate wicks. Operate for 24 hrs to allow grease from seals to penetrate plunger surface, then lubricate wicks. See Tech Bulletin #054 for more information on new two piece seal retainer. DO NOT install snap ring on 5FR and 7FR. DO install NEW SNAP RING in all 15FR pumps.

4) Replace Manifold Head onto pump as described under servicing the pumping section and torque per chart.

## ***Servicing the Crankcase Section***

1) While Manifold Head, Plungers and Seal Retainers are removed, examine Crankcase Seals for wear.

2) Check oil level and for evidence of water in oil.

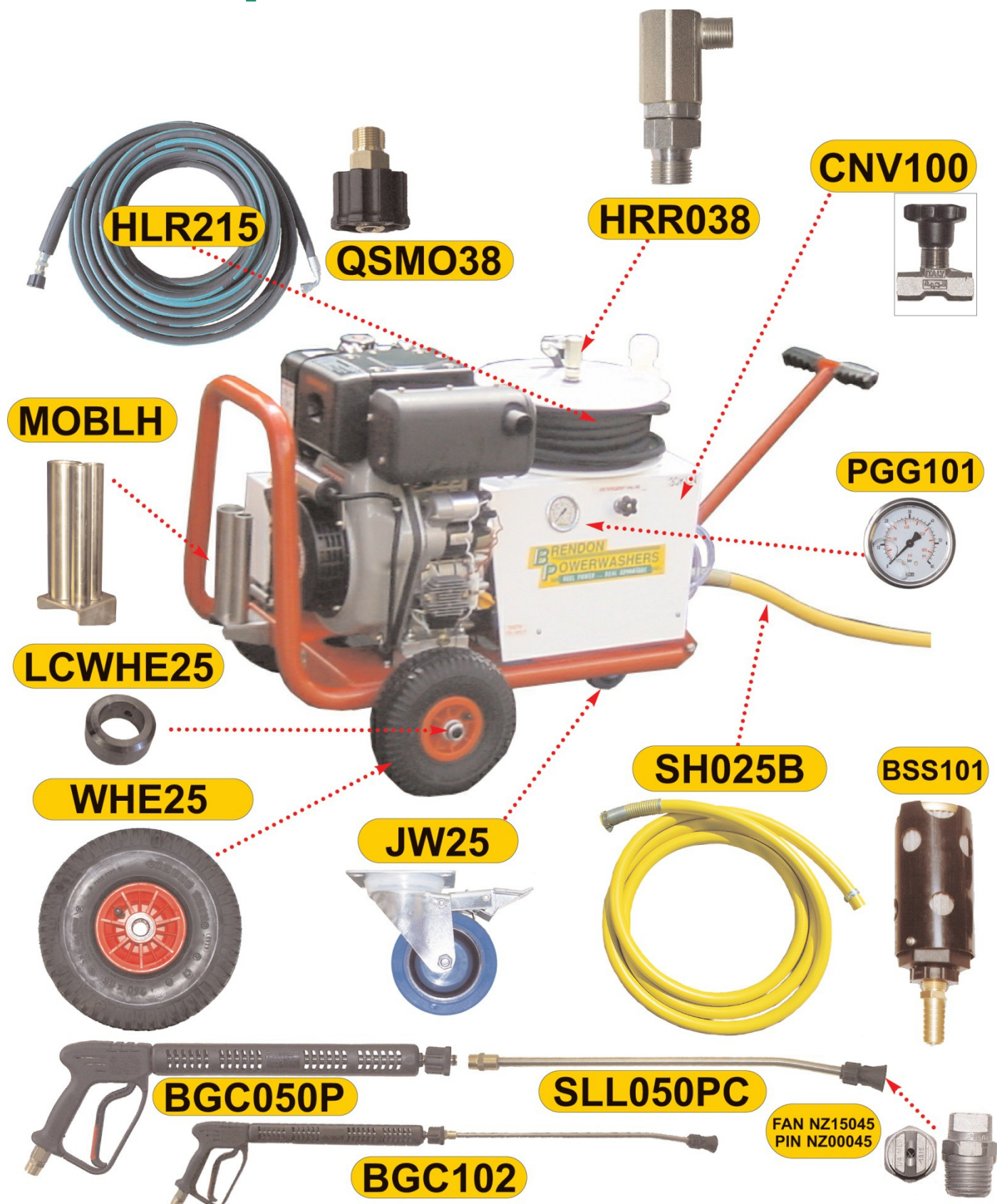
3) Rotate Crankshaft by hand to feel for smooth bearing movement.

4) Examine Crankshaft Oil Seal externally for drying, cracking or leaking.

5) Consult factory or your local distributor if crankcase service is evidenced.



## Fast-Track Spares – 1





## Fast-Track Spares – 2

## Fast-Track Spares – 3

## Anti-Freeze COSHH Certificate

|                                |   |
|--------------------------------|---|
| Product:                       | Elf Universal Antifreeze  |
| Application:                   | Water freezing point suppressant                                  |
| Composition:                   | Monoethylene glycol with anti-corrosion additives                 |
| Physical Data:                 | Green/Blue liquid. Soluble in water                               |
| Boiling Point:                 | 198°C   |
| Specific Gravity:              | 1.139   |
| Oduor:                         | Sweetish  |
| Fire Hazard Data:              | Flash point = 115°C   |
| Hazardous Combustion Products: | CO <sub>2</sub> , Dry Powder, Foam, Halon, Water Vapour           |
| Extinguisher media:            | Oxides of carbon, water vapour and Unidentified carbon compounds  |
| Incompatible materials:        | Strong oxidizers and perchloric acid                              |
| Toxicological Data:            | Toxic Dose - 100ml adult man - Ethylene glycol                    |
| TLV:                           | 10Mg/m <sup>3</sup> (Mist) 60Mg/m <sup>3</sup> (Vapour)           |
| Effect on Skin:                | Can cause irritation  |
| Effect on Eyes:                | Mild irritation and smarting, with temporary conjunctive reaction |

### Emergency and First Aid Procedures

|                     |  |
|---------------------|--|
| Ingestion:          | Can be fatal (Minimal dose 100 ml adult men) DO NOT INDUCE VOMITING. Seek urgent medical attention Give milk or water if patient is conscious.   |
| Contact with eyes:  | Flush with plenty of water for 15 minutes  |
| Contact with skin:  | Wash with soap and water   |
| Inhalation of mist: | In the event of dizziness or nausea, remove from exposure keep warm and at rest. If affects persist, seek medical attention. If breathing stops give artificial respiration and if necessary cardiac resuscitation. Seek medical help.<br><i>Notes for Doctors: Gastric lavage should be considered if significant quantities have been swallowed in previous 4 hours.</i> |
| Spillages:          | Soak up with absorbent material and collect solids in container. Clean floor with water.   |
| Disposal:           | Incinerate or land dump in accordance with local regulations.  |

## Notes:



