



## Service Manual BC450 Pump



BC450 Virgin AC Pump

# Table of Contents

<b>General Safety Precautions</b>	<b>3</b>
<b>Installation</b>	<b>4</b>
<i>Shaft Alignment</i>	
<i>System Piping</i>	
<i>Piping Strain</i>	
<b>Relief Valve</b>	<b>5</b>
<b>Start-Up</b>	<b>6</b>
<b>Routine Maintenance</b>	<b>7</b>
<i>Shaft Seal</i>	
<i>Seal Replacement Procedure</i>	
<i>Packing Replacement Procedure</i>	
<b>Troubleshooting</b>	<b>9</b>
<i>No liquid delivered or the pump will not prime.</i>	
<i>Pump noisy when operating</i>	
<b>Technical Data</b>	<b>10</b>
<i>Maximum Operating Limitations</i>	
<b>BC-450 Parts Diagram</b>	<b>11</b>

# GENERAL SAFETY PRECAUTIONS

- This manual should be read entirely prior to the commencement of installation and operation.
- Only qualified personnel should install, operate and maintain this pump and associated equipment.
- Check pump for specific safety warnings/labels.
- Prior to start-up, ensure complete cleanliness and integrity of the system in which the pump is installed.
- In most cases the relief valve is factory set during performance test. In cases where the type of duty is not known (such as distributors or stock orders) or where the components containing the relief valve come from pre-tested stock batches, it is not possible to factory set the relief valve. In this case it is the installers responsibility to set the relief valve in accordance with the specific application.
- Pumps with heat tracing or jacketing necessary to prevent solidification of the product should be brought up to working temperature prior to start-up.
- All electrical work must be done in accordance with the manufacturers recommended procedures by qualified personnel.
- Ensure all guards are securely in place before operating the equipment. Do not remove guards at any time during operation.
- For pumps operating under 'flooded' suction, when venting the pump through a plug or valve, care should be taken not to completely remove vent plugs or completely open any vent as this could result in liquid being discharged from the openings under pressure.
- Prior to start-up, ensure that the system valves and associated equipment are correctly set.
- Wear appropriate safety attire including long sleeves, face shield, and gloves, whenever starting or operating the pump.

# INSTALLATION

## Shaft Alignment

In the case of a belt driven system, care should be taken to insure proper alignment and tension of the drive belts and pulleys. A pillow block must be used in order to support the side load from the belts. Insure that the belts and pulleys are free and clean from oil and debris.

In the case of a direct drive system, proper care must be used to insure that the coupled shafts are accurately aligned. Failure to do so may result in rapid wear of the seal and/or reduced pump life.

## System Piping

Pump should be positioned as near as possible to source feeding it. Suction piping must be no smaller in diameter than the pump intake port and designed to avoid sharp bends, changes in sections or undue restrictions. Pressure drops due to an accumulation of valves, flex lines, etc can be considerable and must be taken into consideration.

Certain designs such as a low level drop are designed in order to maintain a minimum amount of liquid at the pump. After evacuating the lines, this remaining liquid can significantly improve start-up priming.

## Piping Strain

To ensure undue forces are not present, flange bolts (suction and discharge) should be completely slackened. If flanges are observed to spring apart, twist or move out of parallel excessively, remedial action must be taken.

The piping system can expand and contract considerably with the changes in temperature. Ensure that the final system allows for this change.

# RELIEF VALVE

BearCat Pumps are positive displacement pumps and must have some sort of pressure protection. This may be a relief valve mounted to the backside of the pump. The Pressure Relief Valve is made up of a plate that is held against a port by a spring. The spring tension can be adjusted for varying pressures. When the pressure exceeds the adjusted amount, it pushes the plate (Inner Poppet) back, allowing the liquid to flow back to the inlet side of the pump.

If a pump is rotated in reverse of normal operation, the end plate with the relief valve must be rotated 180 degrees. Pressure relief valves cannot be used to control flow or regulate pressure.

## Caution:

A relief valve is necessary to protect the pump and system from potentially dangerous over-pressure.

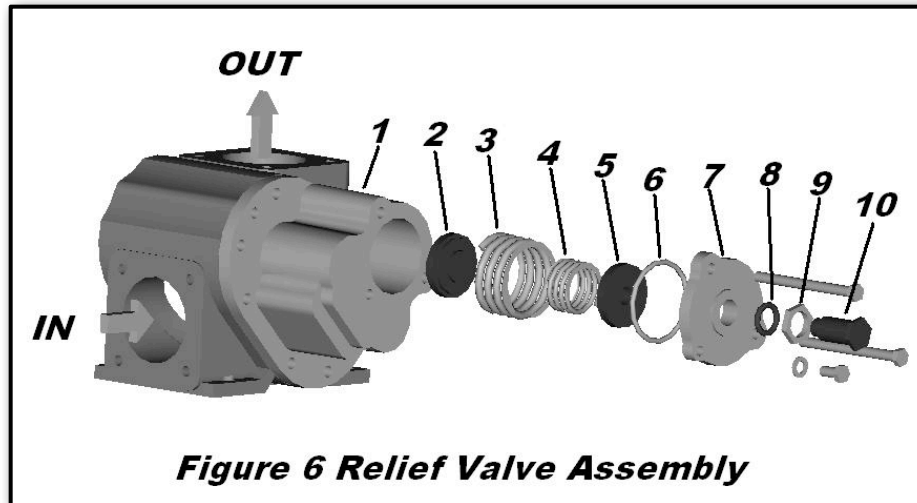
The relief valve will operate in the event of a restriction in the discharge line or the inadvertent closure of a downstream valve.

The valve must not be used as a flow control device.

If the pump is supplied without an internal relief valve, a suitable external relief to the system must be supplied

The internal relief valve will have been factory set. However, check for correct operation upon installation.

Re-adjustment may be necessary due to viscosity variations.



- (1) Rear End Plate
- (2) Inner Poppet
- (3) Outer Spring
- (4) Inner Spring
- (5) Outer Poppet
- (6) Cap o-ring
- (7) Adjuster Cap
- (8) Bolt o-ring
- (9) Adjuster Nut

## START-UP

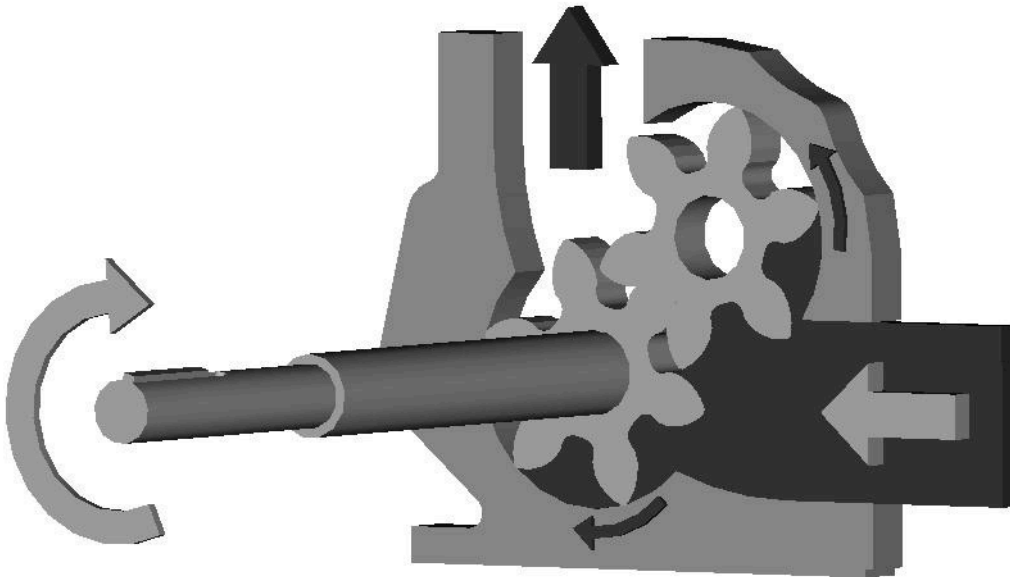
1. Pump should turn freely by hand. Ensure all guards are in place.
2. If heating is necessary, turn on supply and allow pump temperature to stabilize.
3. Gradually open appropriate valves, and check for signs of leakage.
4. If pump is above the level of liquid in the tank (suction lift), prime the pump by pouring a few gallons of liquid (Do not use water) in the strainer housing or adjacent piping – particularly on the suction side.
5. Check the pump rotation by flicking motor starter 'on' then 'off'. (Correct rotation indicated by diagram on pump cover plate)
6. Start pump – check system for leaks

### Caution:

Be sure all guards are in place, and all appropriate safety gear is worn prior to starting pump.

During initial run, pump speed should be operated at minimum in order to insure all functions are normal, connections are leak free, and rotation is smooth.

Cautiously increase to normal operating speed.



### Rotation and Flow

(Flow is reversible from what is shown)

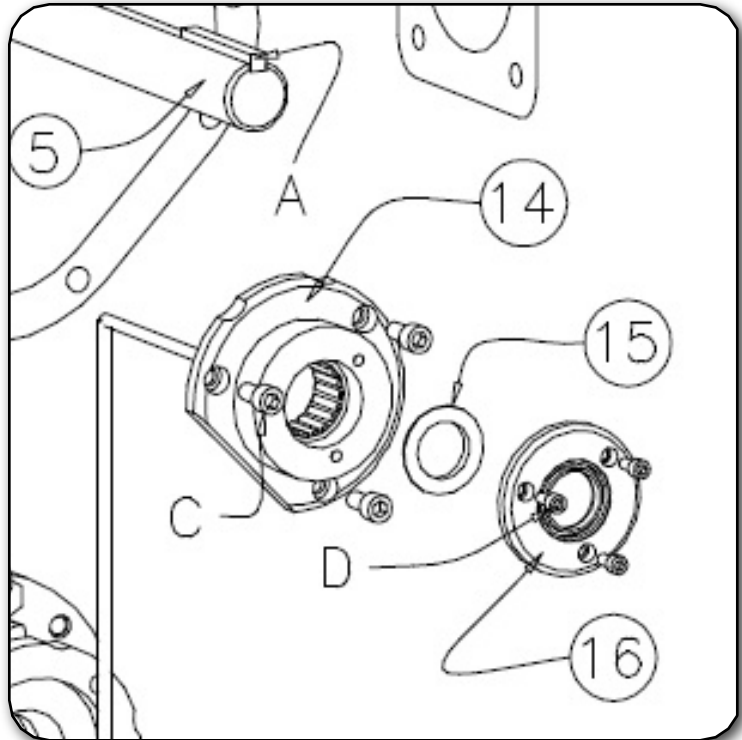
# ROUTINE MAINTENANCE

## Shaft Seal

After a period of time (based on pressure, operating procedures, material, etc) it will be necessary to change the shaft seal. This is a fairly easy procedure. If the pump is leaking more than a drop a minute, or any amount deemed unacceptable, insure the the a seal kit is on hand and follow the seal replacement procedure;

### Seal Replacement Procedure

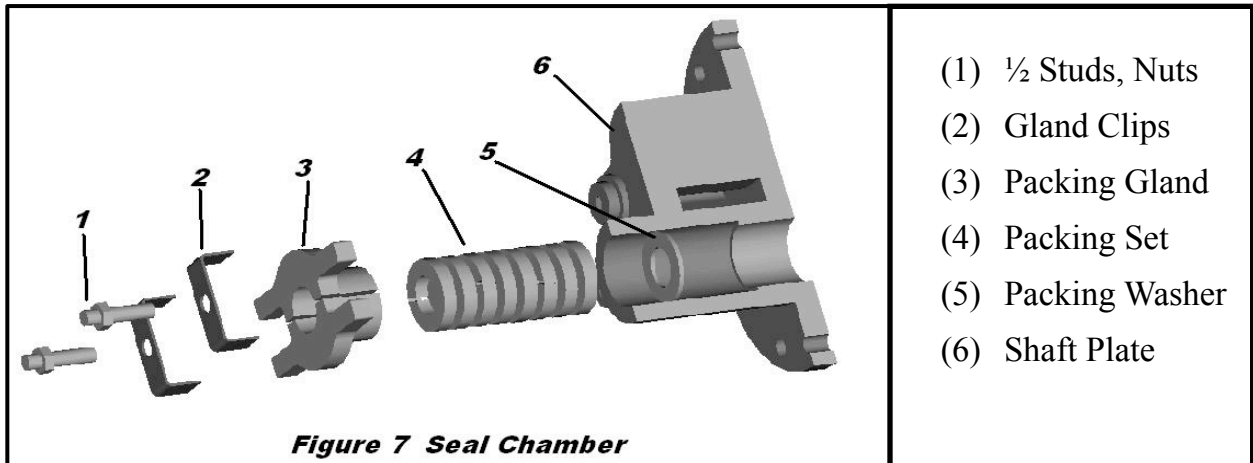
1. Turn pump off completely.
2. Ensure that pump is isolated from system by closing suction and discharge valves.
3. Remove any guards, couplings, bearings, or companion flanges aft the dust seal (item 16). Remove the dust seal bracket (item 16) and use a flat head screw driver to pry out the old seal (item 15).
4. Clean the shaft surface and seal bore of any asphalt / debris. Inspect and remove any sharp burrs in the keyway and shaft body. Also inspect for groove worn into shaft by the old seal. An excessively deep groove will require shaft replacement.
5. Clear plastic tape can be used to mask keyway prior to seal installation. Once the keyway is taped, lubricate with grease. Gently slide main seal (item 15) over shaft, and into seal bore. Install new dust seal bracket.
6. Replace guards, couplings etc.



## Packing Replacement Procedure

Periodic service of the shaft packing can improve pump performance as well as extend service life.

1. Remove Clips and Gland.
2. Remove old packing. (Use a packing hook, or T-handle cork screw tool). Be sure to remove ALL packing.
3. Install new packing one at a time. Stagger the split of each ring at 180° intervals. Lubricate the rings with oil or grease to aid in assembly. A length of pipe or tubing will help in seating the packing rings.
4. Install the Packing Gland and Nuts. The gland must enter the stuffing box at least one-eighth of an inch after tightening the Packing Gland Nuts. Be sure the glands are tightened evenly. Tighten Packing Nuts to about 1-1/2 turns past figure tight. DO NOT over tighten; further adjustment should be done while pump is operating.





# TROUBLESHOOTING

Under each fault symptom given below is a list of recommended inspections that could indicate the cause, most are elementary but are often overlooked.

The best aid to fault finding in the pump is a vacuum gauge as close as possible to the pump inlet. This can readily indicate whether the imposed suction is within the pumps capability, or if there has been a dramatic change from the conditions, which will indicate a change in the viscosity of the pumping media, resulting in higher pressure loss in the suction line, or that a filter requires cleaning, etc.

## **No liquid delivered or the pump will not prime.**

- Check Direction of shaft rotation.
- Are suction line joints leaking in air?
- Total suction condition, is there sufficient N.P.S.H. available?
- Has the pump been properly primed before start-up?
- Is suction port blocked? Is filter clean?
- All valves in system are open?
- Is the discharge line vented? Pressure build-up will ultimately prevent suction vacuum!
- If the vacuum gauge is reading over 20inHG there is almost certainly a blockage in the suction.
- Is the material hot enough? EVERYWHERE?
- If you have a screen box, add 3 gallons of suitable liquid to help establish prime.

## **Pump noisy when operating**

- A low growling sound is normal for new pump. The noise is attributed to the meshing of the hardened gears. The pump will tend to be louder when turning empty and will quiet down once liquid prime is established.
- A loud clacking can be an indication that the pump is cavitating. Look for signs of inlet flow restrictions or lower than normal material temperature. As a last resort, slow pump speed until noise goes away.
- Pump internals are worn.
- Debris in material. Add screen box.
- Misalignment of drive system.

# TECHNICAL DATA

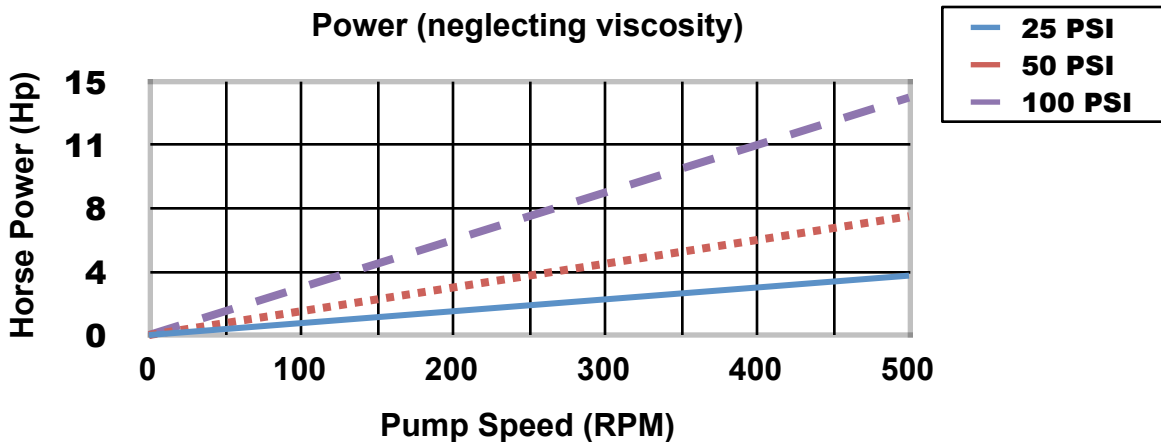
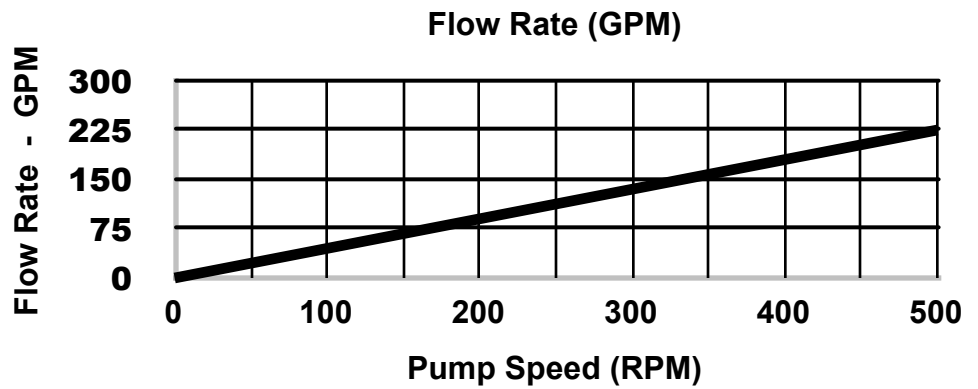
## Maximum Operating Limitations

- Pressure: 130 PSI (9 BAR)
- Speed: 500 RPM
- Temperature: 500°F (260°C)

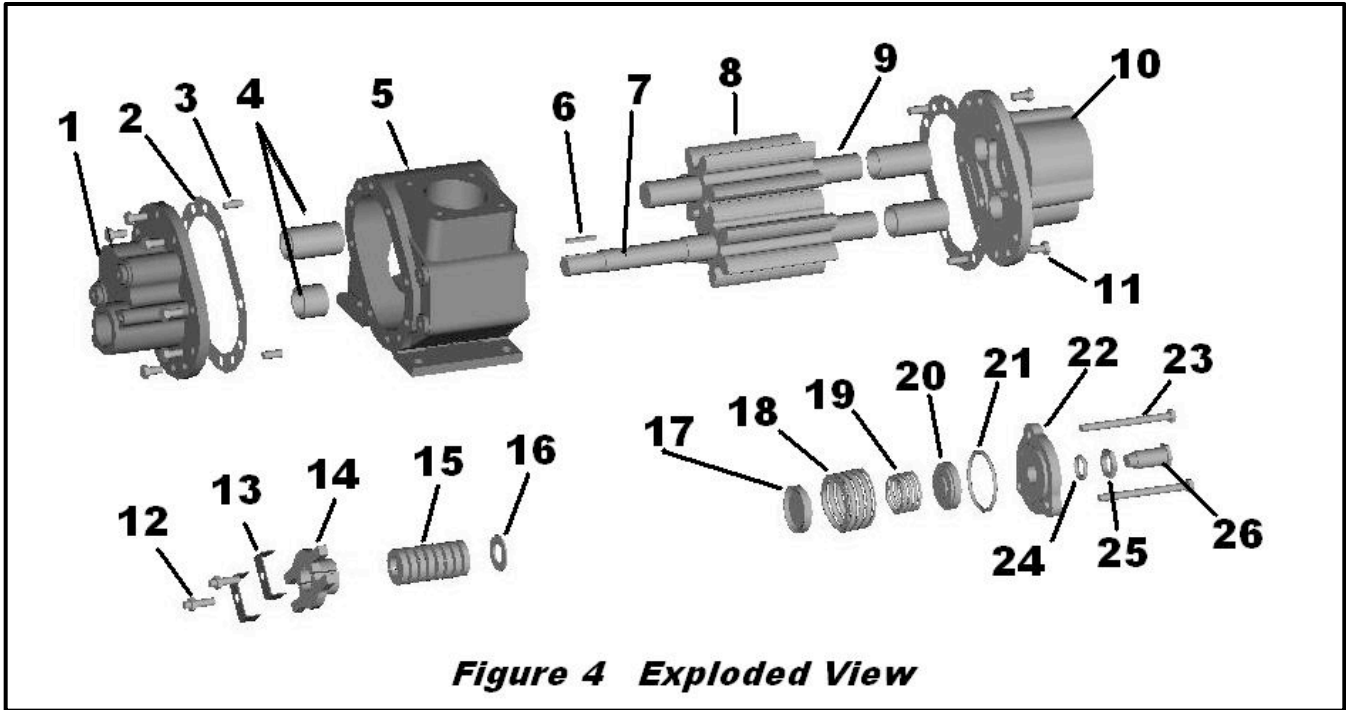
Actual flow can be limited by any number of parameters. Line flow restrictions, viscosity, material type etc. The standard maximum RPM is based on ideal conditions.

When certain conditions are met, the pumps may be used in excess of the limitations. Please consult factory for high performance parameters exceeding standard specifications.

## Pump Graphs



# BC-450 PARTS DIAGRAM



<p>To order specify model number (ex - BC-450) followed by item;</p> <ul style="list-style-type: none"> <li>(1) Shaft Plate</li> <li>(2) Gasket</li> <li>(3) ½ Dowel Pin</li> <li>(4) Bushing Set</li> <li>(5) Housing</li> <li>(6) Shaft Key</li> <li>(7) Drive Shaft</li> <li>(8) Gear Set</li> <li>(9) Idler Shaft</li> <li>(10) Rear RV Plate</li> <li>(11) ½-13x1-½ Bolt</li> <li>(12) ½ Studs and Nuts</li> <li>(13) Clips</li> <li>(14) Gland Set</li> </ul>	<p>Continued</p> <ul style="list-style-type: none"> <li>(15) Packing Set</li> <li>(16) Packing Washer</li> <li>(17) Inner Poppet</li> <li>(18) Outer Spring</li> <li>(19) Inner Spring</li> <li>(20) Outer Poppet</li> <li>(21) Cap o-ring</li> <li>(22) Adjuster Cap</li> <li>(23) ½-13x5” Bolt</li> <li>(24) Bolt o-ring</li> <li>(25) Adjuster Nut</li> <li>(26) Adjuster Bolt</li> </ul>	<p>Modified Seal Components (optional)</p> <ul style="list-style-type: none"> <li>• Bearing Housing</li> <li>• Mr24/Mi20 Bearing</li> <li>• Main Seal</li> <li>• Dust Seal</li> <li>• Dust Seal Bracket</li> <li>• ¼-20x.5 SHCS</li> </ul> <hr/> <p>Heat fittings. All tapped ports require a #12 O-ring Fitting. <b>DO NOT USE PIPE THREAD FITTINGS!</b></p> <ul style="list-style-type: none"> <li>• #12 MB O-ring Plug</li> <li>• #12 MB O-ring Straight</li> <li>• J-tube</li> <li>• #12 MB O-ring Elbow</li> </ul>
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