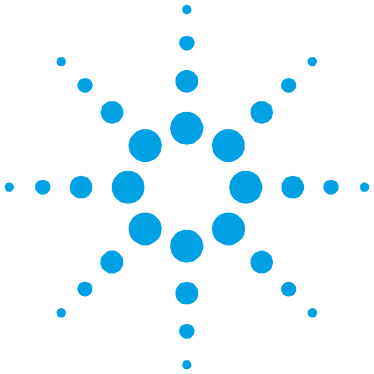

Mini Ti-Ball™ Titanium Sublimation Source

Models
916-0008, 916-0009

User Manual

87-400-361-00 (E)
05/2011

Agilent Technologies

Notices

Manual Part Number

Publication Number: 87-400-361-00 (E)

Edition

Edition 05/2011

Printed in ITALY

Agilent Technologies Italia S.p.A.

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Safety Notices

CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

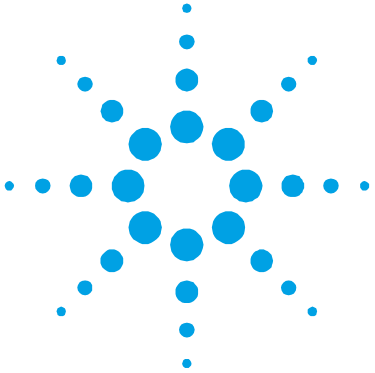
WARNING

A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

Mini Ti-Ball™ Titanium Sublimation Source

Contents

Contents



1 Instructions for Use

Original Instructions

General Information

The equipment described in this manual is intended for professional use. The user must carefully read this instruction manual and any additional information provided by Agilent before using the equipment. Agilent declines all responsibility for damage caused by the total or partial misuse of the instructions provided herein, by the improper use of the equipment by untrained personnel, by unauthorized interventions or by negligence in complying with any specific national rule or regulation.

The following sections provide you with all the information needed to guarantee the operator's safety when using the equipment. Detailed information is provided in the appendix entitled "Technical Information".

The following conventions are used in this manual:

WARNING! **Warning messages call the operator's attention to a specific procedure or operation that could cause serious injury if not performed correctly.**

CAUTION! Caution messages are provided before procedures that could cause damage to the equipment if not complied with.

NOTE Notes provide you with important information extracted from the text.

Storage

The equipment can be transported and stored under the following environmental conditions:

- Temperature: -20 °C to +70 °C
- Relative humidity: 0 to 95 % (non-condensing)

Prior to Installation

If you detect any damage to the equipment that could have been caused during transportation, contact your local sales office immediately. When unpacking the equipment, be careful to avoid dropping it or knocking it against anything.

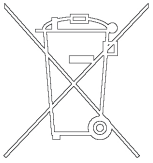
Do not dispose the packaging material in the environment. The packaging material is totally recyclable and complies with EEC directives 85/399 for the safeguard of the environment.

Disposal

Meaning of the "WEEE" logo found in labels.
The following symbol is applied in accordance with the EC WEEE (Waste Electrical and Electronic Equipment) Directive.

This symbol (**valid only in countries of the European Community**) indicates that the product it applies to must NOT be disposed of together with ordinary domestic or industrial waste but must be sent to a differentiated waste collection system.

The end user is therefore invited to contact the supplier of the device, whether the Parent Company or a retailer, to initiate the collection and disposal process after checking the contractual terms and conditions of sale.



Overview

The Mini Ti-Ball™ Source is a superior titatium sublimation source for getter pumping in high vacuum and utrahigh vacuum systems. Directly interchangeable with Agilent's standard TSP filament cartridge, the Mini Ti-Ball™ Source requires no additional water cooling or power.

Although designed for use with either Mini Ti-Ball™ TSP Control Units Model 929-0023 (50 Hz) or Model 929-0022 (60 Hz), the Mini Ti-Ball™ Source may be used with any other standard 380 Watt, 50 Amp AC filament power supply. The Source will fit any port with a 2¾" OD x 1½" ConFlat® flange.

Compact in design, the Mini Ti-Ball™ Source consists of a titamium ball assembly and holder mounted on 2¾" OD ConFlat flange. The center of the Mini Ti-Ball Source extends approximately 7½" into the vacuum system at what would be the approximate midpoint of the 3-filament cartridge assembly, which the Source replaces.

A characteristic of pure titanium is that it undergoes a shift in crystalline structure each time it passes through approximately 900 °C. Therefore, it is recommended that the Mini Ti-Ball™ Source be kept at a standby power level (95 – 100 Watts, ~ 30 amps) while under vacuum rather than be cycled to an off condition when not in use. Excessive cycling can cause severe distortion of titanium ball, which can lead to premature end of life. Maintaining the Source at standby power does not consume titanium, since sublimation at this level is negligible.

Specifications

A Holder

Vacuum Flange Size:	2¾" OD ConFlat®
Bakeability:	a. to 250 °C for normal Operation
	b. to 450 °C with reduced life caused by oxidation of braze joints.

B Mini Ti-Ball™ Titanium Source

Total Usable Titanium	15,2 grams max.
Operating Current:	50 amps max.
Voltage:	7.6 V at holder
Operating Pressure Range:	< 20 millitorr

C Sublimation Rate 0.25 gram/hour minimum, at 50 amps heater current

Mounting Dimensions

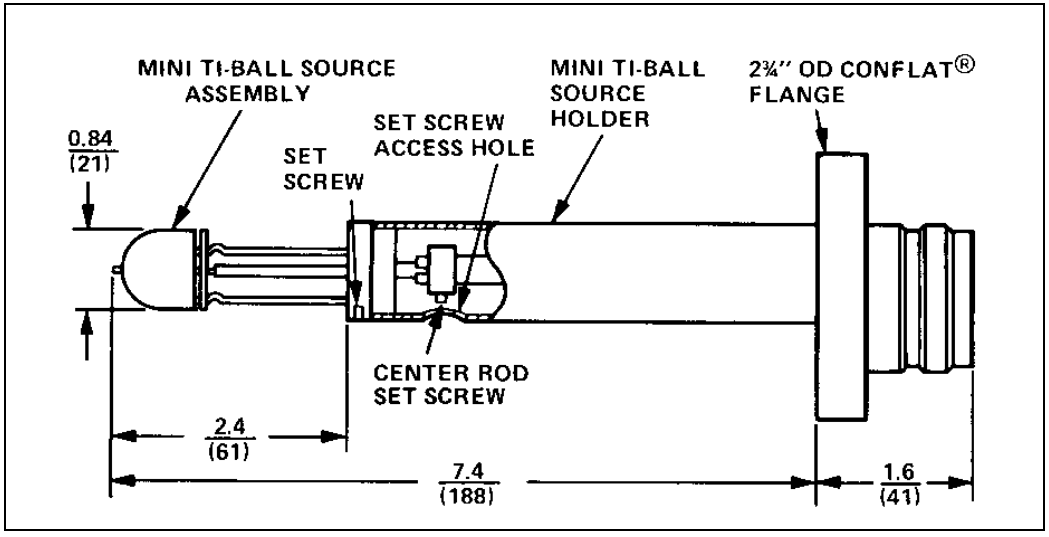


Figure 1 Mini Ti-Ball™ Source Assembly, Model No. 916-0009, Dimension Drawing

Dimensions: Inches / (Millimeters)

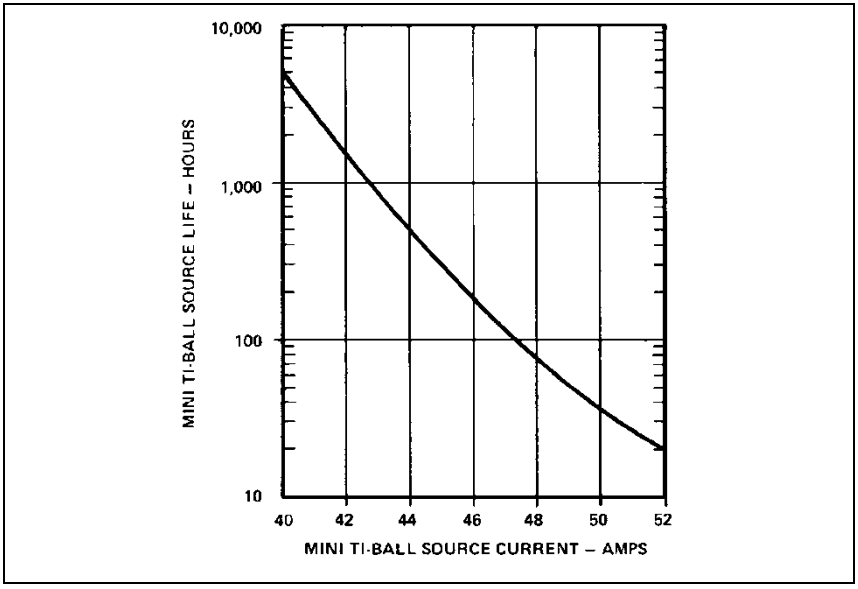


Figure 2 Mini Ti-Ball™ Source Life in Hours as a Function of Heater Current

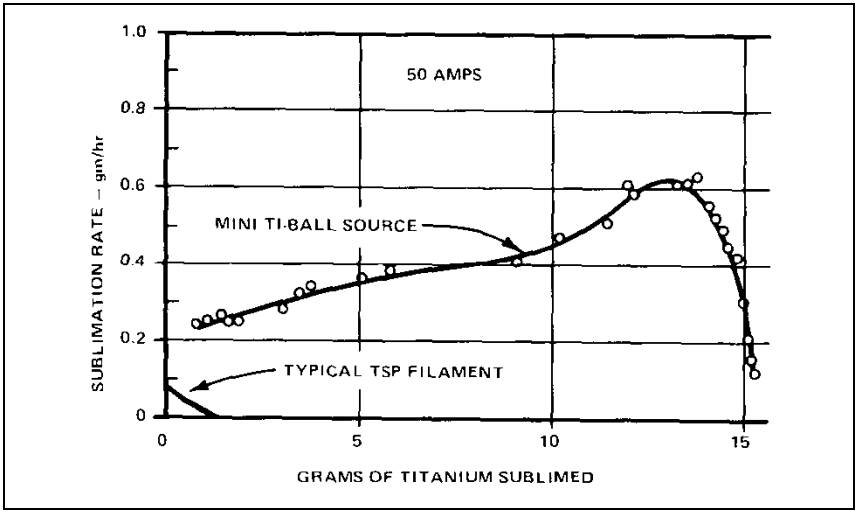


Figure 3 Mini Ti-Ball™ Source Sublimation Rate as a Function of Life

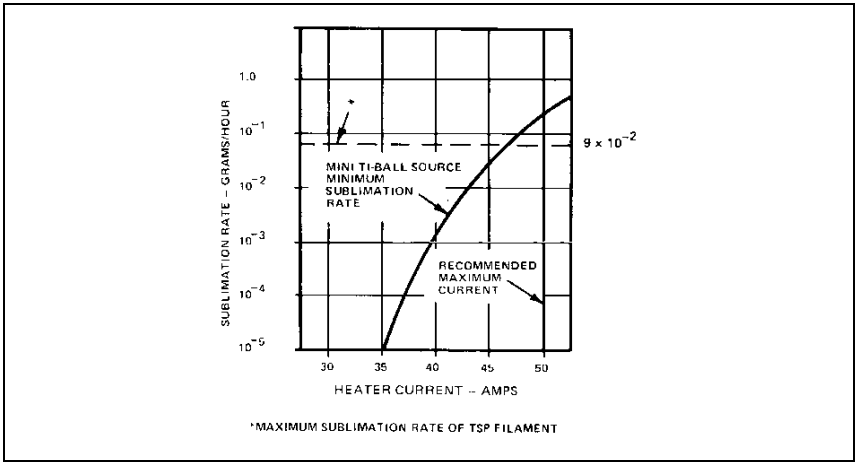


Figure 4 Mini Ti-Ball™ Source Minimum Sublimation Rate as a Function of Heater Current. The Rate of Sublimation Increases Somewhat with Life (at a Constant Heater Current)

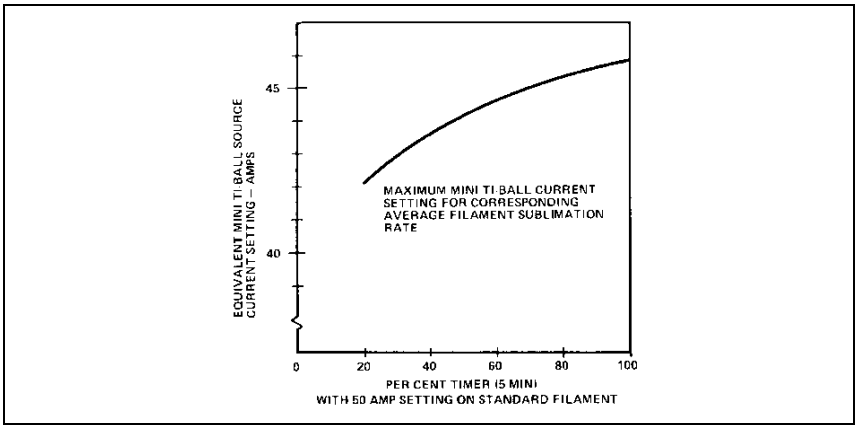


Figure 5 Equivalent Mini Ti-Ball™ Source Continuous Current Setting Corresponding to Average Sublimation. Rate Setting when Using Old TSP Timer to Operate Filament with Initial 50-amp Setting (Note that the new Mini Ti-Ball™/TSP Control Unit features a 30-minute timer)

Installation

Inspection

The Mini Ti-Ball™ Source is shipped ready for assembly, The Mini Ti-Ball™ Source shipping package contains the Mini Ti-Ball™ Source assembly, Mini Ti-Ball holder, four set screws, and two bristol key wrenches. If you have ordered a replacement Mini Ti-Ball Source, the shipping package contains the Mini Ti-Ball™ Source assembly, four set screws and two bristol key wrenches.

The shipping package is designed to afford a satisfactory degree of protection against usual transportation handling. If the package is damaged, set the Source package aside and contact your receiving departement for instructions. If the package is intact, proceed with removal of Source.

Remove from shipping card by cutting plastic shin pack. Do not pull on ball or supports. Then cut the plastic tie-bands and carefully remove shipping spool from the Mini Ti-Ball™ Source, taking care not to exert force on the center (heater lead) pin.

Assembly

Assemble the Mini Ti-Ball™ Source and holder as follows:

1. Place the holder upright on a bench.
2. Slide the Mini Ti-Ball™ assembly into the holes until the central heater support leg extends approximately 1/16" beyond the set screw hole. See the following figure. It is important that all of the legs slide freely into their respective holes, so that the heater is not stressed when in operation.
3. Install and tighten the three 6 – 32 set screws holding the support wires.
4. Install and tighten the 8 – 32 set screw on the heater leg.

NOTE Do not force the Mini Ti-Ball™ Source beyond the distance indicated as this may dislodge the source heater.

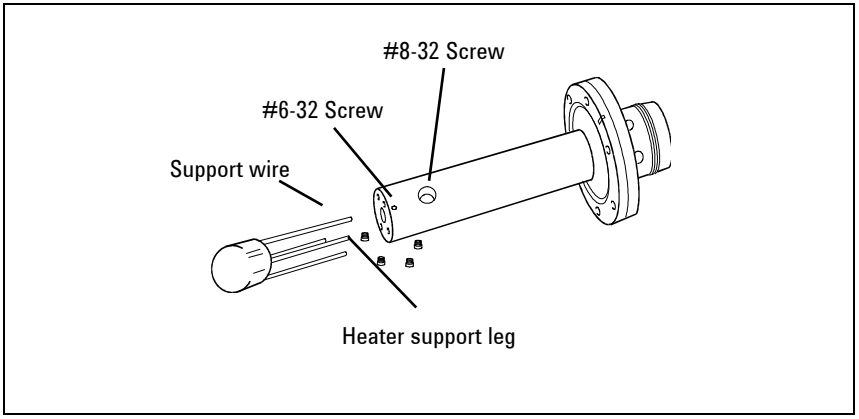


Figure 6 Mini Ti-Ball™ Source Assembly and Holder

Installation

Required vacuum hardware:

1. Copper gasket, Agilent Model No. 953-5014.
2. High tensile screw and nut set, Agilent Model No. 953-5020.
3. Fel-Pro thread lubricant, Agilent Model No. 953-0031 (use ontly with ConFlat® Flange bolts, not with threaded parts internal to vacuum system).

To install the Mini Ti-Ball™ Source, proceed as follows:

1. Place a new copper gasket between the Mini Ti-Ball™ holder flange and the vacuum system port.
2. Lubricate screw and nut with Fel-Pro thread lubricant.
3. Uniformly tighten screw and nut set until the flange faces meet.

Control Unit Connection

The instruction manual supplied with your control unit should be consulted for installation and operation of that unit.

Maintenance

Replacement Mini Ti-Ball™ Source (Model No. 916-0008)

End of life of a properly used Mini Ti-Ball™ Source is indicated by what appears to be an "open filament" condition. Remove and replace Mini Ti-Ball™ Source as follows:

1. Loosen the #8-32 set screw (gold) that holds the Heater Support Leg, but do not remove the screws completely. See the previous figure.
2. Loosen the three #6-32 set screws which fasten the Ti-Ball Support Wires, and carefully withdraw the Mini Ti-Ball™ Assembly.
3. Install a replacement Mini Ti-Ball™ Source as described previously.

Cleaning of Titanium Film

Titanium deposits build up on the surfaces of the vacuum chamber. These deposits will flake off, adding to the surface area to be pumped and cause the pumping performance to deteriorate.

Therefore, a procedure should be developed to deposit the minimum amount of titanium required for a pumping job so that the interval between cleaning operations is as long as possible.

Cleaning Methods

When cleaning is needed, use one of these methods:

Blast the internal surfaces of the pump chamber with glass beads or sand and then degrease it, OR Remove loose deposits and then use the cleaning procedure for stainless steel, following:

WARNING!

Titanium flakes are flammable and may spontaneously ignite when exposed to air. A dull red, short-lived flame may result. Also, vigorous abrasion may produce sparks. Accumulated flakes may ignite at any time in the presence of air, either on or off the substrate. Do not vacuum the flakes or leave them in contact with any flammable materials; flakes should be stored in a metal container until they can be disposed of. For Maximum safety during the trasportation to a cleaning facility, heavily coated surfaces should be enclosed in an air-tight container.

Cleaning Procedure for Stainless Steel

WARNING!

The chemicals used in this procedure are corrosive. Only authorized, trained personnel should make up the baths and process the parts. Personnel should be equipped with safety goggles, waterproof rubber gloves and apron. Chemical baths should be vented, and an eye wash shower located in immediate vicinity (see state safety regulations).

1. Solvent degrease i trichloroethane or equivalent.
2. Hot alkali dip for about two minutes, dependig on condition.
3. Rinse in hot tap water.
4. Hydrochloric acid dip. Solution 1:1 HC1 (tech) 9in water at 70 °C.
5. Rinse in cold tap water.
6. Nitric-Hydrofluoric acid dip: conc. HNO3, 97 % by volume, conc. HF 3 % by volume. Dip until surface gases slightly, then quickly rinse in water. Welds and knife-edge sealing surfaces will be attached by the acid. Excessive etching may cause pinhole leaks in welds or marginal seals.
7. Rinse in cold tap water three times.
8. Rinse in cold deionized water (NaCI less than 1 ppm) three times.
9. Methanol rinse (electronic grade).
10. Warm air dry in clean, filtered, fume free air at about 65 °C
11. (Optional) Air bake at 150 °C to 400 °C for 30 minutes to one hour, depending on the mass of the part.

Part List

Replacement Part List

Tab. 1

Description	Quantity required	Agilent model part no.
Replacement Mini Ti-Ball™ Source	1	916-0008

Agilent Technologies

Vacuum Products Division

Dear Customer,

Thank you for purchasing an Agilent vacuum product. At Agilent Vacuum Products Division we make every effort to ensure that you will be satisfied with the product and/or service you have purchased.

As part of our Continuous Improvement effort, we ask that you report to us any problem you may have had with the purchase or operation of our products. On the back side you find a Corrective Action request form that you may fill out in the first part and return to us.

This form is intended to supplement normal lines of communications and to resolve problems that existing systems are not addressing in an adequate or timely manner.

Upon receipt of your Corrective Action Request we will determine the Root Cause of the problem and take the necessary actions to eliminate it. You will be contacted by one of our employees who will review the problem with you and update you, with the second part of the same form, on our actions.

Your business is very important to us. Please, take the time and let us know how we can improve.

Sincerely.

Giampaolo LEVI

Vice President and General Manager
Agilent Vacuum Products Division

Note: Fax or mail the Customer Request for Action (see backside page) to Agilent Vacuum Products Division (Torino) – Quality Assurance or to your nearest Agilent representative for onward transmission to the same address.

CUSTOMER REQUEST FOR CORRECTIVE / PREVENTIVE / IMPROVEMENT ACTION

TO: AGILENT VACUUM PRODUCTS DIVISION TORINO – QUALITY ASSURANCE

FAX N°: XXXX-011-9979350

ADDRESS: AGILENT TECHNOLOGIES ITALIA S.p.A. – Vacuum Products Division –

Via F.lli Varian, 54 – 10040 Leinì (TO) – Italy

E-MAIL: vpd-qualityassurance_pdl-ext@agilent.com

NAME	COMPANY	FUNCTION

ADDRESS:

TEL. N° : _____ FAX N° : _____

E-MAIL: _____

PROBLEM / SUGGESTION :

REFERENCE INFORMATION (model n°, serial n°, ordering information, time to failure after installation, etc.):

DATE _____

CORRECTIVE ACTION PLAN / ACTUATION (by AGILENT VPD) LOG N° _____

XXX = Code for dialing Italy from your country (es. 01139 from USA; 00139 from Japan, etc.)

Agilent Technologies

Agilent Technologies

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:	**NORTH AMERICA:**	**PACIFIC RIM:**
Fax: 00 39 011 9979 330		
Fax Free: 00 800 345 345 00	Fax: 1 781 860 9252	please visit our website for individual
Toll Free: 00 800 234 234 00	Toll Free: 800 882 7426, Option 3	office information
vpt-customercare@agilent.com	vpl-ra@agilent.com	http://www.agilent.com

Agilent Technologies

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

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

1) CUSTOMER INFORMATION

Company Name:	**Contact Name:**
Tel: **Email:**	**Fax:**
Customer Ship To:	**Customer Bill To:**
Europe only: **VAT reg. Number:**	USA/Canada only: ☐ **Taxable** ☐ **Non-taxable**

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:**

Agilent Technologies

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	- Noise	- Vertical	Power:	Rotational Speed:
- Does not spin freely	- Vibrations	-Horizontal	Current:	Inlet Pressure:
- Does not reach full speed	-Leak	-Upside-down	Temp 1:	Foreline Pressure:
- Mechanical Contact	-Overtemperature	-Other:	Temp 2:	Purge flow:
- Cooling defective	-Clogging	.....	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 backround
- 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.

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Printed in ITALY
05/2011
Publication Number: 87-400-361-00 (E)

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