TriScroll™ 300 Series
Dry Scroll Vacuum Pump

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**Return for Request Health and Safety Certification**

**Sales and Service Offices**
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We, in all our sole responsibility, declare that the product,
explained, with our sole responsibility, the product,
declaramos, bajo nuestra sola responsabilidad, que el producto,
verklaren onder onze verantwoordelijkheid, dat het product,
dichiariamo sotto nostra unica responsabilità, che il prodotto,

TriScroll Series Vacuum Pump

to which this declaration relates is in conformity with the following standard(s) or other normative documents.

98/37/EEC, Machinery Directive
EN 1012-2:1996 Compressors and Vacuum pumps Safety Requirements; Part 2 Vacuum Pumps
EN 1050:1996 Safety of machinery - principles for risk assessment
EN 60204-1 Electrical equipment of industrial machines; general requirements

73/023/EEC, Low Voltage Directive
EN 60034 part 1 Rotating electrical machines - Part 1: Rating and performance

89/336/EEC, Electromagnetic Compatibility Directive
EN 61000-4-2 Testing and Measurement Techniques - Electrostatic Discharge Immunity Test

March 2003
Preface

This manual provides the information you need to successfully perform scheduled maintenance on your Vacuum Technologies TriScroll™ Dry Vacuum Pump. The time to perform major rebuild is typically 18,000 hours. If you have questions that are not addressed in this manual, please contact the nearest Vacuum Technologies service facility listed on the rear cover of this manual.

Safety Considerations

READ THE FOLLOWING INSTRUCTIONS. TAKE ALL NECESSARY PRECAUTIONS.

The following format is used in this manual to call attention to hazards:

**WARNING**  The warning messages are for attracting the attention of the operator to a particular procedure or practice which, if not followed correctly, could lead to serious injury.

**CAUTION**  The caution messages are displayed before procedures, which if not followed, could cause damage to the equipment.

**NOTE**  The notes contain important information taken from the text.

Maintenance personnel must be aware of all hazards associated with this equipment. They must know how to recognize hazardous and potentially hazardous conditions, and know how to avoid them. The consequences of work performed by unskilled or improperly trained maintenance personnel, or careless operation of the equipment employed in the specified maintenance procedures can be serious.

Every maintenance person must read and thoroughly understand the materials discussed and the instructions provided in this manual, as well as any additional information provided by Vacuum Technologies.
All warnings and cautions must be read carefully, fully understood, and strictly observed. Consult local, state/province, and national agencies regarding specific requirements and regulations. Address any safety, operation, and/or maintenance questions to the nearest Vacuum Technologies location.

**WARNING**

Disconnect power from the TriScroll 300 before performing any maintenance procedure.

Allow the pump to cool before performing any maintenance procedure. Approximate cool-down time is one to two hours.

**CAUTION**

Wipe all O-rings clean with a lint-free cloth before installation to ensure that no foreign matter is present to impair the seal.

Do not use alcohol, methanol or other solvents on O-rings. To do so causes deterioration and reduces their ability to hold a vacuum.

If applicable, apply a small amount of Krytox® GPL 224 grease and wipe the O-rings “shiny” dry.

**NOTE**

Vacuum Technologies recommends replacing all O-rings during routine maintenance or during any maintenance procedure requiring that O-rings be removed.

Unless otherwise stated, apply Loctite® 242 or Loctite PST® to the first few threads only. Apply just enough to obtain a seal.

**WARNING**

The TriScroll 300 weighs 26.4 kg (58 lbs). To avoid injury, use proper lifting techniques when moving the pump.
Related TriScroll Manuals

Manuals related to the installation and operation, tip seal and pump module replacement for TriScroll 300 series pumps are listed in the following table:

<table>
<thead>
<tr>
<th>Title</th>
<th>Applicable TriScroll Model</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pump Module Replacement</td>
<td>All TriScroll 300 Series Models</td>
<td>699904285</td>
</tr>
<tr>
<td>Tip Seal Replacement Manual</td>
<td>All TriScroll 300 Series Models</td>
<td>699904280</td>
</tr>
<tr>
<td>Installation and Operation Manual</td>
<td>All TriScroll 300 Series Models</td>
<td>699904265</td>
</tr>
</tbody>
</table>

Maintenance and Tool Kits

Material and tooling required to perform maintenance on TriScroll pumps is provided in kit form. A description of each kit and ordering information is provided in the following table:

<table>
<thead>
<tr>
<th>Description</th>
<th>Contents</th>
<th>Applicable TriScroll Model</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Maintenance Tool Kit</td>
<td>All bearings, bearing seals, bearing lubricant, O-rings, and tip seals required to rebuild TriScroll 300 Series pumps.</td>
<td>All TriScroll 300 Series models</td>
<td>PTSS0300MK</td>
</tr>
<tr>
<td>Maintenance Tool Kit</td>
<td>All fixtures and tools required to perform any maintenance on TriScroll 300 Series pumps.</td>
<td>All TriScroll 300 Series models</td>
<td>PTSS0300TK</td>
</tr>
<tr>
<td>Tip Seal Tool Kit</td>
<td>All tools required to change the tip seals on any TriScroll Series pump.</td>
<td>All TriScroll Series models</td>
<td>PTSTSTKIT</td>
</tr>
<tr>
<td>Replacement Tip Seal Set</td>
<td>Replacement tip seals and static O-rings for TriScroll 300 Series pumps.</td>
<td>All TriScroll 300 Series models</td>
<td>PTSS0300TS</td>
</tr>
</tbody>
</table>

NOTE: The Maintenance Tool Kit or the Tip Seal Tool Kit is required for tip seal replacement.
Factory Service Options

Vacuum Technologies offers factory-rebuild service or advance exchange of complete TriScroll Pumps or TriScroll Pump Modules. Contact your nearest Vacuum, Inc. sales office for price and availability information. Select your preferred service option from the table below.

<table>
<thead>
<tr>
<th>Factory Service Options</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advance Exchange TriScroll 300 Single Phase</td>
<td>EXPPTS03001</td>
</tr>
<tr>
<td>Advance Exchange TriScroll 300 Three Phase</td>
<td>EXPPTS03003</td>
</tr>
<tr>
<td>Advance Exchange TriScroll 310 Single Phase</td>
<td>EXPPTS03101</td>
</tr>
<tr>
<td>Advance Exchange TriScroll 310 Three Phase</td>
<td>EXPPTS03103</td>
</tr>
<tr>
<td>Advance Exchange TriScroll 300 Pump Module Only</td>
<td>EXPPTS0300SC</td>
</tr>
<tr>
<td>Advance Exchange TriScroll 310 Pump Module Only</td>
<td>EXPPTS0310SC</td>
</tr>
<tr>
<td>Service/Rebuild TriScroll 300 Pump (Single or Three Phase)</td>
<td>PTS0300KMA</td>
</tr>
<tr>
<td>Service/Rebuild TriScroll 310 Pump (Single or Three Phase)</td>
<td>PTS0310KMA</td>
</tr>
<tr>
<td>Service/Rebuild TriScroll 300 Pump Module Only</td>
<td>PTS0300SCRIP</td>
</tr>
<tr>
<td>Service/Rebuild TriScroll 310 Pump Module Only</td>
<td>PTS0310SCRIP</td>
</tr>
</tbody>
</table>

Serial Number Notes

This manual applies to TriScroll 300 series with serial numbers beginning with LP, and ascending from LPB80124. For service on TriScroll series pumps with serial numbers J7000001 to A8000108, contact your nearest Varian, Inc. office.

TriScroll 300 series pumps with serial number above LPC80250 have 1/4-18 National Pipe Threads in the bearing purge, gas ballast, and exhaust ports. Pumps with serial numbers below LPC80250 were manufactured with 1/4-19 British Standard Pipe Threads. Contact your nearest Varian, Inc. office if mating hardware is required.

Contacting Vacuum Technologies

In the United States, you can contact Vacuum Technologies Customer Service at 1-800-8VARIAN. See the back cover of this manual for a listing of our sales and service offices.

Internet users:
- Send email to Customer Service & Technical Support at vpl.customer.support@varianinc.com
- Visit our web site at www.varianinc.com/vacuum
- Order on line at www.evarian.com
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Major Maintenance

General Information
Vacuum Technologies TriScroll 300 series pumps are designed to provide years of trouble-free service if maintenance procedures and intervals are observed. Bearing grease replenishment and tip seal replacement are recommended when the pump base pressure has risen to an unacceptably high level for your application. Bearings, rotary seals and O-rings should also be replaced if the pump exhibits humming or grinding noises from the bearings. Main bearing life may be shortened if your application requires the pumping of high quantities of water vapor. Use of the bearing purge will keep this water from impacting bearing life.

Required Equipment

- **Maintenance Tool Kit**: PTSS0300TK (page 2)
- **Major Maintenance Kit**: PTSS0300MK (page 4)
- **Arbor Press**: 1/2 ton or larger, 10" work diameter capacity, 8" capacity over table
- **Oven**: 400 °F temperature capability, 11" wide x 11" deep x 4" high minimum chamber, 500 watt or higher heating capacity
- **Heat Resistant Surface**
- **Vacuum Gauge**: Capable of measuring pressure of 5 mTorr to 20 mTorr with an accuracy of ± 1 mTorr. A capacitance manometer or Pirani gauge is recommended.
Maintenance Tool Kit

- Gloves
- Cooling Stand
- Orbiting Plate Bearing Fixture
- Bypass Plug Installation Tool
- Snap Ring Pliers
- Locking Nut Wrench
Maintenance Tool Kit (continued)
Major Maintenance Tool Kit

- 7205W SU Bearing
- 7305WN SU Bearing
- Shaft Seal 32x42x4
- Loctite #242
- Loctite 567 pipe sealant
- Needle Bearing
- J9104P Bearing
- Nylon Sleeve
- Shaft Seal 8x15x3
- 7304WN SU Bearing
- Sync Crank Assemblies
- Shaft Seal 24x32x4
Major Maintenance Tool Kit (continued)

**TS-300 O-rings**

<table>
<thead>
<tr>
<th>O-ring Part Number</th>
<th>Quantity</th>
<th>Inside Diameter (in.)</th>
<th>Cross-Section (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-016</td>
<td>6</td>
<td>0.614</td>
<td>0.070</td>
</tr>
<tr>
<td>2-111</td>
<td>2</td>
<td>0.424</td>
<td>0.103</td>
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<tr>
<td>2-115</td>
<td>1</td>
<td>0.674</td>
<td>0.103</td>
</tr>
<tr>
<td>2-118</td>
<td>3</td>
<td>0.862</td>
<td>0.103</td>
</tr>
<tr>
<td>2-121</td>
<td>1</td>
<td>1.049</td>
<td>0.103</td>
</tr>
<tr>
<td>2-137</td>
<td>1</td>
<td>2.050</td>
<td>0.103</td>
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<td>2-152</td>
<td>1</td>
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<td>0.103</td>
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<tr>
<td>2-157</td>
<td>1</td>
<td>4.487</td>
<td>0.103</td>
</tr>
<tr>
<td>2-205</td>
<td>1</td>
<td>0.421</td>
<td>0.139</td>
</tr>
<tr>
<td>2-269</td>
<td>1</td>
<td>8.734</td>
<td>0.139</td>
</tr>
</tbody>
</table>
Tip Seal Tool Kit

Locking Nut Wrench

Chisel

Hex Key Set

Snap Ring Pliers

Depth Gauge
TriScroll 300 Disassembly

Remove and Disassemble the Outboard Housing
1. Remove the three M5x16 screws that attach the cowling to the module.
2. Remove the cowling.
3. Remove the six M5x22 screws that attach the outboard cover to outboard housing.
TriScroll 300 Disassembly (continued)

4. Remove the outboard cover.
5. Remove and discard the O-ring.

6. Remove the six M5x10 screws that attach the three sync crank covers to the outboard housing.
7. Remove the sync crank covers.
8. Remove and discard the O-rings.

9. Remove the two M5x16 screws that attach the intake clamp to the outboard housing.
10. Remove the intake clamp and intake fitting.
11. Remove and discard the O-ring.

12. Remove the six M6x45 screws that attach the outboard housing to inboard housing.
13. Remove the outboard housing.
TriScroll 300 Disassembly (continued)

14. Remove and discard the O-ring.

15. Remove and discard the three sync crank assemblies.
TriScroll 300 Disassembly (continued)

16. Remove and discard the tip seals from the outboard housing.
TriScroll 300 Disassembly (continued)

Remove and Disassemble the Orbiting Plate

17. Remove the snap ring that is holding the orbiting cup in the orbiting plate.

18. Remove the orbiting cup.

19. Remove and discard the O-ring.
20. Use the locking nut wrench to hold the locking nut.
21. Loosen the four M4x12 screws in the locking nut.
22. Remove the locking nut.
23. Remove the orbiting plate from the crankshaft.

24. Remove and discard the tip seals from both sides of the orbiting plate.
25. Remove the six M5x5 set screws from the orbiting plate.

NOTE
Set screws are held in with Loctite.

26. Remove the three snap rings holding the needle bearings and shaft seals in the orbiting plate.
27. Push out and discard the three needle bearings and shaft seals.

28. Remove and discard the six O-rings from the three sync bearing bores in the orbiting plate.
29. Heat the orbiting plate for a minimum of 1 hour in a 350 °F oven.

30. Immediately after removing the orbiting plate from oven, use the bearing extractor tool and arbor press to press out the two bearings, orbiting spacer, nylon sleeve and wave washer from the orbiting plate. The parts are shown in the photo on page 19.

**WARNING**

This step requires the use of heat resistant gloves. Do not proceed without them!
The parts removed from the orbiting plate are:
① Wave washer
② Nylon sleeve
③ 7305WN SU bearing
④ J9104P bearing
⑤ Orbiting spacer

31. Allow the orbiting plate to air cool until it can be handled with bare hands. This generally takes a few hours.

32. Remove and discard the shaft seal from the orbiting plate.
33. Remove and discard the tip seal from the inboard housing.
Remove and Disassemble the Inboard Housing

1. Remove the four M6x16 screws that attach the inboard housing to the frame.

2. Remove the inboard housing from the frame.
3. Remove the M8x12 screw and washer that attach the fan assembly to the crankshaft, then remove the fan assembly.

4. Remove the three M5x10 screws that hold the seal housing to the inboard housing.
5. Remove the seal housing.
6. Remove and discard the O-rings and the shaft seal from seal housing.

7. Remove the shaft seal spacer from the crankshaft.