NOTICE: This document contains references to Varian. Please note that Varian, Inc. is now part of Agilent Technologies. For more information, go to **www.agilent.com/chem.** 



# 564 Ionization Gauge Tube

INSTRUCTION MANUAL

Manual No. 699905564 Revision C December 2002

# 564 Ionization Gauge Tube



# Preface

# 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, to replace, or refund of 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

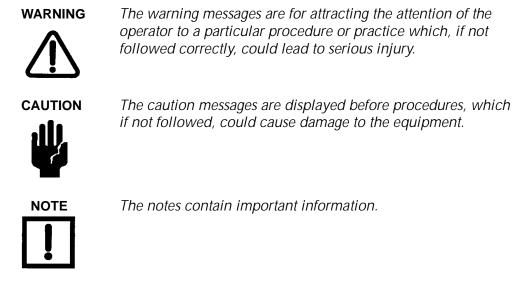
All claims under warranty must be made promptly after occurrence of circumstances giving rise thereto, and must be received within the applicable warranty period by Seller or its authorized representative. Such claims should include the Product serial number, the date of shipment, and a full description 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, notwith-standing 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 its expense; in addition, a charge for testing and examination may be made on Products so returned.

3/1/00

## **Hazard and Safety Information**

This manual uses the following standard safety protocols:



Operators and service 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 unskilled, improper, or careless operation of the equipment can be serious. This product must only be operated and maintained by trained personnel. Every operator or service person must read and thoroughly understand operation/maintenance manuals and any additional information provided by Varian Vacuum Technologies. All warning and cautions should be read carefully and strictly observed. Consult local, state, and national agencies regarding specific requirements and regulations. Address any safety, operation, and/or maintenance questions to your nearest Varian Vacuum Technologies office.

#### **Use with Combustibles and Mixtures**



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.

#### Vacuum Equipment and Cleanliness

Cleanliness is vital when servicing any vacuum equipment.



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<sup>®</sup>. Alconox is not compatible with aluminum and will cause damage.



Normally, it is unnecessary to use vacuum grease. However, if it must be used, do not use silicone types, and use it sparingly. Apiezon<sup>®</sup> L grease is recommended (Varian Part Number 695400004).

# **Contacting Varian Vacuum Technologies**

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

Internet users:

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

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

# Introduction

The Varian 564<sup>1</sup> lonization Gauge Tube is designed specifically to be as rugged and reliable as the state of the art will permit<sup>2</sup>. Careful adherence to manufacturing techniques and standards ensures close agreement between gauges. Initial calibration is done against closely checked McLeod gauge standards.

The 564 has high-pressure capability and a low X-ray limit, and thus the 564 tube is usable to  $1 \times 10^{-1}$  Torr in argon and  $6 \times 10^{-2}$  Torr in air. This is accomplished by the smaller geometry of the tube elements and the use of a conductive platinum coating on the inside of the glass envelope which improves gauge tube performance.

In high and ultra-high vacuum ranges, a platinum shield prevents external electrical fields from affecting the low ion current. In higher pressure ranges where the number of ions produced is much greater, the platinum conductive coating drains off the static charge which can build up on the inside of the glass tube. Thus, the 564 tube gives superior performance in stressful environments.

It is important to understand the limitations of any ionization gauge for the longest service and most meaningful results.





Placement of a ground wire between the vacuum chamber and the controller chassis is not safe; large continuous currents could flow through it.

Personnel could be killed by high voltages (160 to 1000 V) which may be present in an improperly grounded system.

Check that your Ion Gauge Controller and vacuum system are separately grounded to a common ground.

<sup>1.</sup> US Patent 3153744.

<sup>2.</sup> See: "A Detailed Examination of the Principles of Ion Calibration", W.B. Nottingham and F.L. Tomey, Jr. Vacuum Symposium Transactions, 1960, p.117.

### **Electrical Connections**

Ensure that your vacuum system is grounded as shown in Figure 1.

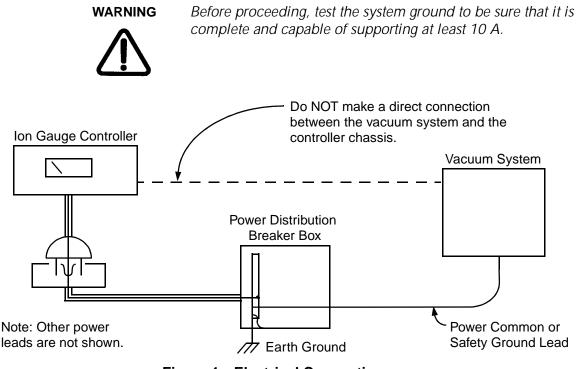


Figure 1 Electrical Connections

An independent agency has determined that all vacuum chambers, regardless of manufacture, can possibly become charged to lethal voltage levels under certain conditions if they are not grounded with a quality, common ground with the controller of their ionization tube.





After each maintenance/service procedure and before operating the controller and vacuum system, verify the integrity of the ground of both units.

Equipment utilizing these controls should be designed to prevent personnel contact with high voltages.

Always break the primary circuit when direct access to the control unit is required.

### Operation

The 564 Ionization Gauge Tube can be used with a variety of commercial controls which are equipped for resistance degassing.



It is particularly important to determine if a control will exceed any of the maximum ratings noted in this manual. For this reason, it is recommended that this gauge tube be operated with an Ionization Gauge Control which has been specifically designed for it and thus can take advantage of its broad range.

The thoria-coated iridium filament resists burnout from accidental exposure to atmosphere. When used in argon, the tube can operate continuously at  $1 \times 10^{-1}$  Torr with no effect on filament life. Tube life in air may be shortened above  $1 \times 10^{-3}$  Torr.

# Sensitivity

The sensitivity of an ionization gauge is defined as the ion current per unit of pressure at a specified grid (electron) current. Since all ionization gauges are sensitive to the type and pressure of a gas, the gas composition must be known to correctly establish the pressure reading. Table 1 gives the 564 Ionization Gauge Tube sensitivities for helium, nitrogen and air.

Gas	Gauge Constant S S = i⁺/i <sup>−</sup> x 1/P	Emission Setting for 0.01 A/Torr sensitivity (10 uA/micron)
Helium	1.5 per Torr	6.7 mA
Nitrogen	10 per Torr	1.0 mA
Air	8 per Torr	1.0 mA

Table 1 Gas Sensitivity Parameters

where:

 $\mathbf{S}$  = Sensitivity, Torr<sup>-1</sup>

i<sup>+</sup> = Ion current, Amps

- i<sup>-</sup> = Grid (electron) current, Amps
- **P** = Partial pressure of the gas, Torr

# **Specifications**

Range	1x10 <sup>-1</sup> to 4x10 <sup>-10</sup> Torr*
Maximum Operating Pressure	1x10 <sup>-1</sup> Torr (argon); 6x7 <sup>-2</sup> Torr (air)
Pumping Speed, ionic	0.06 liters/sec (Nitrogen) (1mA)
X-ray Limit*	Approximately 4x10 <sup>-10</sup> Torr (Nitrogen)

Table 2 Vacuum Specifications

\* See Section "X-ray Limit" on page 9 \*\* Calibration of production standards only.

Envelope	Nonex (all models)
Grid	Tungsten "Non-Sag", 0.025" diameter
Filament	Hairpin thoria-coated iridium
Collector	Tungsten, 0.010" diameter
Base Leads	Soft nickel, 0.060" diameter
Collector Lead	Soft nickel, 0.040" diameter
Shipping Weight	3 lbs. (6.6 kg)
Internal Volume	220 cc (not including tubulation)

### Table 3 Physical Specifications

Collector	0 VDC (ground)*
Grid	+180 VDC to ground
Filament Bias Voltage	+30 VDC to ground
Filament Voltage	4.0 VAC nominal
Filament Current	Approximately 3.5 A AC (1 mA grid current)
Filament Voltage, absolute maximum	6.0 VAC
Filament Current, absolute maximum	6.0 A AC
Grid Current, absolute maximum	100 mA
Filament Temperature, absolute maximum	1400 °C

Table 4 Operating Ratings

\* Collector operated at ground potential through electrometer circuit to reduce noise pickup and leakage currents.

Resistance Heating*		Electron Bombardment		
Grid Voltage	6.3 VAC	Grid to Filament Voltage	+700 VDC	
Grid Current	8.7 A	Grid Current	100 mA DC	
Grid Temperature	1200 °C	Grid Temperature	1200 °C max	
		Filament Temperature	1400 °C	

Table 5 Degassing Ratings

\* All values in the Resistance Heating column are absolute maximum ratings. If these values are exceeded, sagging of the grid can occur.

## Mounting

The 564 Ionization Gauge Tube mounts in either a vertical or horizontal position and may be operated and degassed in either position for prolonged periods. An outline drawing of the tube is shown in Figure 2.

Any ionization gauge using a hot filament can show pronounced pumping (gauge pressure lower than system pressure) if the conductance of the pipe connecting it to the system is too low. In general, the gauge tube should be mounted as close as possible to the desired location through a large tubulation (1" OD recommended). This effect becomes of particular concern when pressures below 10<sup>-8</sup> Torr are to be measured.

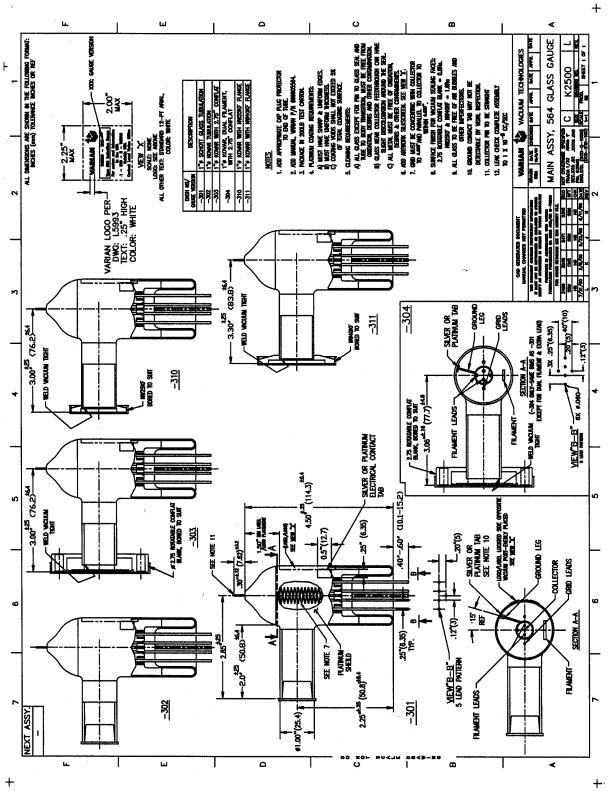


Figure 2 564 Ionization Gauge Tube Outline Drawing

### Use of the Gauge Tube

The 564 Ionization Gauge Tube may be used to measure equivalent pressures of gases from 10<sup>-1</sup> Torr down to the X-ray limit of the gauge. All ionization gauges are composition-sensitive and pressure readings derived from these gauges can only be expressed in terms of equivalent pressure of one gas, usually nitrogen.

Because Bayard-Alpert gauges contain hot filaments, degassing of residual gases in the glass and metal parts of the gauge will occur from the time it is first turned on. It is, therefore, very important to keep the gauge as free from contaminating vapors as possible (diffusion pump fluids, mercury and water vapor, etc.). High temperature baking of the gauge should not be attempted at pressures above 10<sup>-5</sup> to avoid oxidation of the gauge elements which can make it very difficult to attain ultrahigh vacuum pressure readings. Conversely, ionization gauges cannot be expected to reach low ultimate pressure if the gauge and its connection are not thoroughly degassed.

# Degassing

Degassing of the metal parts and glass walls of the gauge can be done by direct resistance heating of the grid or by electron bombardment of the grid by electrons supplied from the filaments of the gauge. In either case, it is important to use the values of grid voltage and current recommended to prevent damage to the gauge (see Table 5 on page 5). The standard Varian controls provide resistance degassing. In general, electron bombardment will result in a faster cleanup of a Bayard-Alpert gauge, but it must be carefully employed and watched to be efficient and non-hazardous to the gauge. Prolonged degassing at pressures above 10<sup>-7</sup> Torr is usually unnecessary and of little value since the time to re-absorb common gases at this pressure is very short.

WARNING



If electron bombardment degassing is employed, high voltages (up to 700 VDC maximum) will be applied to the grid connections; such high voltages can kill. Observe all appropriate precautions.

Degassing the gauge by resistance heating will typically require one-half hour or more in the high vacuum range, such as 10<sup>-9</sup> Torr, depending on cleanliness of the vacuum system and its past history. Degassing should proceed until the pressure during degas has reached a peak, then dropped asymptotically to a lower equilibrium pressure. Allowing the gauge to degas overnight will usually insure this if pressures below 10<sup>-8</sup> Torr are to be measured.

## X-ray Limit

In ionization gauges, X-rays generated by the ionizing electrons hitting the grid produce a photoelectric emission at the ion collector. This causes a lower limit of pressure readings known as the X-ray limit, (about  $4x10^{-10}$  Torr in the 564 tube. Degassing effects of the gauges are often mistaken for the X-ray limit. Only careful investigation can determine which is the real cause. A second assumption often made is that the X-ray limit is always constant. Among other things, this limit depends on the photoelectric efficiency of the collector surface which, in turn, depends on the amount and type of absorbed gas, etc.

Therefore, as the X-ray limit is approached, readings should not be considered unequivocal.

# **Mounting and Flange Availability**

Varian Part No.	Description
K2466301	1" Nonex
K2466302	1" Kovar
K2466303	2 <sup>31</sup> /44" Kovar ConFlat <sup>®</sup> Flange
K2466304	<sup>31</sup> / <sub>44</sub> " Nonex
K2661305	<sup>31</sup> / <sub>44</sub> " Kovar
K2471311	NW40 KF Flange

Table 6 Ordering Information

### **Gas Correction Factors**

Gas correction factor tables are only reproduced for the convenience of the user and do not imply that use with other gases will be safe with hot filament gauge controllers. Table 7 lists relative gauge gas correction factors for various gases. The values are derived by empirical methods substantiated by measurements reported in literature. This table was compiled and published by Robert L. Summers of Lewis Research Center, NASA Technical Note TND-5285, National Aeronautics and Space Administration, Washington, DC, June 1969.

Substance	Formula	Relative Ionization Gauge Gas Correction Factor	Substance	Formula	Relative Ionization Gauge Gas Correction Factor
Acetaldehyde	C <sub>2</sub> H <sub>4</sub> O	2.6	Carbon Disulfide	CS <sub>2</sub>	5.0
Acetone	(CH <sub>3</sub> ) <sub>2</sub> CO	3.6			4.7 4.8
	0/2	4.0	Orthur Manual I		
		3.6	Carbon Monoxide	со	1.05 1.05
Acetylene	C <sub>2</sub> H <sub>2</sub>	1.9			1.05
, looty lone	02.12	2.0	Carbon Tetrachloride	CCI <sub>4</sub>	6.0
Air		1.0		0014	6.3
		0.98	Cesium	Cs	4.3
Ammonio	NU I				2.0
Ammonia	NH <sub>3</sub>	1.3 1.2			4.8
		1.2	Chlorine	Cl <sub>2</sub>	0.68
		1.5			2.6
Amylene:		5.0			1.6
ISO.	ISO·C <sub>5</sub> H <sub>10</sub>	5.9 5.8	Chlorobenzene	C <sub>6</sub> H <sub>5</sub> Cl	7.0
cyclo.	CY·C <sub>5</sub> H <sub>10</sub>		Chloroethane	C <sub>2</sub> H <sub>5</sub> Cl	4.0
Argon	Ar	1.3	Chloroform	CHCI <sub>3</sub>	4.7
	N	1.1			4.8
		1.2			4.8
		0.9	Chloromethane	CH <sub>3</sub> CI	2.6
Benzene	C <sub>6</sub> H <sub>6</sub>	5.9			3.2 3.1
		5.8	Cyanogen	(CN) <sub>2</sub>	2.8
		5.7	Cyanogen	(CN)2	3.6
		5.9			2.7
		6.0	Cyclohexylene	C <sub>6</sub> H <sub>12</sub>	7.9
Benzoic Acid	C <sub>6</sub> H <sub>5</sub> COOH	5.5		-0-12	6.4
Bromine	Br	3.8	Deuterium	D <sub>2</sub>	0.35
Bromomethane	CH <sub>3</sub> Br	3.7		_	0.38
Butane:	U		Dichlorodifloromethane	CCl <sub>2</sub> F <sub>2</sub>	2.7
n.	n·C₄H <sub>10</sub>	4.9			4.1
	1 04110	4.7	Dichloromethane	CH <sub>2</sub> Cl <sub>2</sub>	3.7
ISO.	ISO·C <sub>4</sub> H <sub>10</sub>	4.6	Dinitrobenzene	$C_6H_4(NO_2)_2$	
100	100 04110	4.9	0.	• · · · · · · · ·	7.8
Cadmium	Cd	2.3	m·		7.8
Caumum		3.4	p.		7.6
A 1 5: ···			Ethane	C <sub>2</sub> H <sub>6</sub>	2.6
Carbon Dioxide	CO <sub>2</sub>	1.4			2.8
		1.4			2.5
		1.5	Ethanol	C <sub>2</sub> H <sub>5</sub> OH	3.6
		1.5			2.9
		1.4	Ethyl Acetate	CH <sub>3</sub> COOC <sub>2</sub> H <sub>5</sub>	5.0

Substance	Formula	Relative Ionization Gauge Gas Correction F5tor	Substance	Formula	Relative Ionization Gauge Gas Correction Factor
Ethyl ether	(C <sub>2</sub> H <sub>5</sub> ) <sub>2</sub> O	5.1	Naphthalene	C <sub>10</sub> H <sub>8</sub>	9.7
Ethylene	C <sub>2</sub> H <sub>4</sub>	5.1 2.3	Neon	Ne	0.30 0.31
		2.4 2.2	Nitrobenzene	C <sub>6</sub> H <sub>5</sub> NO <sub>2</sub>	7.2
		2.2 2.2 to 2.5	Nitrogen	N <sub>2</sub>	1.0
Ethylene oxide	(CH <sub>2</sub> ) <sub>2</sub> O	2.5	Nitrotoluene (o·, m·, p·)		8.5
Helium	He	0.18	Nitric Oxide	NO	1.3
		0.15			1.2
		0.13 0.12	Nitrous Oxide	NO	1.0
Heptane	C <sub>7</sub> H <sub>16</sub>	8.6	Nillous Oxide	N <sub>2</sub> O	1.5
Hexadiene:					1.7
1.5	1.5·C <sub>5</sub> H <sub>10</sub>	6.4			1.3 to 2.1
cyclo·	CY·C <sub>6</sub> H <sub>10</sub>	6.0	Oxygen	0 <sub>2</sub>	1.0
Hexane	C <sub>6</sub> H <sub>14</sub>	6.6			1.1
Hexene:	1011	5.0			0.9
1· cyclo	1·C <sub>6</sub> H <sub>12</sub> CY·C <sub>6</sub> H <sub>10</sub>	5.9 6.4			0.9
Hydrogen	H <sub>2</sub>	0.46	Pentane		0.0
пушоден	F12	0.48	n	n·C <sub>5</sub> H <sub>17</sub>	6.2 6.0
		0.41			5.7
		0.45	ISO.	ISO·C <sub>5</sub> H <sub>17</sub>	6.0
		0.44	neo·	(CH <sub>3</sub> ) <sub>4</sub> C	5.7
Hydrogen Bromide	HBr	2.0	Phenol	C <sub>6</sub> H <sub>5</sub> OH	6.2
Hydrogen Chloride	HCI	1.5	Phosphine	PH <sub>3</sub>	2.6
		1.6	Potassium	K	3.6
		2.0	Propane		4.2
Hydrogen Cyanide	HCN	1.5	Fiopane	C <sub>3</sub> H <sub>8</sub>	4.2 3.7
nyurogen Cyanide		1.6			3.7 to 3.9
Hydrogen Floride	HF	1.4			3.6
Hydrogen lodide	НІ	3.1	Propene oxide	C <sub>3</sub> H <sub>6</sub> O	3.9
Hydrogen Sulfide	H <sub>2</sub> S	2.2	Propene:		
, yarogon eanae		2.2	n	n∙C <sub>3</sub> H <sub>6</sub>	3.3
		2.3			3.2 to 3.7
		2.1	cyclo·	cy·C <sub>3</sub> H <sub>6</sub>	3.6
lodine	I <sub>2</sub>	5.4	Rubidum	Rb	4.3
lodomethane	CH <sub>3</sub> I	4.2	Silver perchlorate	AgCIO <sub>4</sub>	3.6
Isoamyl Alcohol	C <sub>5</sub> H <sub>11</sub> OH	2.9	Sodium	Na	3.0
Isobutylene	C <sub>4</sub> H <sub>8</sub>	3.6	Stannic iodide	Snl <sub>4</sub>	6.7
Krypton	Kr	1.9	Sulphur Dioxide	SO <sub>2</sub>	2.1
		1.7		2	2.3
		1.7	Sulphur Hexafloride	SF <sub>6</sub>	2.3
Lithium	Li	1.9		Ū	2.8
Mercury	Hg	3.6	Toluene	C <sub>6</sub> H <sub>5</sub> CH <sub>3</sub>	6.8
Methane	CH <sub>4</sub>	1.4	Trinitrobenzene	C <sub>6</sub> H <sub>3</sub> (NO <sub>2</sub> ) <sub>3</sub>	9.0
		1.5	Water	H <sub>2</sub> O	1.1
		1.6 1.4 to 1.8	. Tator	1.20	1.0
		1.4 to 1.8			0.8
		1.5	Xenon	Xe	2.9
Methanol	СН <sub>3</sub> ОН	1.8			2.2
		1.9			2.4
Mehtyl Acetate	CH <sub>3</sub> COOCH <sub>3</sub>	4.0	Xylene:		
Mythyl ether	(CH <sub>3</sub> ) <sub>2</sub> O	3.0	0.	o·C <sub>6</sub> H <sub>4</sub> (CH <sub>3</sub> ) <sub>2</sub>	7.8
		3.0	p.	p·C <sub>6</sub> H <sub>4</sub> (CH <sub>3</sub> ) <sub>2</sub>	7.9

### Table 7 Gas Correction Factors, continued

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### **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 Customer Service Representative.
- Pack goods appropriately and drain all oil from rotary vane and diffusion pumps (for exchanges please use the packing 2. 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:

North and South America	<b>Europe and Middle East</b>
Varian Vacuum Technologies	Varian S.p.A.
121 Hartwell Ave.	Via F.lli Varian, 54
Lexington, MA 02421	10040 Leini (TO) – ITALY
Fax: (781) 860-9252	Fax: (39) 011 997 9350
For a complete list of phone/fax number	ers see <u>www.varianinc.com/vacuum</u>

ope and Middle East Varian S.p.A. 'ia F.lli Varian, 54 0 Leini (TO) – ITALY x: (39) 011 997 9350

Asia and ROW Varian Vacuum Technologies Local Office

4. If a product is received at Varian 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 employees occurring as a result of exposure to toxic or hazardous materials present in the product.

#### **CUSTOMER INFORMATION**

Company name:		
		Tel:
	Fax:	
Ship Method:	Shipping Collect #:	
<i>Europe only</i> : V	AT Reg. Number:	<u>USA only</u> :
Customer Ship T	o: Cust	tomer Bill To:
	•••••	

#### **PRODUCT IDENTIFICATION**

Product Description	Varian P/N	Varian S/N

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

Paid Exchange	Paid Repair	Wa
Credit	Shipping Error	Ev

rranty Exchange Γ aluation Return 

	Warranty Repair
٦	Calibration

**D** Loaner Return **O**ther .....

#### **HEALTH and SAFETY CERTIFICATION**

VARIAN VACUUM TECHNOLOGIES CANNOT ACCEPT ANY BIOLOGICAL HAZARDS, RADIOACTIVE MATERIAL, ORGANIC METALS, OR MERCURY AT ITS FACILITY. CHECK ONE OF THE FOLLOWING: I confirm that the above product(s) has (have) **NOT** pumped or been exposed to any toxic or dangerous materials in a quantity harmful for human contact. 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 (Must be filled in): ..... Print Name: PLEASE FILL IN THE FAILURE REPORT SECTION ON THE NEXT PAGE

Do not write b	below tl	his line
----------------	----------	----------





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		
$\Box$ Does not start	Noise	□ Vertical	Power:	Rotational Speed:	
$\Box$ Does not spin freely	<b>D</b> Vibrations	🗖 Horizontal	Current:	Inlet Pressure:	
$\Box$ Does not reach full speed	🗖 Leak	🗇 Upside-down	Temp 1:	Foreline Pressure:	
Mechanical Contact	<b>Overtemperature</b>	<b>D</b> Other:	Temp 2:	Purge flow:	
Cooling defective	Clogging		OPERATION TI	ME:	
Describe Failure :					
TURBOCONTROLLER ERROR MESSAGE:					

#### **ION PUMPS/CONTROLLERS**

Bad feedthrough	Poor vacuum	Main seal leak	Bellows leak
Vacuum leak	High voltage problem	Solenoid failure	Damaged flange
$\Box$ Error code on display	<b>O</b> ther	Damaged sealing area	<b>O</b> ther
Describe failure:		Describe failure:	
Customer application:		Customer application:	

#### LEAK DETECTORS

Cannot calibrate	No zero/high background
□ Vacuum system unstable	$\Box$ Cannot reach test mode
Failed to start	□ Other
Describe failure:	
Customer application:	

#### **INSTRUMENTS**

VALVES/COMPONENTS

<ul> <li>Gauge tube not working</li> <li>Communication failure</li> <li>Error code on display</li> </ul>	<ul> <li>Display problem</li> <li>Degas not working</li> <li>Other</li> </ul>
Describe failure:	
Customer application:	

#### ALL OTHER VARIAN PUMPS

Pump doesn't start	Noisy pump (describe)
Doesn't reach vacuum	Overtemperature
<b>D</b> Pump seized	□ Other
Describe failure:	
Customer application:	

Electrical problem
Cooling coil damage
<b>O</b> ther



VPD Service Operation



### **Returned Material Report**

This report must accompany all products returned for repair, replacement, or warranty evaluation. Full information regarding reasons for return of the product will expedite repair or adjustment. Please fill in all blanks below and furnish any other information which will help identify the nature and cause of failure.

Reason for Return (check appropriate box)

Paid Repair	Advance Exchange	Shipping Error	Credit
Warranty Evaluation	Loaner Return	Shipping Damage	
Product Information (use sepa	arate forms if more than one	model no.)	
Varian Model No.	Serial No	Quantity	
Purchase Information (if produ number and date purchased)			nal purchase order
Varian Sales Order No. (if	available)	Machine #	
Original Purchase Order N	0	Purchase Order Date	
Company Name		_ Contact	
Address			
City			
Telephone			
Failure Report (describe in det			
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#### **Returned Products**

All products returned to Varian/VPD Service Operation for warranty evaluation must be sent **prepaid** and customer must comply with the **warranty replacement and adjustment** provision set forth in the warranty.

Ship directly to: Varian Vacuum Products Vacuum Products Service Center 121 Hartwell Avenue Lexington, MA 02421

All products sold by Varian and returned by customer are subject to Varian Vacuum Products standard terms and conditions of sale including, but not limited to, the warranty and damages and liability provisions set forth in the warranty.

November 1995

#### **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

#### Australia

Varian Australia Pty Ltd.

679-701 Springvale Road Mulgrave, Victoria ZZ 3170 Australia Tel: (61) 395607133 Fax: (61) 395607950

#### 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:

Varian Vacuum Technologies 121 Hartwell Avenue Lexington, MA 02421 USA Tel: (781) 861 7200 Fax: (781) 860 5437 Toll Free: (800) 882 7426

#### China

#### Varian Technologies - Beijing

Room 1201, Jinyu Mansion No. 129A, Xuanwumen Xidajie Xicheng District Beijing 1000031 P.R. China Tel: (86) 10 6641 1530 Fax: (86) 10 6641 1534

# France and Wallonie Varian s.a.

7 avenue des Tropiques Z.A. de Courtaboeuf – B.P. 12 Les Ulis cedex (Orsay) 91941 France Tel: (33) 1 69 86 38 13 Fax: (33) 1 69 28 23 08

#### Germany and Austria Varian Deutschland GmbH

Alsfelder Strasse 6 Postfach 11 14 35 64289 Darmstadt Germany Tel: (49) 6151 703 353 Fax: (49) 6151 703 302

#### India

#### Varian India PVT LTD

101-108, 1st Floor 1010 Competent House 7, Nangal Raya Business Centre New Delhi 110 046 India Tel: (91) 11 5548444 Fax: (91) 11 5548445

#### Italy

### Varian Vacuum Technologies

Via F.Ili Varian, 54 10040 Leini, (Torino) Italy Tel: (39) 011 997 9111 Fax: (39) 011 997 9350

#### Japan

Varian Vacuum Technologies Sumitomo Shibaura Building, 8th Floor 4-16-36 Shibaura Minato-ku, Tokyo 108 Japan Tel: (81) 3 5232 1253 Fax: (81) 3 5232 1263

#### Korea

Varian Technologies Korea, Ltd. Shinsa 2nd Bldg. 2F 966-5 Daechi-dong Kangnam-gu, Seoul Korea 135-280 Tel: (82) 2 3452 2452 Fax: (82) 2 3452 2451

#### Mexico Varian S.A.

Concepcion Beistegui No 109 Col Del Valle C.P. 03100 Mexico, D.F. Tel: (52) 5 523 9465 Fax: (52) 5 523 9472

#### Taiwan Varian Technologies Asia Ltd.

Varian rechnologies Asia Etu. 18F-13 No.79, Hsin Tai Wu Road Sec. 1, Hsi Chih Taipei Hsien 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 England Tel: (44) 1932 89 8000 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 Toll Free: (800) 882 7426

#### Other Countries

Varian Vacuum Technologies Via F.Ili Varian, 54 10040 Leini, (Torino) Italy Tel: (39) 011 997 9111 Fax: (39) 011 997 9350

#### Internet Users:

#### Customer Service & Technical Support: vpl.customer.support@varianinc.com

Worldwide Web Site: www.varianinc.com/vacuum

Order On-line: www.evarian.com

Representatives in most countries

