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# ***IMG-100 Inverted Magnetron Gauge***

*INSTRUCTION MANUAL*

Manual No. 699908220

Revision B

May 2004

# IMG-100 Inverted Magnetron Gauge



# Warranty

Products manufactured by Seller are warranted against defects in materials and workmanship for twelve (12) months from date of shipment thereof to Customer, and Seller's liability under valid warranty claims is limited, at the option of Seller, to repair, replace, or refund an equitable portion of the purchase price of the Product. Items expendable in normal use are not covered by this warranty. All warranty replacement or repair of parts shall be limited to equipment malfunctions which, in the sole opinion of Seller, are due or traceable to defects in original materials or workmanship. All obligations of Seller under this warranty shall cease in the event of abuse, accident, alteration, misuse, or neglect of the equipment. In-warranty repaired or replaced parts are warranted only for the remaining unexpired portion of the original warranty period applicable to the repaired or replaced parts. After expiration of the applicable warranty period, Customer shall be charged at the then current prices for parts, labor, and transportation.

Reasonable care must be used to avoid hazards. Seller expressly disclaims responsibility for loss or damage caused by use of its Products other than in accordance with proper operating procedures.

Except as stated herein, Seller makes no warranty, express or implied (either in fact or by operation of law), statutory or otherwise; and, except as stated herein, Seller shall have no liability under any warranty, express or implied (either in fact or by operation of law), statutory or otherwise. Statements made by any person, including representatives of Seller, which are inconsistent or in conflict with the terms of this warranty shall not be binding upon Seller unless reduced to writing and approved by an officer of Seller.

## Warranty Replacement and Adjustment

All claims under warranty must be made promptly after occurrence of circumstances giving rise thereto, and must be received within the applicable warranty period by Seller or its authorized representative. Such claims should include the Product serial number, the date of shipment, and a full description of the circumstances giving rise to the claim. Before any Products are returned for repair and/or adjustment, written authorization from Seller or its authorized representative for the return and instructions as to how and where these Products should be returned must be obtained. Any Product returned to Seller for examination shall be prepaid via the means of transportation indicated as acceptable by Seller. Seller reserves the right to reject any warranty claim not promptly reported and any warranty claim on any item that has been altered or has been returned by non-acceptable means of transportation. When any Product is returned for examination and inspection, or for any other reason, Customer shall be responsible for all damage resulting from improper packing or handling, and for loss in transit, notwithstanding any defect or non-conformity in the Product. In all cases, Seller has the sole responsibility for determining the cause and nature of failure, and Seller's determination with regard thereto shall be final.

If it is found that Seller's Product has been returned without cause and is still serviceable, Customer will be notified and the Product returned at Customer's expense; in addition, a charge for testing and examination may be made on Products so returned.

3/1/00

## IMG-100 Inverted Magnetron Gauge

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## IMG-100 Inverted Magnetron Gauge

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



We  
Wir  
Nous  
Nosotros  
Wij  
Noi

Varian, Inc.  
Vacuum Technologies  
121 Hartwell Avenue  
Lexington, MA, 02421-3133 USA

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,

**IMG-100 Inverted Magnetron Gauge**

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 folgenden 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).  
waaraan deze verklaring verwijst, aan de volgende norm(en) of richtlijn(en) beantwoordt.  
a cui se riferisce questa dichiarazione è conforme alla/e seguente/i norma/o documento/i normativo/i.

**EN 55011**

1991 ..... Group 1 Class A ISM emission requirements

**EN 61010-1**

1993 ..... Safety requirements for electrical equipment for measurement, control, and laboratory use incorporating Amendments Nos 1 and 2.

**EN 50082-2**

1995 ..... EMC heavy industrial generic immunity standard

A handwritten signature in black ink that reads "Frederick C. Campbell".

Frederick C. Campbell  
Operations Manager  
Vacuum Technologies  
Varian, Inc.  
Lexington, Massachusetts, USA

October 2003



# Preface

## Hazard and Safety Information

This product must only be operated and maintained by trained personnel.

This manual uses the following standard safety protocols:

**WARNING**



*Warnings indicate a particular procedure or practice, which if not followed correctly, could lead to serious injury.*

**CAUTION**



*Cautions indicate a particular procedure or practice, which if not followed, could cause damage to the equipment.*

**NOTE**



*Notes contain important information.*

Before operating or servicing equipment, read and thoroughly understand all operation/maintenance manuals provided by Vacuum Technologies. Be aware of the hazards associated with this equipment, know how to recognize potentially hazardous conditions, and how to avoid them. Read carefully and strictly observe all cautions and warnings. The consequences of unskilled, improper, or careless operation of the equipment can be serious.

In addition, consult local, state, and national agencies regarding specific requirements and regulations. Address any safety, operation, and/or maintenance questions to your nearest Vacuum Technologies office.



## IMG-100 Inverted Magnetron Gauge

### Grounding the IMG-100 Inverted Magnetron Gauge Controller

Be certain that the IMG-100 Inverted Magnetron Gauge Controller and vacuum system are separately grounded to a common ground.

#### WARNING



- ❑ Do not place a ground wire between the vacuum chamber and the controller chassis; large continuous currents could flow through it.
- ❑ Personnel can be killed by high voltages (160 to 900 V may be present in an improperly grounded system).
- ❑ Make absolutely sure that the vacuum system is grounded as shown in Figure 1.
- ❑ Test the system ground to be sure that it is complete and capable of supporting at least 10 A.

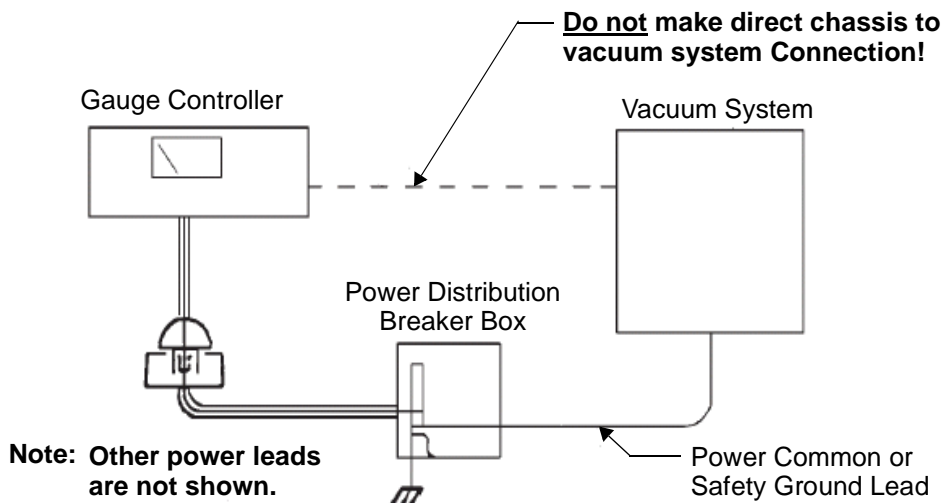


Figure 1 Ion Gauge and Vacuum System Connections

### Use with Combustibles and Mixtures

#### WARNING



As with all ionization gauges, this device is not intrinsically safe. Exercise extreme care when using this vacuum gauge while pumping or backfilling a system or in any other system condition which contains combustible gases or mixtures. The filament, the end of a hot filament ion gauge and the high voltage discharge of a cold cathode gauge can be ignition sources.

When such a gas or mixture is present, do not turn on any such vacuum gauge. Failure to follow this instruction could result in serious injury to personnel and damage to equipment.

## IMG-100 Inverted Magnetron Gauge

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### Vacuum Equipment and Cleanliness

Cleanliness is vital when servicing any vacuum equipment.

#### CAUTION



*Do not use silicone oil or silicone grease.*

*Use powder-free butyl or polycarbonate gloves to prevent skin oils from getting on vacuum surfaces.*

*Do not clean any aluminum parts with Alconox. Alconox is not compatible with aluminum and will cause damage.*

#### NOTE



*Normally, it is unnecessary to use vacuum grease. However, if it must be used, do not use silicone types, and use it sparingly. Apiezon L grease is recommended (Vacuum Technologies Part Number 695400004).*

### EMC Warnings

#### EN 55022 Class A Warning

This is a Class A product. In a domestic environment this product may cause radio interference. In such cases, the user will be required to correct the interference at his own expense.

#### FCC

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesirable operation.



*The equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is also likely to cause harmful radio communications interference in which case, the user will be required to correct the interference at his own expense.*

### Contacting Vacuum Technologies

In the United States, you can contact Vacuum Technologies Customer Service at 1-800-8VARIAN.

Internet users:

- Send email to Customer Service & Technical Support at [vpl.customer.support@varianinc.com](mailto:vpl.customer.support@varianinc.com)
- Visit our web site at [www.varianinc.com/vacuum](http://www.varianinc.com/vacuum)
- Order on line at [www.evarian.com](http://www.evarian.com)

See the back cover of this manual for a listing of our sales and service offices.

# IMG-100 Inverted Magnetron Gauge

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# IMG-100 General Purpose Inverted Magnetron Gauge

## Description

The IMG-100 is a 1" diameter inverted magnetron cold cathode ionization gauge that measures vacuum pressure from 1 mT to  $5 \times 10^{-9}$  T.

Advantages include:

- ❑ An inverted magnetron design that ensures fast, reliable starting and good linearity throughout the pressure range as compared to traditional cold cathode/magnetron type gauges.
- ❑ Minimized outgassing at high vacuum due to temperature increases because there is no hot filament.
- ❑ Greater ruggedness with the IMG-100 than Bayard-Alpert type gauges because there is no delicate filament to break or burnout due to high-pressure exposure.
- ❑ An all-welded stainless steel shell that is virtually unbreakable compared to that of typical glass Bayard-Alpert gauges.
- ❑ A lack of excess electrons, photons, and heat which can be important in some applications.

A standard SHV connector and coaxial cable provides for a safe, easy connection to a Multi-Gauge. Attachment to the vacuum system is made using either a KF or ConFlat flange. All materials exposed to the vacuum system are high vacuum compatible with no elastomers used in IMG-100 construction.

## Application

Use the IMG-100 wherever an extremely rugged high vacuum gauge is desired or where the presence of stray electrons and photons can cause problems in the vacuum system. While the inverted magnetron design ensures good linearity as compared to a standard cold cathode type gauge, the IMG-100, like other cold cathode type gauges, is generally not as stable and linear as a well-maintained Bayard-Alpert type.

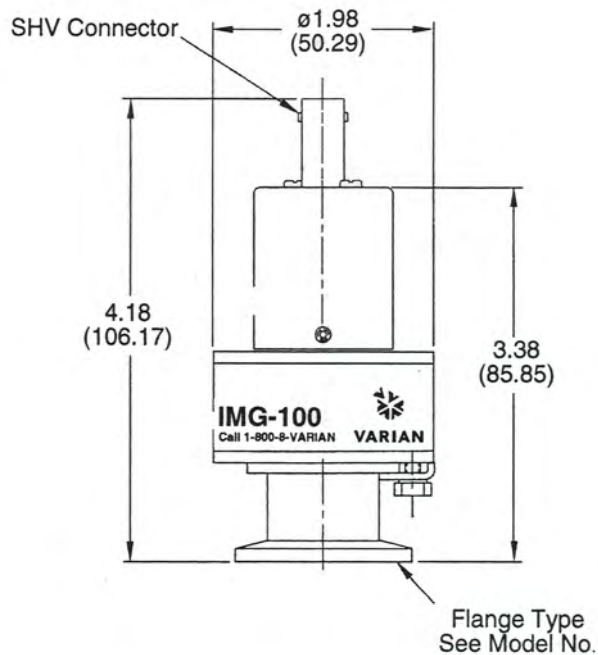
The IMG-100 with CFF handles bakeout temperatures of up to 150 °C, with the cable unplugged. The temperature limit of the KF versions depends on the O-ring material and the clamp used.

Due to the IMG-100 start time, no specific starting accessory is required under normal conditions. However, very cold temperatures and contamination build-up can result in extended starting times, especially at high vacuum.

## IMG-100 Inverted Magnetron Gauge

As with all cold cathode devices, the magnet generates a field external to the device. When installing the IMG-100, follow these guidelines (Figure 1-1):

- ❑ Do not mount the IMG-100 closer than a few inches to any magnetic material.
- ❑ If no magnetic force from the IMG-100 can be felt, it is sufficiently far away.
- ❑ Exercise care in mounting and handling to prevent the gauge from contacting other objects.
- ❑ Avoid rough handling or prolonged contact with the metal surface which can cause a decrease in magnet strength and result in a calibration change.



**Figure 1-1 Outline Drawing, IMG-100 Inverted Magnetron Gauge**

The calibration of the IMG-100 may be maintained under the STARRS service program. STARRS allows simple, periodic service and calibration for all of your Vacuum Technologies gauging equipment. Contact Vacuum Technologies Customer Service at 1-800-8VARIAN for more information on the STARRS program.

## Technical Specifications

Table 1-1 lists the gauge technical specifications.

**Table 1-1 IMG-100 Technical Specifications**

Specification	Definition
Operating voltage (HV range)	3 kv
Sensitivity	2 A/Torr nominal $\pm 20\%$ @ $5 \times 10^{-6}$ T
Measurement Range	1 mT to $5 \times 10^{-9}$ Torr
Maximum Operating Temperature	150 °C, no cable, CFF metal gasket
Electrical Connector	SHV style, 5kV rated
Feedthrough/HV Seal	Glass compression seal
Ignition Time	< 5 seconds at pressures <1E-6 Torr
Material Exposed to the Vacuum	Stainless steel, Nickel alloy 52 and glass

## Ordering Information

Table 1-2 lists the part numbers for the IMG-100.

**Table 1-2 IMG-100 Parts**

Part Number	Description
R0310301	IMG-100 NW-25
R0310302	IMG-100 NW-40
R0310303	IMG-100 2.75 CFF
R03113xxx	Cable, xxx is the length in feet

## Fringe Field Contours

Figure 1-2 and Figure 1-3 represent fringe field contours.

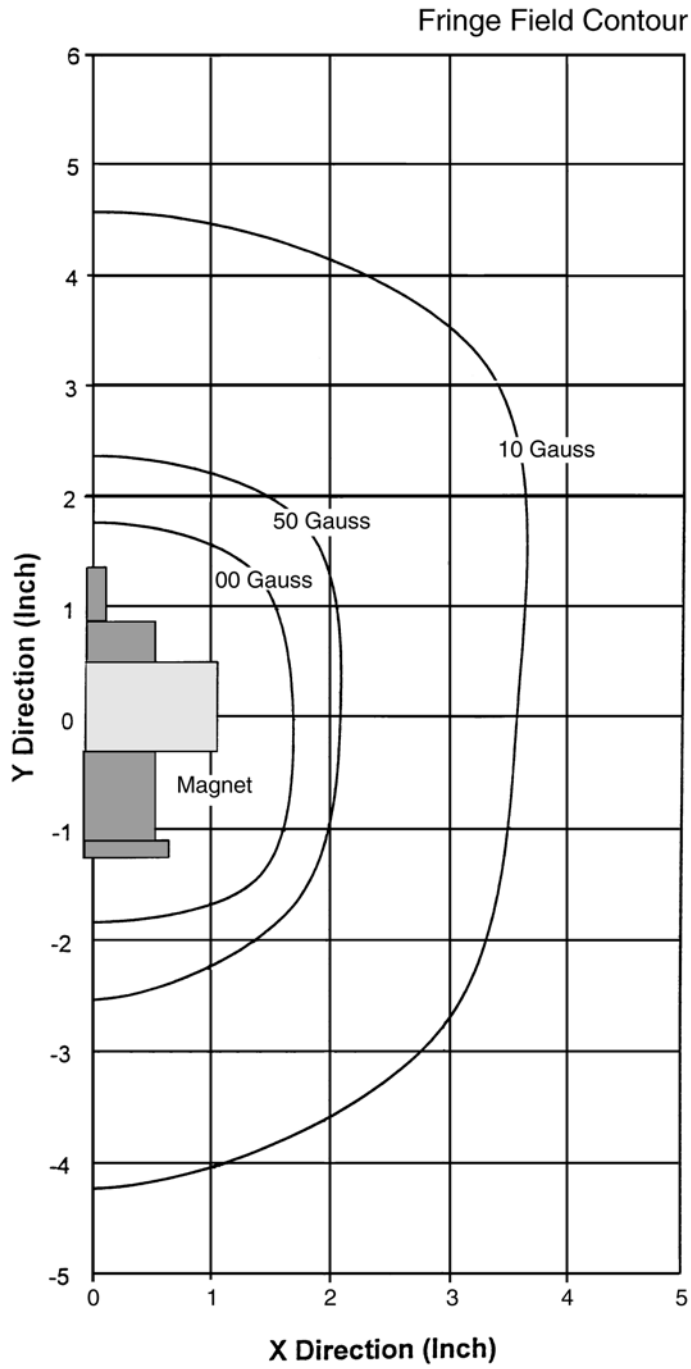
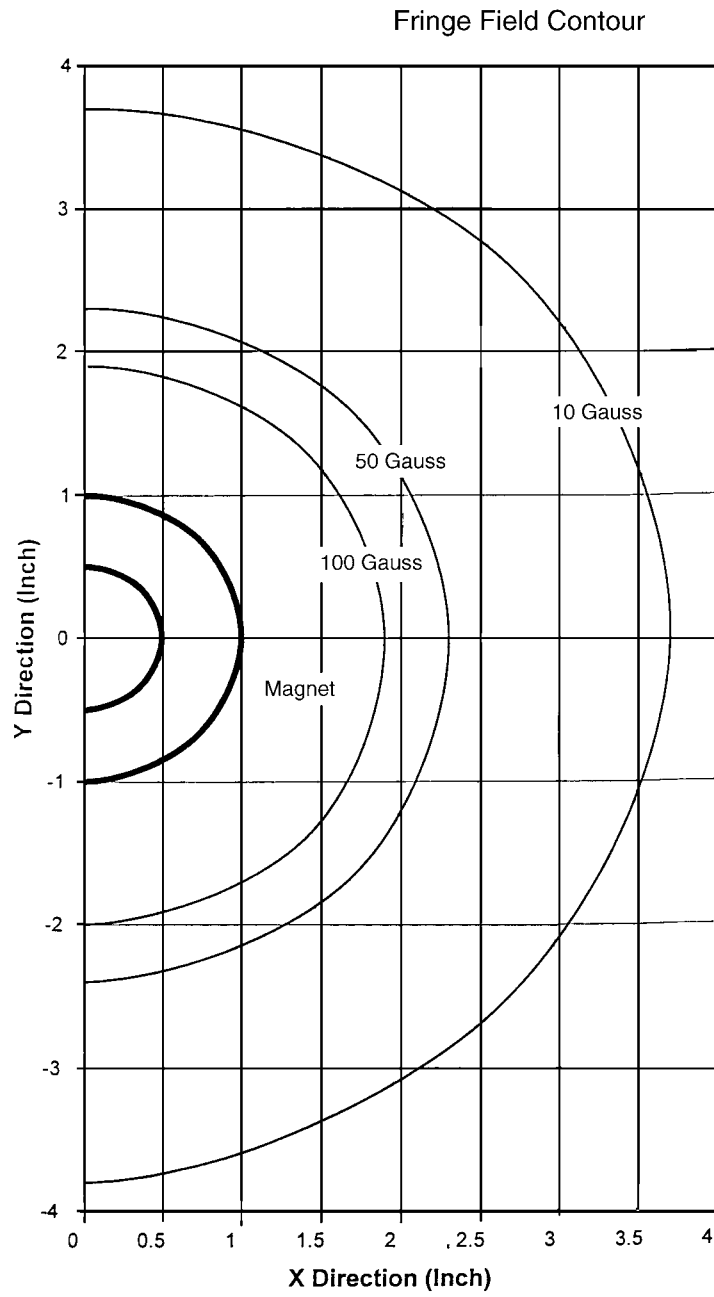


Figure 1-2 Fringe Field Contour



# IMG-100 Inverted Magnetron Gauge



**Figure 1-3 Fringe Field Contour**

## IMG-100 Inverted Magnetron Gauge

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# Request for Return Health and Safety Certification



- 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.
- 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.
- Return product(s) to the nearest location:

**North and South America**

Varian, Inc.  
Vacuum Technologies  
121 Hartwell Ave.  
Lexington, MA 02421  
Fax: (781) 860-9252

**Europe and Middle East**

Varian S.p.A.  
Via F.lli Varian, 54  
10040 Leini (TO) – ITALY  
Fax: (39) 011 997 9350

**Asia and ROW**

Varian Vacuum Technologies  
Local Office

For a complete list of phone/fax numbers see [www.varianinc.com/vacuum](http://www.varianinc.com/vacuum)

- 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"/> Error code on display <input type="checkbox"/> Display problem <input type="checkbox"/> Degas not working <input type="checkbox"/> Other .....
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:



## Sales and Service Offices

### Argentina

#### Varian Argentina Ltd.

Sucursal Argentina  
Av. Ricardo Balbin 2316  
1428 Buenos Aires  
Argentina  
Tel: (54) 1 783 5306  
Fax: (54) 1 786 5172

### Benelux

#### Varian Vacuum Technologies

Rijksstraatweg 269 H,  
3956 CP Leersum  
The Netherlands  
Tel: (31) 343 469910  
Fax: (31) 343 469961

### Brazil

#### Varian Industria e Comercio Ltda.

Avenida Dr. Cardoso de Mello 1644  
Vila Olimpia  
Sao Paulo 04548 005  
Brazil  
Tel: (55) 11 3845 0444  
Fax: (55) 11 3845 9350

### Canada

#### Central coordination through:

Vacuum Technologies  
121 Hartwell Avenue  
Lexington, MA 02421  
USA  
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Fax: (781) 860 5437  
Toll Free: (800) 882 7426

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Fax: (86) 10 6641 1534

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Fax: (33) 1 69 28 23 08

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64289 Darmstadt  
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Tel: (49) 6151 703 353  
Fax: (49) 6151 703 302

### India

#### Varian India PVT LTD

101-108, 1st Floor  
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7, Nangal Raya Business Centre  
New Delhi 110 046  
India  
Tel: (91) 11 5548444  
Fax: (91) 11 5548445

### Italy

#### Varian Vacuum Technologies

Via F.lli Varian, 54  
10040 Leini, (Torino)  
Italy  
Tel (39) 011 997 9 111  
Fax (39) 011 997 9 350

### Japan

#### Varian Vacuum Technologies

Sumitomo Shibaura Building, 8th Floor  
4-16-36 Shibaura  
Minato-ku, Tokyo 108  
Japan  
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Fax: (81) 3 5232 1263

### Korea

#### Varian Technologies Korea, Ltd.

Shinsa 2nd Building 2F  
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Kangnam-gu, Seoul  
Korea 135-280  
Tel: (82) 2 3452 2452  
Fax: (82) 2 3452 2451

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Concepcion Beistegui No 109  
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Mexico, D.F.  
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Fax: (52) 5 523 9472

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Taiwan, R.O.C.  
Tel: (886) 2 2698 9555  
Fax: (886) 2 2698 9678

### UK and Ireland

#### Varian Ltd.

28 Manor Road  
Walton-On-Thames  
Surrey KT 12 2QF  
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Fax: (44) 1932 22 8769

### United States

#### Varian Vacuum Technologies

121 Hartwell Avenue  
Lexington, MA 02421  
USA  
Tel: (781) 861 7200  
Fax: (781) 860 5437

### Other Countries

#### Varian Vacuum Technologies

Via F.lli Varian, 54  
10040 Leini, (Torino)  
Italy  
Tel: (39) 011 997 9 111  
Fax: (39) 011 997 9 350

### Customer Support and Service:

#### North America

Tel: 1 (800) 882-7426 (toll-free)  
vtl.technical.support@varianinc.com

#### Europe

Tel: 00 (800) 234 234 00 (toll-free)  
vtl.technical.support@varianinc.com

#### Japan

Tel: (81) 3 5232 1253 (dedicated line)  
vtj.technical.support@varianinc.com

#### Korea

Tel (82) 2 3452 2452 (dedicated line)  
vtk.technical.support@varianinc.com

#### Taiwan

Tel: 0 (800) 051 342 (toll-free)  
vtw.technical.support@varianinc.com

### Worldwide Web Site, Catalog and On-line Orders:

www.varianinc.com

Representatives in most countries

