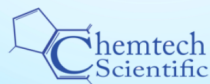


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*vacuum technologies*

# ***TriScroll™ 300 Series Dry Scroll Vacuum Pump***

*TIP SEAL REPLACEMENT  
MANUAL*

Manual No. 699904280  
Revision H  
December 2004

# TriScroll™ 300 Series Dry Scroll Vacuum Pump



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## TriScroll 300 Dry Scroll Vacuum Pump

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**Declaration of Conformity**  
**Konformitätserklärung**  
**Déclaration de Conformité**  
**Declaración de Conformidad**  
**Verklaring de Overeenstemming**  
**Dichiarazione di Conformità**

declare under our sole responsibility that the product,  
erklären, in alleiniger Verantwortung, daß dieses Produkt,  
déclarons sous notre seule responsabilité que le produit,  
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.  
auf das sich diese Erklärung bezieht, mit der/den flogenden Norm(en) oder Richtlinie(n) übereinstimmt.  
auquel se réfère cette déclaration est conforme à la (aux) norme(s) ou au(x) document(s) normatif(s).  
al que se refiere esta declaración es conforme a la(s) norma(s) u otro(s) documento(s) normativo(s).  
waamaar deze verklaring verwijst, aan de volende norm(en) of richtlijn(en) beantwoordt.  
a cui se riferisce questa dichiarazione è conforme alla/e sequente/I norma/o documento/I normativo/i.

**98/37/EEC, Machinery Directive**

EN 1012-2:1996

Compressors and Vacuum Pumps Safety Requirements; Part 2 Vacuum Pumps

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

## Preface


This manual provides the information you need to successfully perform tip seal replacement on your Vacuum Technologies 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 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.

## TriScroll 300 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 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<sup>®</sup> 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.*

**WARNING**



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

## TriScroll 300 Dry Scroll Vacuum Pump

### Related TriScroll Manuals

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

Title	Applicable TriScroll Model	Part Number
Major Maintenance Manual	All TriScroll 300 Series Models	699904260
Pump Module Replacement	All TriScroll 300 Series Models	699904285
Installation and Operation Manual	All TriScroll 300 Series Models	699904265

### 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 300 Series pumps.	All TriScroll 300 Series models	PTSS0300MK
Maintenance Tool Kit	All fixtures and tools required to perform any maintenance on TriScroll 300 Series pumps.	All TriScroll 300 Series models	PTSS0300TK
Tip Seal Tool Kit	All tools required to change the tip seals on any TriScroll Series pump	All TriScroll Series models	PTSTSTKIT
Replacement Tip Seal Set	Replacement tip seals and static O-ring for TriScroll 300 Series pumps.	All TriScroll 300 Series models	PTSS0300TS



## TriScroll 300 Dry Scroll Vacuum Pump

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### Factory Service Options

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

<b>Factory Service Options</b>	<b>Part Number</b>
Advance Exchange TriScroll 300 Single Phase	EXPPTS03001
Advance Exchange TriScroll 300 Three Phase	EXPPTS03003
Advance Exchange TriScroll 310 Single Phase	EXPPTS03101
Advance Exchange TriScroll 310 Three Phase	EXPPTS03103
Advance Exchange TriScroll 300 Pump Module Only	EXPTS0300SC
Advance Exchange TriScroll 310 Pump Module Only	EXPTS0310SC
Service/Rebuild TriScroll 300 Pump (Single or Three Phase)	PTS0300KMA
Service/Rebuild TriScroll 310 Pump (Single or Three Phase)	PTS0310KMA
Service/Rebuild TriScroll 300 Pump Module Only	PTS0300SCRP
Service/Rebuild TriScroll 310 Pump Module Only	PTS0310SCRP

## TriScroll 300 Dry Scroll Vacuum Pump

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# Tip Seal Replacement

## General Information

Vacuum Technologies TriScroll 300 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.

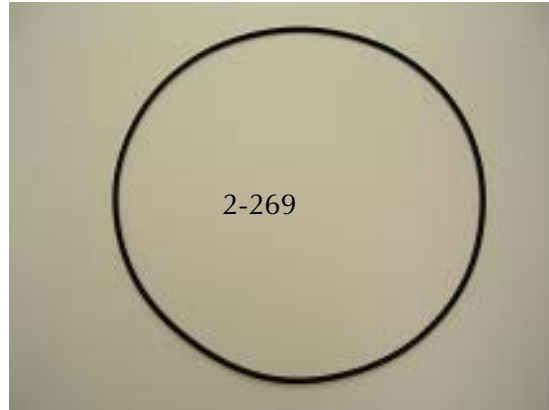
## Required Equipment

- ❑ **Tip Seal Replacement Kit:** PTSS0300TS (“Tip Seal Replacement Kit” on page 2)
- ❑ **Tip Seal Tool Kit:** PTSS0300TS (“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.

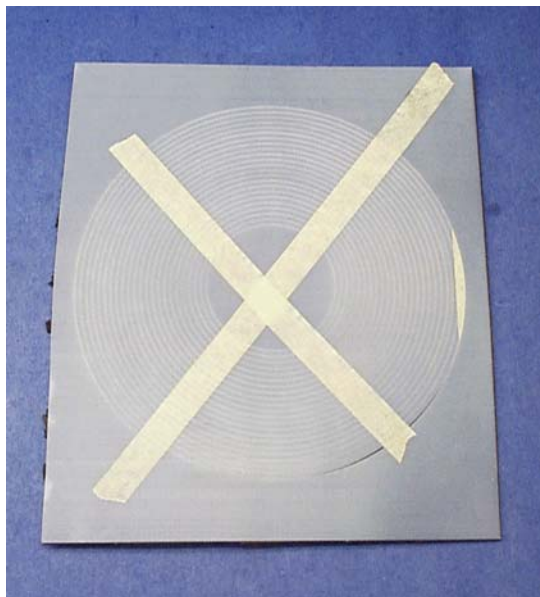
# TriScroll 300 Dry Scroll Vacuum Pump

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## Tip Seal Replacement Kit



Tip Seal



Krytox GPL 224  
Grease



## TriScroll 300 Dry Scroll Vacuum Pump

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### Tip Seal Tool Kit



Chisel

Metric Hex Key  
Set



## TriScroll 300 Disassembly



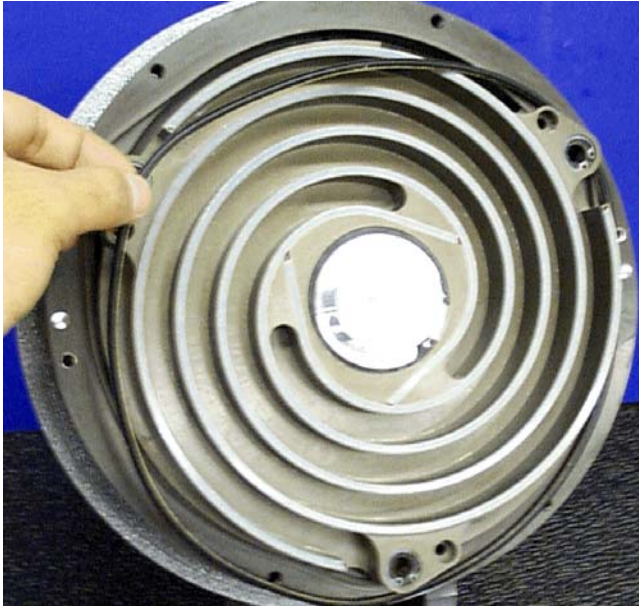
### Remove the Outboard Housing

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



3. Remove the six M6x45 screws that attach the outboard housing to inboard housing.
4. Remove the outboard housing.

## TriScroll 300 Disassembly (continued)



5. Remove and discard the O-ring.



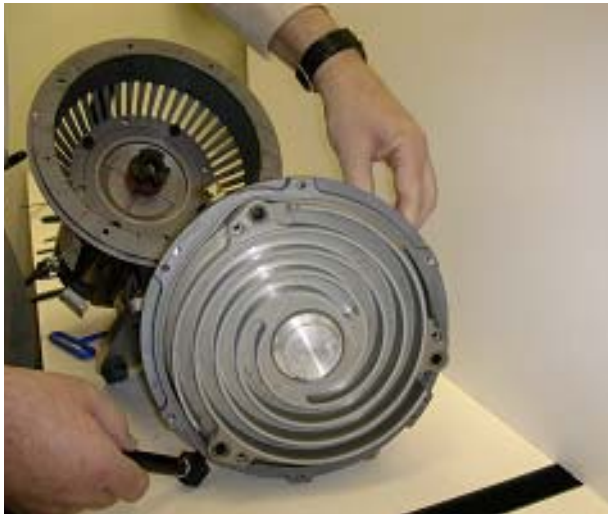
6. Remove and discard the tip seals from the outboard housing.

## TriScroll 300 Disassembly (continued)



### Remove the Inboard Housing and the 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.

Use care to locate the rubber spider that mounts between the motor shaft coupling and the inboard housing assembly.

### CAUTION

*The inboard housing assembly weighs 15.5 lbs.*





## TriScroll 300 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.



### TriScroll 300 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 300 Disassembly (continued)



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

### TriScroll 300 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 300 Reassembly

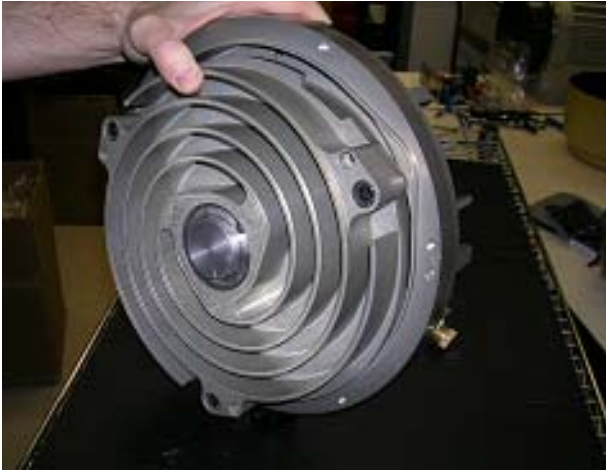


1. Insert the new tip seal into the scroll tip grooves on the inboard housing side of the orbiting plate.
2. Cut the seal to the correct length at the end of each groove. Leave a gap of 1/4" (6 mm) from the outer end to allow for thermal growth.



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.

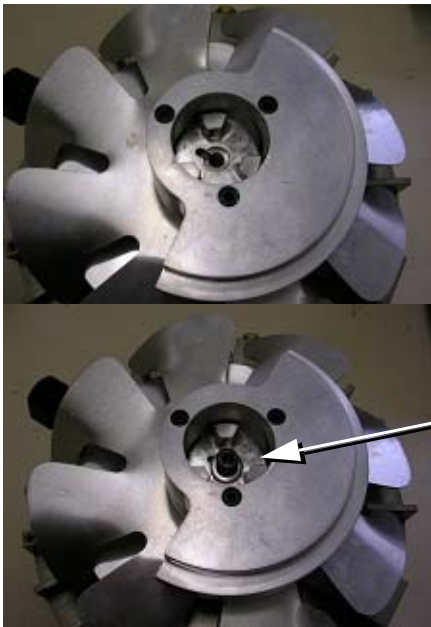
### TriScroll 300 Reassembly (continued)



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.



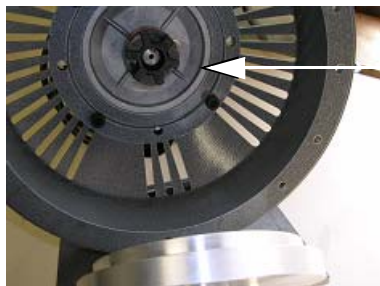
7. Reinstall the counterweight onto the crankshaft.
8. Align the keyways in the counterweight and crankshaft and install the key.
9. Secure the counterweight to the crankshaft using the M8x12 screw and washer.

Screw  
and  
washer  
installed

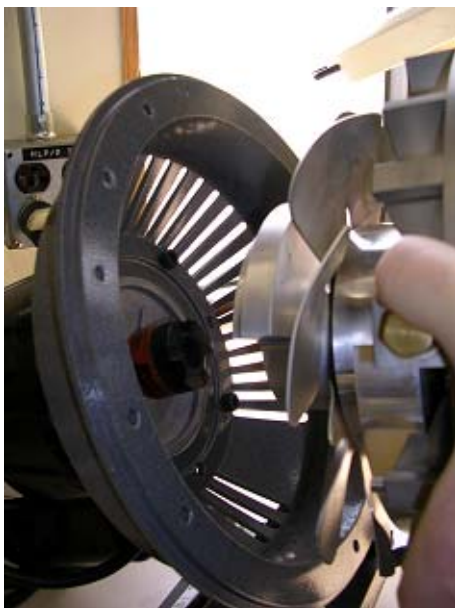
## TriScroll 300 Reassembly (continued)



10. Install the rubber spider into the 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 300 Reassembly (continued)



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



14. Insert the tip seal in 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.



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.



## TriScroll 300 Reassembly (continued)



19. Lightly grease the new 2-269 O-ring and install it around the lip on the inboard housing.



20. Insert the tip seals in to 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.

## TriScroll 300 Reassembly (continued)



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

**NOTE** *Align the three sync cranks and the orbiting plate in the downward position before installing outboard housing.*



23. Secure the outboard housing to the inboard housing with the six M6x45 screws.

## TriScroll 300 Reassembly (continued)



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



This figure illustrates a fully reassembled TriScroll 300 Series Pump.

### Putting the Pump Back into Service

The TriScroll 300 pump can be placed into service immediately after maintenance is complete. However, 24 hours of run time is required before a base pressure of 10 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.*



# Request for Return Health and Safety Certification



1. Return authorization numbers (RA#) **will not** be issued for any product until this Certificate is completed and returned to a Varian, Inc. Customer Service Representative.
2. Pack goods appropriately and drain all oil from rotary vane and diffusion pumps (for exchanges please use the packing material from the replacement unit), making sure shipment documentation and package label clearly shows assigned Return Authorization Number (RA#) VVT cannot accept any return without such reference.
3. Return product(s) to the nearest location:
  
4. If a product is received at Varian, Inc. in a contaminated condition, **the customer is held responsible** for all costs incurred to ensure the safe handling of the product, and **is liable** for any harm or injury to Varian, Inc. employees occurring as a result of exposure to toxic or hazardous materials present in the product.

<b>CUSTOMER INFORMATION</b>			
Company name: .....			
Contact person: Name: .....	Tel:.....		
Fax: .....	E-mail: .....		
Ship method: .....	Shipping Collect #: .....	P.O.#: .....	
Europe only: VAT Reg Number: .....	USA only: <input type="checkbox"/> Taxable <input type="checkbox"/> Non-taxable		
Customer ship to: .....	Customer bill to: .....		
.....	.....		
.....	.....		

**PRODUCT IDENTIFICATION**

Product Description	Varian, Inc. Part Number	Varian, Inc. Serial Number

**TYPE OF RETURN (check appropriate box)**

<input type="checkbox"/> Paid Exchange	<input type="checkbox"/> Paid Repair	<input type="checkbox"/> Warranty Exchange	<input type="checkbox"/> Warranty Repair	<input type="checkbox"/> Loaner Return
<input type="checkbox"/> Credit	<input type="checkbox"/> Shipping Error	<input type="checkbox"/> Evaluation Return	<input type="checkbox"/> Calibration	<input type="checkbox"/> Other

**HEALTH and SAFETY CERTIFICATION**

<b>VACUUM TECHNOLOGIES CANNOT ACCEPT ANY BIOLOGICAL HAZARDS, RADIOACTIVE MATERIAL, ORGANIC METALS, OR MERCURY AT ITS FACILITY. CHECK ONE OF THE FOLLOWING:</b>		
<input type="checkbox"/> I confirm that the above product(s) has (have) <b>NOT</b> pumped or been exposed to any toxic or dangerous materials in a quantity harmful for human contact.		
<input type="checkbox"/> I declare that the above product(s) has (have) pumped or been exposed to the following toxic or dangerous materials in a quantity harmful for human contact ( <u>Must be filled in</u> ):		
Print Name .....	Signature .....	Date .....

**PLEASE FILL IN THE FAILURE REPORT SECTION ON THE NEXT PAGE**

Do not write below this line

Notification (RA) #: ..... Customer ID #: ..... Equipment #: .....

# Request for Return Health and Safety Certification



## FAILURE REPORT

(Please describe in detail the nature of the malfunction to assist us in performing failure analysis):

### TURBO PUMPS AND TURBOCONTROLLERS

Claimed Defect	Position	Parameters
<input type="checkbox"/> Does not start <input type="checkbox"/> Does not spin freely <input type="checkbox"/> Does not reach full speed <input type="checkbox"/> Mechanical Contact <input type="checkbox"/> Cooling defective <input type="checkbox"/> Noise <input type="checkbox"/> Vibrations <input type="checkbox"/> Leak <input type="checkbox"/> Overtemperature <input type="checkbox"/> Clogging	<input type="checkbox"/> Vertical <input type="checkbox"/> Horizontal <input type="checkbox"/> Upside-down <input type="checkbox"/> Other .....	Power:                      Rotational Speed: Current:                    Inlet Pressure: Temp 1:                     Foreline Pressure: Temp 2:                     Purge flow: Operation Time:
Describe Failure:		
Turbocontroller Error Message:		

### ION PUMPS/CONTROLLERS

<input type="checkbox"/> Bad feedthrough <input type="checkbox"/> Vacuum leak <input type="checkbox"/> Error code on display <input type="checkbox"/> Poor vacuum <input type="checkbox"/> High voltage problem <input type="checkbox"/> Other .....
Describe failure:
Customer application:

### VALVES/COMPONENTS

<input type="checkbox"/> Main seal leak <input type="checkbox"/> Solenoid failure <input type="checkbox"/> Damaged sealing area <input type="checkbox"/> Bellows leak <input type="checkbox"/> Damaged flange <input type="checkbox"/> Other .....
Describe failure:
Customer application:

### LEAK DETECTORS

<input type="checkbox"/> Cannot calibrate <input type="checkbox"/> Vacuum system unstable <input type="checkbox"/> Failed to start <input type="checkbox"/> No zero/high background <input type="checkbox"/> Cannot reach test mode <input type="checkbox"/> Other
Describe failure:
Customer application:

### INSTRUMENTS

<input type="checkbox"/> Gauge tube not working <input type="checkbox"/> Communication failure <input type="checkbox"/> Display problem <input type="checkbox"/> Degas not working <input type="checkbox"/> Error code on display ..... <input type="checkbox"/>
Describe failure:
Customer application:

### ALL OTHER VARIAN, INC.

<input type="checkbox"/> Pump doesn't start <input type="checkbox"/> Doesn't reach vacuum <input type="checkbox"/> Pump seized <input type="checkbox"/> Noisy pump (describe) <input type="checkbox"/> Overtemperature <input type="checkbox"/> Other .....
Describe failure:
Customer application:

### DIFFUSION PUMPS

<input type="checkbox"/> Heater failure <input type="checkbox"/> Doesn't reach vacuum <input type="checkbox"/> Vacuum leak <input type="checkbox"/> Electrical problem <input type="checkbox"/> Cooling coil damage <input type="checkbox"/> Other .....
Describe failure:
Customer application: