



**Agilent Technologies**

*Vacuum Products Division*

***TriScroll™ 600  
Series  
Dry Scroll  
Vacuum Pump***

*TIP SEAL REPLACEMENT  
MANUAL*

Manual No. 699904310  
Revision H  
November 2014

# TriScroll™ 600 Series Dry Scroll Vacuum Pump



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*Loctite and PST are registered trademarks of Loctite Corporation.*

*Krytox and Viton are registered trademarks of E. I. du Pont de Nemours and Company.*

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## TriScroll 600 Dry Scroll Vacuum Pump

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## Preface


This manual provides the information you need to successfully perform tip seal replacement on your Agilent TriScroll™ Dry Vacuum Pump. Tip seal replacement is generally recommended when the pump base pressure has risen to an unacceptably high level for your application. If you have questions that are not addressed in this manual, please contact the nearest Agilent 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 Agilent.

## TriScroll 600 Dry Scroll Vacuum Pump

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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 Agilent location.

### WARNING



*Disconnect power from the TriScroll 600 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<sup>®</sup> GPL 224 grease and wipe the O-rings “shiny” dry.*

### NOTE



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

### WARNING



*The TriScroll 600 weighs 32 kg (70 lbs). To avoid injury, use proper lifting techniques when moving the pump.*

## TriScroll 600 Dry Scroll Vacuum Pump

### Related TriScroll Manuals

Manuals related to the installation and operation, pump module replacement, and major maintenance for the TriScroll 600 series pumps are listed in the following table:

Title	Applicable TriScroll Model	Part Number
Major Maintenance Manual	All TriScroll 600 Series Models	699904300
Pump Module Replacement	All TriScroll 600 Series Models	699904305
Installation and Operation Manual	All TriScroll 600 Series Models	699904290

### 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:

Description	Contents	Applicable TriScroll Model	Part Number
Major Maintenance Tool Kit	All bearings, bearing seals, bearing lubricant, O-rings, and tip seals required to rebuild TriScroll 600 Series pumps.	All TriScroll 600 Series models	PTSS0600MK
Maintenance Tool Kit	All fixtures and tools required to perform any maintenance on TriScroll 600 Series pumps.	All TriScroll 600 Series models	PTSS0600TK
Tip Seal Tool Kit	All tools required to change the tip seals on any TriScroll Series pump.	All TriScroll Series pumps	PTSTSTKIT
Replacement Tip Seal Set	Replacement tip seals and static O-rings for TriScroll 600 Series pumps.	All TriScroll 600 Series models	PTSS0600TS

### Factory Service Options

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

Factory Service Options	Part Number
Advance Exchange TriScroll 600 Single Phase	EXPPTS06001
Advance Exchange TriScroll 600 Three Phase	EXPPTS06003
Advance Exchange TriScroll 610 Single Phase	EXPPTS06101
Advance Exchange TriScroll 610 Three Phase	EXPPTS06103
Advance Exchange TriScroll 600 Pump Module Only	EXPTS0600SC
Advance Exchange TriScroll 610 Pump Module Only	EXPTS0610SC
Service/Rebuild TriScroll 600 Pump (Single or Three Phase)	PTS0600KMA
Service/Rebuild TriScroll 610 Pump (Single or Three Phase)	PTS0610KMA
Service/Rebuild TriScroll 600 Pump Module Only	PTS0600SCRP
Service/Rebuild TriScroll 610 Pump Module Only	PTS0610SCRP

### Contacting Agilent

In the United States, you can contact Agilent Customer Service at 1-800-882-7426. See the back cover of this manual for a listing of our sales and service offices.

Visit our web site at:

<http://www.chem.agilent.com/en-US/Products/Instruments/vacuum/pages/default.aspx>.



# Tip Seal Replacement

## General Information

Agilent TriScroll 600 series pumps will provide years of trouble-free service if maintenance procedures and intervals are observed. Bearing grease replenishment and tip seal replacement is recommended when the pump base pressure rises to an unacceptably high level for your application. Replace bearings, rotary seals and O-rings if the pump bearings exhibit humming or grinding noises. Main bearing life may be shortened if your application requires the pumping of high quantities of water vapor. Use bearing purge to keep this water from impacting bearing life.

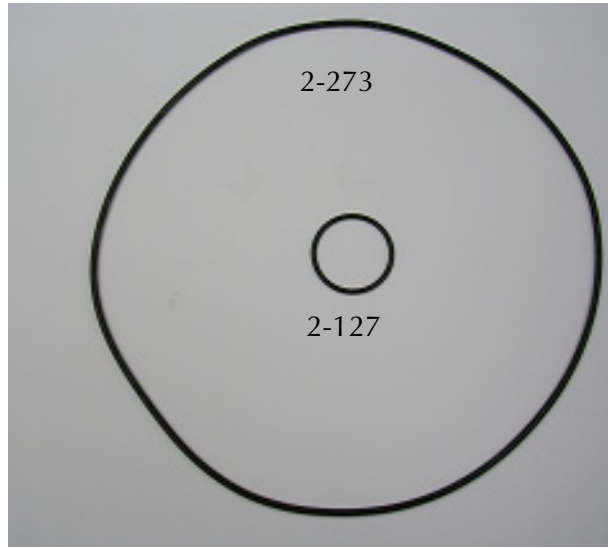
## Required Equipment

- ❑ **Tip Seal Replacement Kit:** PTSS0600TS (“Tip Seal Replacement Kit” on page 2)
- ❑ **Tip Seal Tool Kit:** PTSTSTKIT (“Tip Seal Tool Kit” on page 3; customer can supply metric Allen wrench set and chisel).
- ❑ **Vacuum Measuring Gauge:** Capable of measuring pressures of 5 to 20 mTorr with an accuracy of  $\pm 1$  mTorr. A capacitance manometer or Pirani gauge is recommended.

# TriScroll 600 Dry Scroll Vacuum Pump

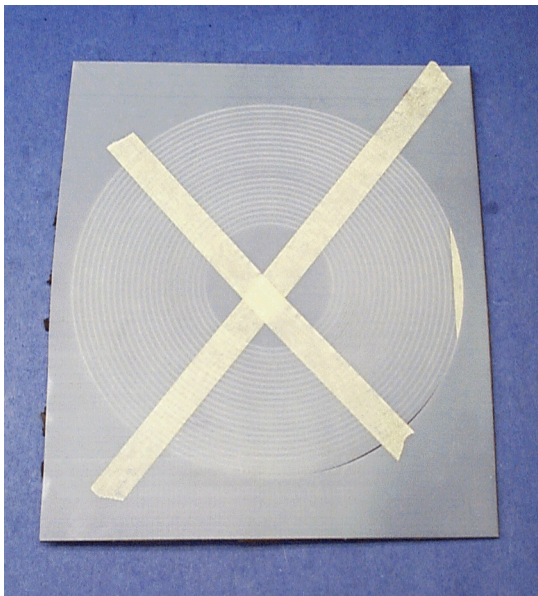
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## Tip Seal Replacement Kit



Tip Seal

Krytox GPL 224  
Grease



## TriScroll 600 Dry Scroll Vacuum Pump

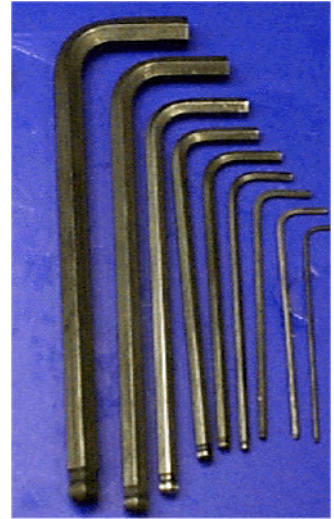
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### Tip Seal Tool Kit



Chisel

Metric Hex Key Set



### TriScroll 600 Disassembly



#### Remove the Intake Fitting

1. Remove the two M5x16 screws from the intake assembly.
2. Remove the intake assembly from the top of the pump.



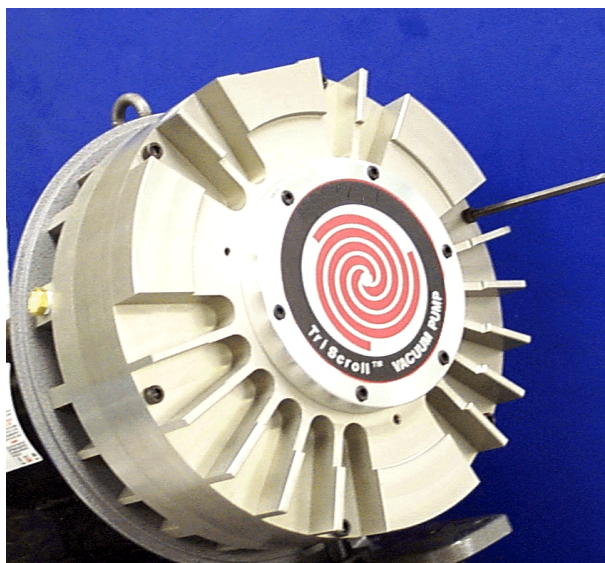
3. Remove and discard the O-ring from the groove on the underside of the intake fitting.

### TriScroll 600 Disassembly (Continued)



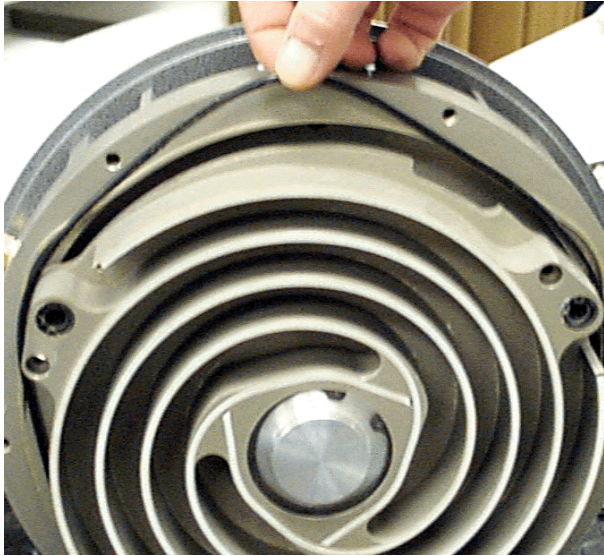
#### Remove the Outboard Housing

1. Remove the three M5x16 screws that attach the cowling to the module.
2. Remove the cowling.

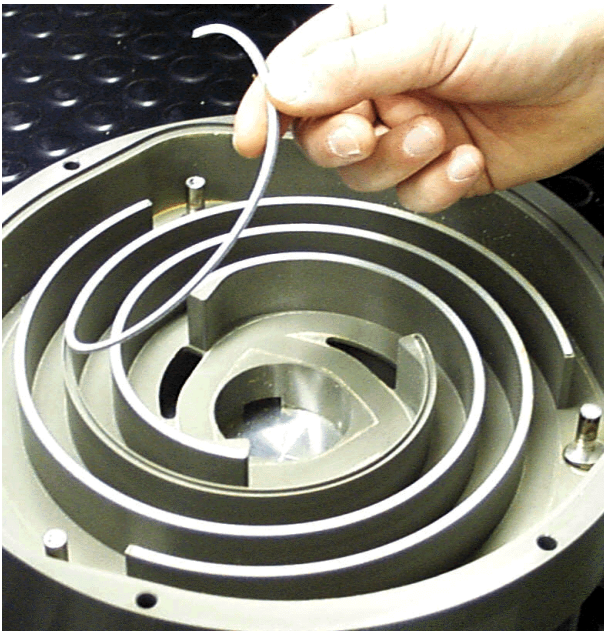


3. Remove the six M6x55 screws that attach the outboard housing to inboard housing.
4. Remove the outboard housing.

## TriScroll 600 Disassembly (Continued)



5. Remove and discard the O-ring.



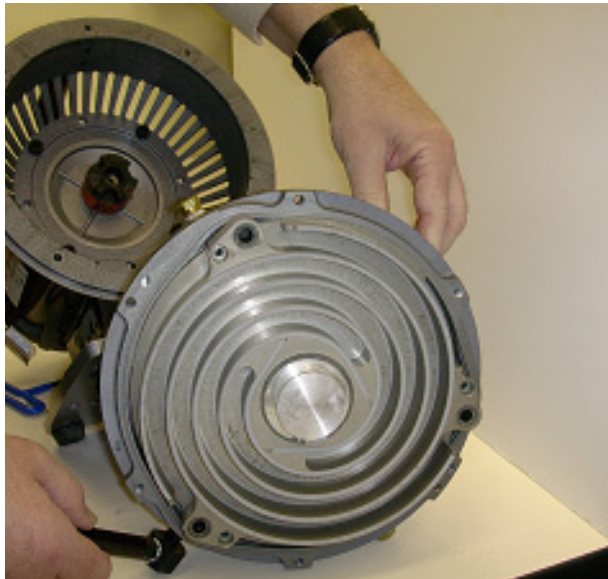
6. Remove and discard the tip seals from the outboard housing.

## TriScroll 600 Disassembly (Continued)



### Remove the Inboard Housing and Orbiting Plate Assembly

1. Remove the four M5x15 screws that attach the inboard housing to the frame.



2. Remove the inboard housing from the frame.

Locate the rubber spider that mounts between the motor shaft coupling and the inboard housing assembly.

### CAUTION

*The inboard housing assembly weighs 22 lbs.*



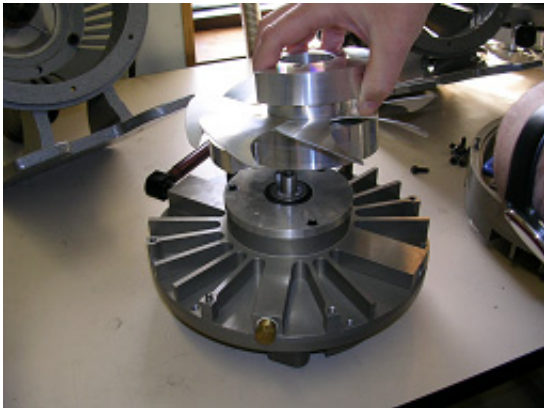
## TriScroll 600 Disassembly (Continued)



Counterweight

### Disassemble the Inboard Housing and the Orbiting Plate Assembly

1. Remove the M8x12 screw and washer that attaches the counterweight to the inboard housing.



2. Lift the counterweight off of the inboard housing.

The counterweight is keyed to the crankshaft. Locate the key after removal of the counterweight from the inboard housing



Key



### TriScroll 600 Disassembly (Continued)

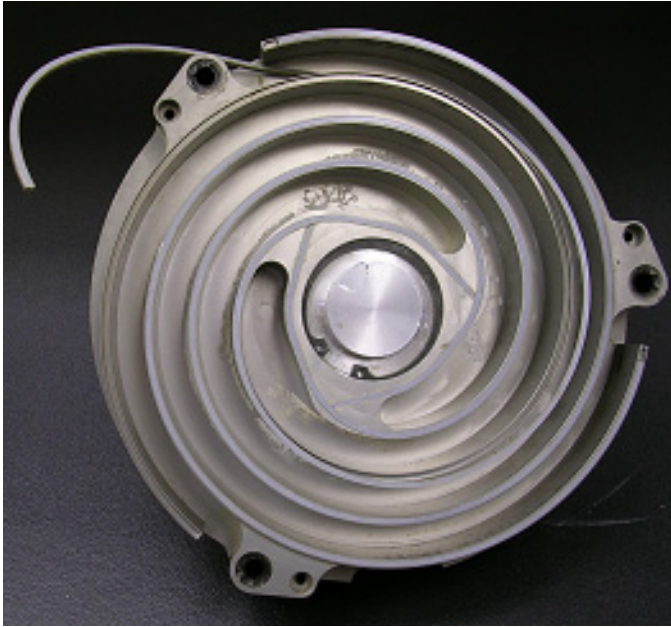


3. Remove the inboard housing from the crankshaft and orbiting plate.



4. Remove and discard the tip seals from the inboard housing.

## TriScroll 600 Disassembly (Continued)



5. Remove and discard the tip seals from both sides of the orbiting plate.

### TriScroll 600 Disassembly (Continued)



#### Scroll Cleaning

1. Carefully scrape with a chisel to loosen the tip seal dust from the:

- Orbiting plate
- Inboard housing
- Outboard housing

**CAUTION** *Do not scratch or gouge any surface.*



If seal debris is attached to the sides of the scroll walls, use a razor blade or Exacto knife to scrape this debris off.

2. Use dry compressed air to remove the tip seal debris from the scroll parts.

**CAUTION** *Do not blow compressed air or debris into exposed bearings.*



3. Wipe the scroll parts with isopropyl alcohol and a clean lint free cloth to remove any remaining tip seal debris.

## TriScroll 600 Reassembly



1. Insert the new tip seal into the scroll tip grooves on the inboard housing side of the orbiting plate.
2. Cut the seal to the correct length at the end of each groove. Leave a gap of 1/4" (6 mm) from the outer end to allow for thermal growth.



3. Insert the new tip seal into the scroll tip grooves on the inboard housing.
4. Cut the seal to the correct length at the end of each groove. Leave a gap of 1/4" (6 mm) from the outer end to allow for thermal growth.

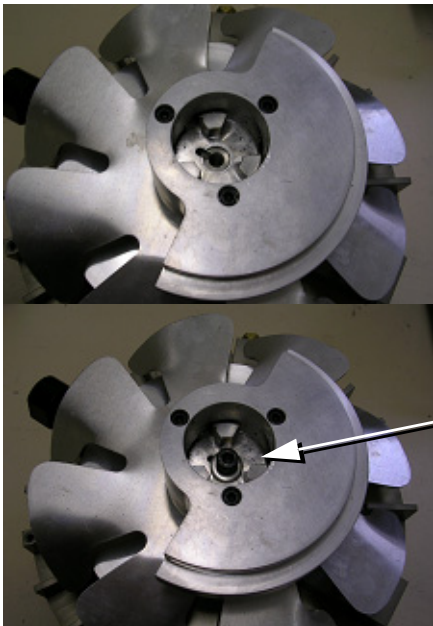
## TriScroll 600 Reassembly (Continued)



5. Place the scroll in the vertical position and reinstall the inboard housing onto the crankshaft.

Placing the scroll in the vertical position keeps the tip seals from falling out of the grooves during reassembly.

6. Ensure that the scroll walls are properly aligned to allow full engagement of the two parts.



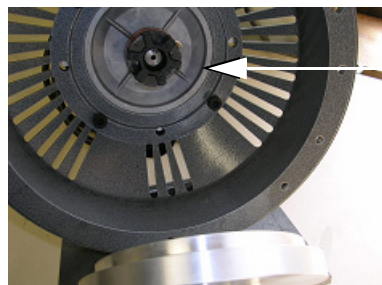
7. Reinstall the counterweight onto the crankshaft.
8. Align the keyways in the counterweight and crankshaft and install the key.
9. Secure the counterweight to the crankshaft using the M8x12 screw and washer.

Screw and washer installed

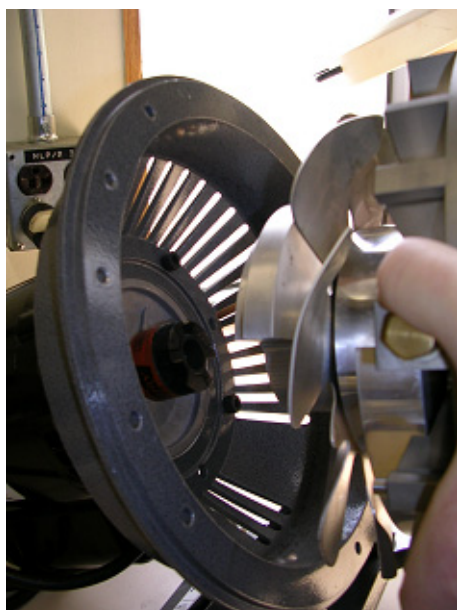
## TriScroll 600 Reassembly (Continued)



10. Install the rubber spider into motor shaft coupling.



Rubber spider installed

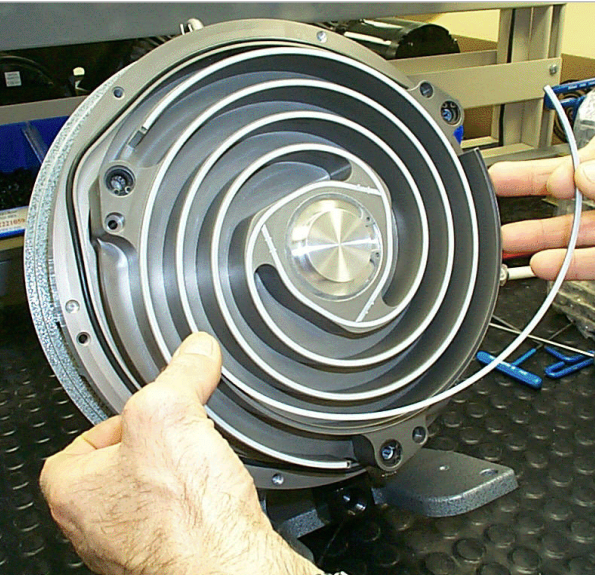


11. Align the motor coupling to properly mate with the fan hub coupling.
12. Install the inboard housing onto the frame.

## TriScroll 600 Reassembly (Continued)

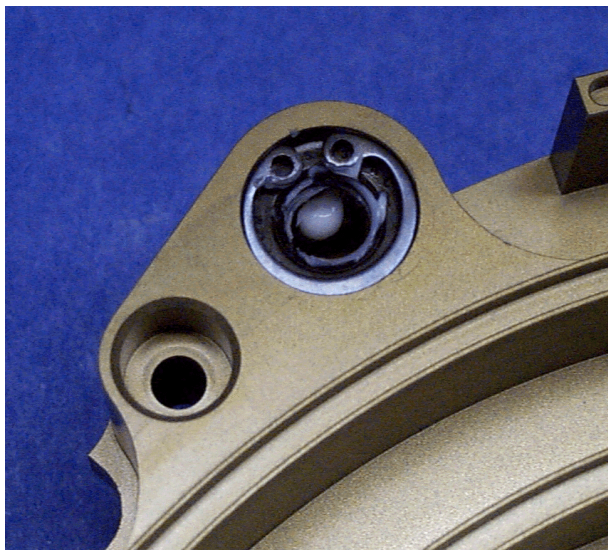


13. Secure the inboard housing assembly to the frame using the four M5x15 screws.

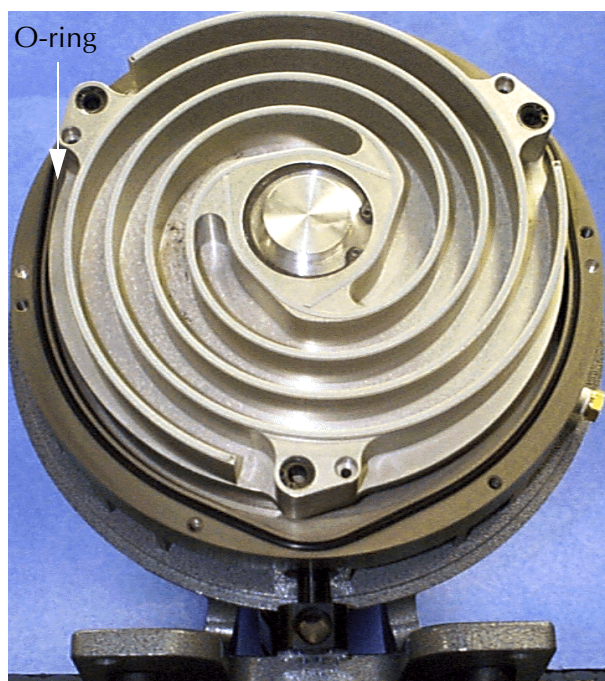


14. Insert the tip seal into the scroll tip grooves on the orbiting plate.
15. Cut the seal to the correct length at the end of each groove. Leave a gap of 1/8" (3mm) from the outer end to allow for thermal growth.

## TriScroll 600 Reassembly (Continued)



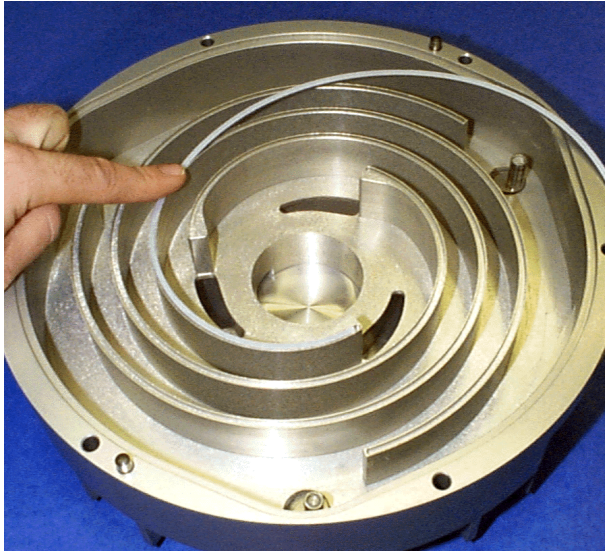
16. Squeeze a dot of Krytox GPL 224 grease into each of the three needle bearings.
17. Smear grease over the needles.
18. Coat the lips of all three seals with grease.



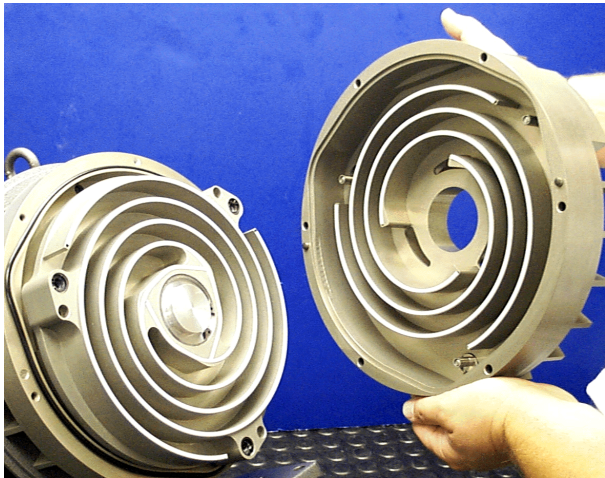
19. Lightly grease the new 2-273 O-ring (large) and install it around the lip on the inboard housing.



## TriScroll 600 Reassembly (Continued)



20. Insert the tip seals into the grooves on the outboard housing.
21. Cut the seal to the correct length at the end of each groove. Leave a gap of 1/8" (3mm) from the outer end to allow for thermal growth.

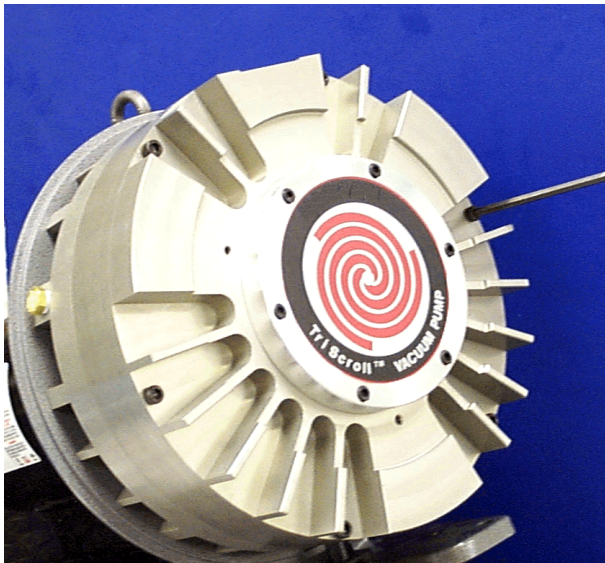


22. Install the outboard housing over the orbiting plate and against the inboard housing, engaging the dowel pins and all the sync cranks.

**NOTE**

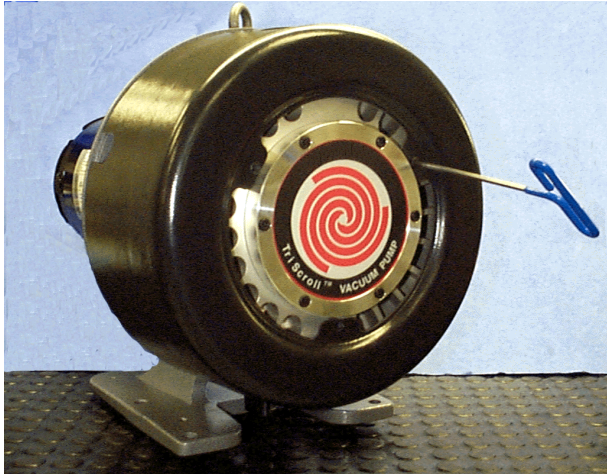


*Orient the sync cranks and the orbiting plate in the downward position before installing the outboard housing.*



23. Secure the outboard housing to the inboard housing with the six M6x55 screws.

## TriScroll 600 Reassembly (Continued)



24. Install the cowling over the pump module.
25. Secure with the three M5x16 screws.

## TriScroll 600 Reassembly (Continued)

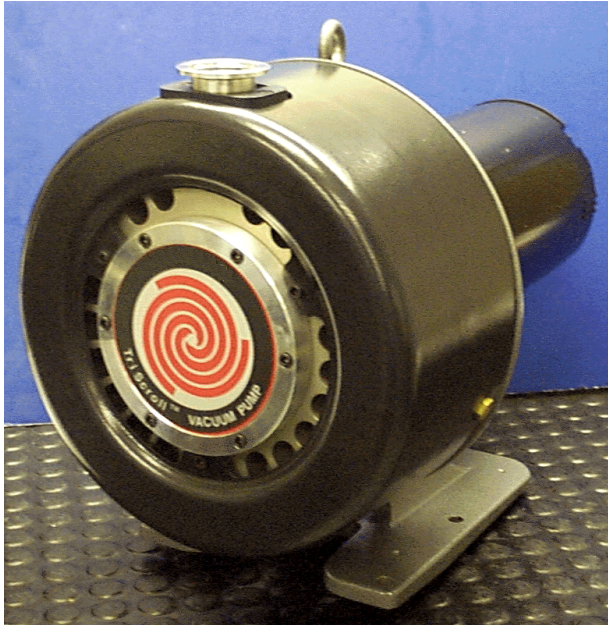


26. Lightly grease the new 2-127 O-ring and insert it into the groove on the intake fitting.
27. Place the intake fitting assembly into the outboard housing.



28. Secure the fitting with the two M5x16 screws.


## TriScroll 600 Reassembly (Continued)



This figure illustrates a fully reassembled TriScroll 600 Series Pump.

### Put the Pump Back into Service

The TriScroll 600 pump can be placed into service immediately after maintenance is complete. However, 24 hours of run time is required before base pressure of 7 mTorr can be achieved.

**NOTE**  *The 24 hour run time does not have to be continuous. If your application requires a low base pressure, it is wise to run the pump for the 24-hour period for optimum performance.*



**Vacuum Products Division  
Instructions for returning products**

Dear Customer:

Please follow these instructions whenever one of our products needs to be returned.

- 1) Complete the attached Request for Return form and send it to Agilent Technologies (see below), taking particular care to identify all products that have pumped or been exposed to any toxic or hazardous materials.
- 2) After evaluating the information, Agilent Technologies will provide you with a Return Authorization (RA) number via email or fax, as requested.  
**Note:** Depending on the type of return, a Purchase Order may be required at the time the Request for Return is submitted. We will quote any necessary services (evaluation, repair, special cleaning, eg).
- 3) **Important steps for the shipment of returning product:**
  - Remove all accessories from the core product (e.g. inlet screens, vent valves).
  - Prior to shipment, drain any oils or other liquids, purge or flush all gasses, and wipe off any excess residue.
  - If ordering an Advance Exchange product, **please use the packaging from the Advance Exchange to return the defective product.**
  - Seal the product in a plastic bag, and package product carefully to avoid damage in transit. You are responsible for loss or damage in transit.
  - Agilent Technologies is not responsible for returning customer provided packaging or containers.
  - **Clearly label package with RA number.** Using the shipping label provided will ensure the proper address and RA number are on the package. Packages shipped to Agilent without a RA clearly written on the outside cannot be accepted and will be returned.
- 4) Return only products for which the RA was issued.
- 5) **Product being returned under a RA must be received within 15 business days.**
- 6) **Ship to the location specified on the printable label, which will be sent, along with the RA number, as soon as we have received all of the required information.** Customer is responsible for freight charges on returning product.
- 7) Return shipments must comply with all applicable **Shipping Regulations** (IATA, DOT, etc.) and carrier requirements.

RETURN THE COMPLETED **REQUEST FOR RETURN** FORM TO YOUR NEAREST LOCATION:

**EUROPE:**  
Fax: 00 39 011 9979 330  
Fax Free: 00 800 345 345 00  
Toll Free: 00 800 234 234 00  
[vpt-customer@agilent.com](mailto:vpt-customer@agilent.com)

**NORTH AMERICA:**  
Fax: 1 781 860 9252  
Toll Free: 800 882 7426, Option 3  
[vpl-ra@agilent.com](mailto:vpl-ra@agilent.com)

**PACIFIC RIM:**  
please visit our website for individual office information  
<http://www.agilent.com>



Please read important policy information on Page 3 that applies to all returns.

**1) CUSTOMER INFORMATION**

<b>Company Name:</b>		<b>Contact Name:</b>	
<b>Tel:</b>	<b>Email:</b>	<b>Fax:</b>	
<b>Customer Ship To:</b>		<b>Customer Bill To:</b>	
Europe only: <b>VAT reg. Number:</b>		USA/Canada only: <input type="checkbox"/> <b>Taxable</b> <input type="checkbox"/> <b>Non-taxable</b>	

**2) PRODUCT IDENTIFICATION**

Product Description	Agilent P/N	Agilent S/N	Original Purchasing Reference

**3) TYPE OF RETURN** (Choose one from each row and supply Purchase Order if requesting a billable service)

- 3A.  Non-Billable  Billable **➔** New PO # (hard copy must be submitted with this form):
- 3B.  Exchange  Repair  Upgrade  Consignment/Demo  Calibration  Evaluation  Return for Credit

**4) HEALTH and SAFETY CERTIFICATION**

**AGILENT TECHNOLOGIES CANNOT ACCEPT ANY PRODUCTS CONTAMINATED WITH BIOLOGICAL OR EXPLOSIVE HAZARDS, RADIOACTIVE MATERIAL, OR MERCURY AT ITS FACILITY.**

**Call Agilent Technologies to discuss alternatives if this requirement presents a problem.**

**The equipment listed above (check one):**

- HAS NOT** pumped or been exposed to any toxic or hazardous materials. OR
- HAS** pumped or been exposed to the following toxic or hazardous materials. If this box is checked, the following information must also be filled out. Check boxes for all materials to which product(s) pumped or was exposed:

- Toxic  Corrosive  Reactive  Flammable  Explosive  Biological  Radioactive

**List all toxic/hazardous materials. Include product name, chemical name, and chemical symbol or formula:**

**NOTE:** If a product is received at Agilent which is contaminated with a toxic or hazardous material that was not disclosed, **the customer will be held responsible** for all costs incurred to ensure the safe handling of the product, and **is liable** for any harm or injury to Agilent employees as well as to any third party occurring as a result of exposure to toxic or hazardous materials present in the product.

**Print Name:** \_\_\_\_\_ **Authorized Signature:** ..... **Date:** \_\_\_\_\_

**5) FAILURE INFORMATION:**

Failure Mode (REQUIRED FIELD. See next page for suggestions of failure terms):
Detailed Description of Malfunction: (Please provide the error message)
Application (system and model):

**I understand and agree to the terms of Section 6, Page 3/3.**

**Print Name:** \_\_\_\_\_ **Authorized Signature:** ..... **Date:** \_\_\_\_\_



**Vacuum Products Division  
Request for Return Form  
(Health and Safety Certification)**

Please use these Failure Mode to describe the concern about the product on Page 2.

**TURBO PUMPS and TURBO CONTROLLERS**

APPARENT DEFECT/MALFUNCTION	POSITION	PARAMETERS
- Does not start - Does not spin freely - Does not reach full speed - Mechanical Contact - Cooling defective	- Noise - Vibrations - Leak - Overtemperature - Clogging	- Vertical - Horizontal - Upside-down - Other: ..... Power:                      Rotational Speed: Current:                    Inlet Pressure: Temp 1:                    Foreline Pressure: Temp 2:                    Purge flow: OPERATING TIME:

**ION PUMPS/CONTROLLERS**

- Bad feedthrough	- Poor vacuum
- Vacuum leak	- High voltage problem
- Error code on display	- Other

**VALVES/COMPONENTS**

- Main seal leak	- Bellows leak
- Solenoid failure	- Damaged flange
- Damaged sealing area	- Other

**LEAK DETECTORS**

- Cannot calibrate	- No zero/high background
- Vacuum system unstable	- Cannot reach test mode
- Failed to start	- Other

**INSTRUMENTS**

- Gauge tube not working	- Display problem
- Communication failure	- Degas not working
- Error code on display	- Other

**SCROLL AND ROTARY VANE PUMPS**

- Pump doesn't start	- Noisy pump (describe)
- Doesn't reach vacuum	- Over temperature
- Pump seized	- Other

**DIFFUSION PUMPS**

- Heater failure	- Electrical problem
- Doesn't reach vacuum	- Cooling coil damage
- Vacuum leak	- Other

Section 6) **ADDITIONAL TERMS**

**Please read the terms and conditions below as they apply to all returns and are in addition to the Agilent Technologies Vacuum Product Division – Products and Services Terms of Sale.**

- Customer is responsible for the freight charges for the returning product. Return shipments must comply with all applicable **Shipping Regulations** (IATA, DOT, etc.) and carrier requirements.
- Customers receiving an Advance Exchange product agree to return the defective, rebuildable part to Agilent Technologies **within 15 business days**. Failure to do so, or returning a non-rebuildable part (crashed), will result in an invoice for the non-returned/non-rebuildable part.
- Returns for credit toward the purchase of new or refurbished Products are subject to prior Agilent approval and may incur a restocking fee. Please reference the original purchase order number.
- Units returned for evaluation will be evaluated, and a quote for repair will be issued. If you choose to have the unit repaired, the cost of the evaluation will be deducted from the final repair pricing. A Purchase Order for the final repair price should be issued within 3 weeks of quotation date. Units without a Purchase Order for repair will be returned to the customer, and the evaluation fee will be invoiced.
- A Special Cleaning fee will apply to all exposed products per Section 4 of this document.
- If requesting a calibration service, units must be functionally capable of being calibrated.

## TriScroll 600 Dry Scroll Vacuum Pump

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# Service & Support

## North America

Agilent Technologies  
Vacuum Products Division  
121 Hartwell Avenue  
Lexington, MA 02421 USA  
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## Benelux

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Herculesweg 8  
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Fax: +31 118 671569  
Toll free: 00 800 234 234 00

## Canada

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Vacuum Products Division  
121 Hartwell Avenue  
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Fax: +86 (0)10 64391318  
Toll-Free: 800 820 3278

## France

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91978 Les Ulis cedex  
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Tel.: +33 (0)1 64 53 61 15  
Fax: +33 (0)1 64 53 50 01  
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e-Mail: [vpf.sales@agilent.com](mailto:vpf.sales@agilent.com)

## Germany & Austria

Agilent Technologies  
Sales & Services GmbH & Co. KG  
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Lyoner Str. 20  
60 528 Frankfurt am Main  
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Tel.: +49 69 6773 43 2230  
Fax: +49 69 6773 43 2250

## India

Agilent Technologies India Pvt. Ltd.  
Vacuum Products Division  
G01. Prime corporate Park,  
230/231, Sahar Road,  
Opp. Blue Dart Centre,  
Andheri (East), Mumbai – 400 099. India  
Tel: +91 22 30648287/8200  
Fax: +91 22 30648250  
Toll Free: 1800 113037

## Italy

Agilent Technologies Italia S.p.A.  
Vacuum Products Division  
Via F.lli Varian 54  
10040 Leini, (Torino) ITALY  
Tel.: +39 011 997 9111  
Fax: +39 011 997 9350  
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