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.**

Agilent Technologies

572 Ionization Gauge Tube

INSTRUCTION MANUAL

Manual No. 699905572
Revision C
December 2002

572 Ionization Gauge Tube

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, 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 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:

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.

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

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.

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 (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 572[1] Ionization Gauge is a wide-range, linear, rugged Bayard-Alpert vacuum gauge, which employs a burn-out resistant thoriated-iridium filament. Careful adherence to manufacturing techniques and standards ensures close agreement between gauges. Initial calibration against closely checked McLeod gauge standards ensures that this calibration is as well-founded as present [2] state of the art will permit.

Unique with its high-pressure capability and low X-ray limit, the 572 tube is usable to $1x10^{-1}$ Torr in argon and $6x10^{-2}$ 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 572 tube gives superior performance in stressful environments.

WARNING

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.

1. US Patent 3153744.
2. US Patent 3153744.

Electrical Connections

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

WARNING *Before proceeding, test the system ground to be sure that it is complete and capable of supporting at least 10 A.*

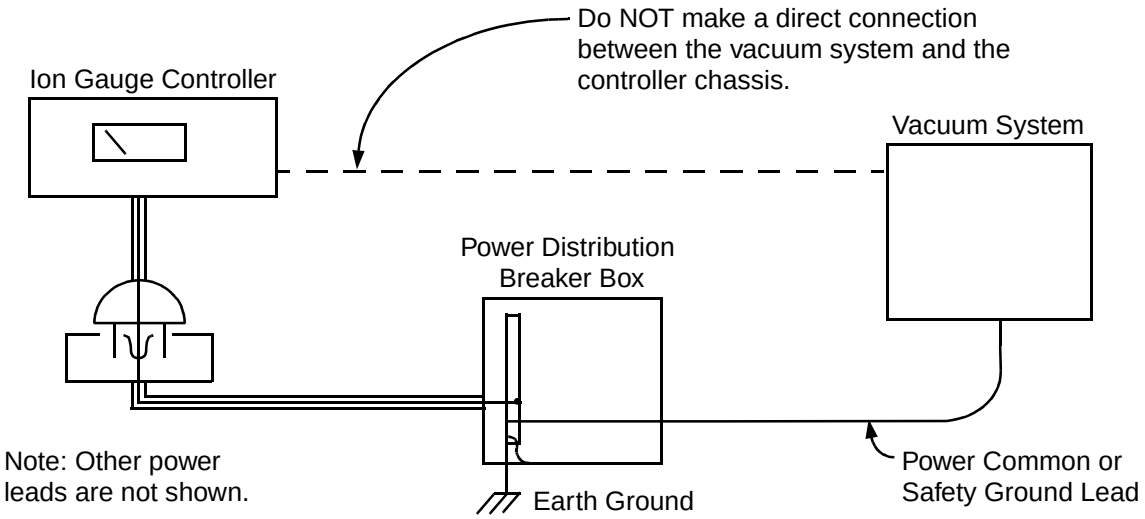


Figure 1 Electrical Connections

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.

WARNING *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 572 Ionization Gauge Tube can be used with a variety of commercial controls which are equipped for resistance degassing.

NOTE

It is particularly important to determine if a control will exceed any of the maximum ratings noted in this manual.

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 572 Ionization Gauge Tube sensitivities for helium, nitrogen and air.

Table 1 Gas Sensitivity Parameters

Gas	Gauge Constant S $S = i^+/i^- \times 1/P$	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	10 per Torr	1.0 mA

where:

S = Sensitivity, $Torr^{-1}$

$\mathbf{i^+}$ = Ion current, Amps

$\mathbf{i^-}$ = Grid (electron) current, Amps

P = Partial pressure of the gas, Torr

Specifications

Table 2 Vacuum Specifications

Range	10^{-3} to $2x10^{-10}$ Torr*
Maximum Operating Pressure	$1x10^{-3}$ Torr
Pumping Speed, ionic	0.06 liters/sec - N_2 (1 mA)
X-ray Limit*	$2x10^{-10}$ Torr (N_2) approximately

* See Section “X-ray Limit” on page 7
** Calibration of production standards only.

Table 3 Physical Specifications

Envelope	Nonex (all models)
Grid	Tungsten “Non-Sag”, 0.025" diameter
Filament	Helical tungsten wire
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 4 Operating Ratings

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

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

Table 5 Degassing Ratings

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

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

Electron Bombarding: 50 W absolute maximum

Table 6 Tubulation Data

Model No.	Tubulation
572-N	1.000" ± 0.015 OD Nonex

Mounting

The 572 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 Figure 2.

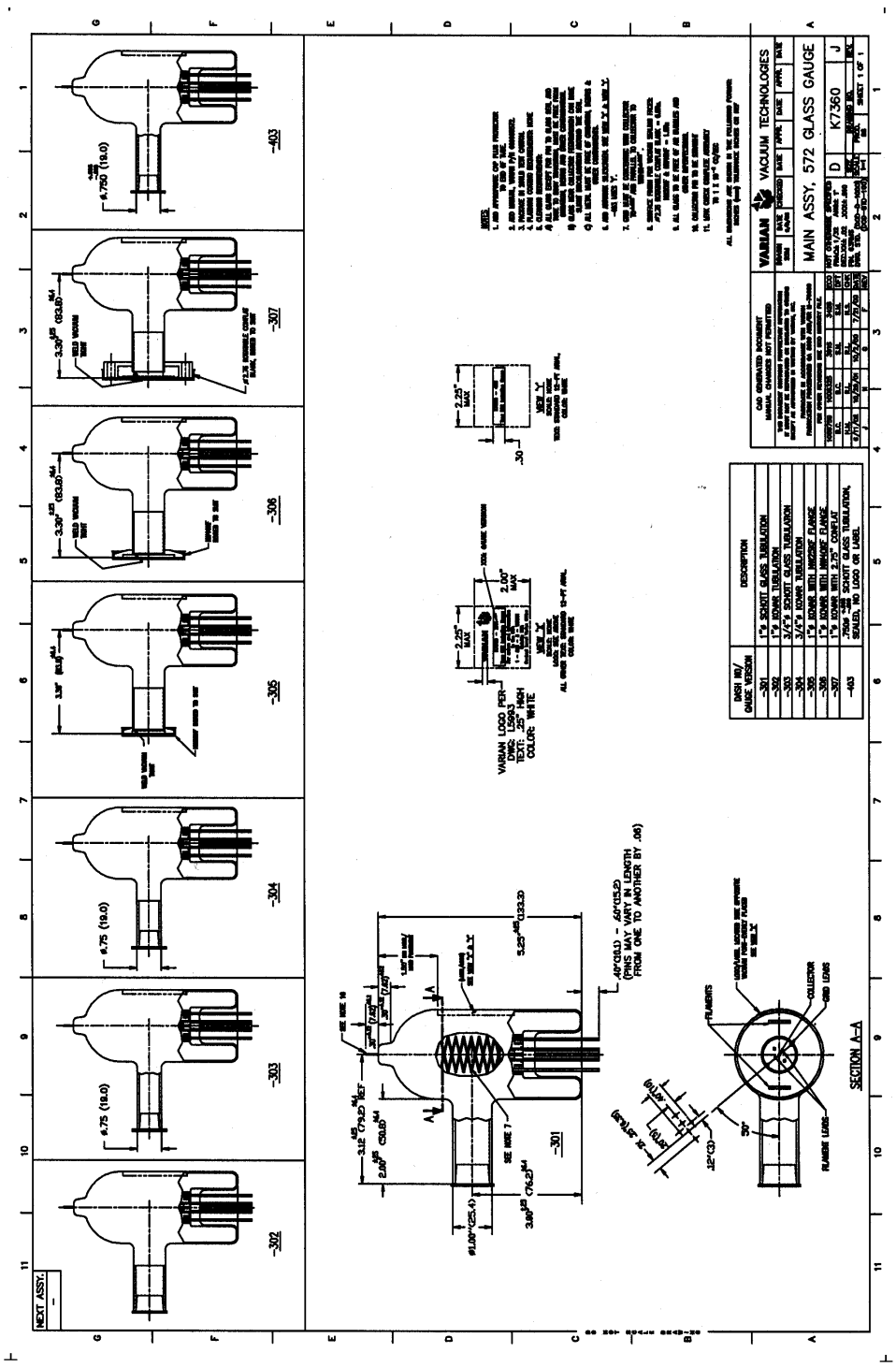


Figure 2 572 Ionization Gauge Tube Outline Drawing

Use of The Gauge Tube

The 572 Ionization Gauge Tube may be used to measure equivalent pressures of gases from 10^{-3} 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^{-5} 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^{-7} Torr is usually unnecessary and of little value since the time to re-absorb common gases at this pressure is very short.

Degassing the gauge by resistance heating will typically require one-half hour or more in the 10^{-9} Torr range 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 ensure this if pressures below 10^{-8} 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 $2x10^{-10}$ Torr in the 572 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 typical value of X-ray limit is approached ($2x10^{-10}$ Torr nitrogen equivalent), readings should not be considered unequivocal.

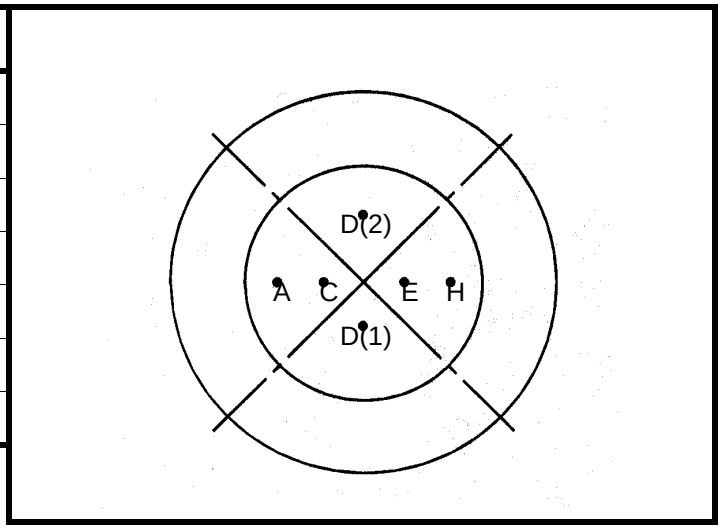
Mounting and Flange Availability

Table 7 Ordering Information

Varian Part No.	Description
K2466301	1" Nonex
K2466302	1” Kovar
K2466303	$2\,^{31}/_{44}$" Kovar ConFlat® Flange
K2466304	$^{31}/_{44}$" Nonex
K2661305	$^{31}/_{44}$" Kovar
K2471311	NW40 KF Flange

Table 8 Ordering Information

Type	Description	
572-N	0572K7360301	
	PIN ARRANGEMENT	
	A	Grid
	D(1) & C	Filament 1
	D(2) & E	Filament 2
	H	Grid



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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 9 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.

Table 9 Gas Correction Factors

Substance	Formula	Relative Ionization Gauge Gas Correction Factor
Acetaldehyde	C_2H_4O	2.6
Acetone	$(CH_3)_2CO$	3.6 4.0 3.6
Acetylene	C_2H_2	1.9 2.0
Air		1.0 0.98
Ammonia	NH_3	1.3 1.2 1.3
Amylene: ISO· cyclo·	 ISO·C_5H_{10} CY·C_5H_{10}	 5.9 5.8
Argon	Ar	1.3 1.1 1.2 0.9
Benzene	C_6H_6	5.9 5.8 5.7 5.9 6.0
Benzoic Acid	C_6H_5COOH	5.5
Bromine	Br	3.8
Bromomethane	CH_3Br	3.7
Butane: n· ISO·	 n·C_4H_{10} ISO·C_4H_{10}	 4.9 4.7 4.6 4.9
Cadmium	Cd	2.3 3.4
Carbon Dioxide	CO_2	1.4 1.4 1.5 1.5 1.4
Carbon Disulfide	CS_2	5.0 4.7 4.8
Carbon Monoxide	CO	1.05 1.05 1.1
Carbon Tetrachloride	CCl_4	6.0 6.3
Cesium	Cs	4.3 2.0 4.8
Chlorine	Cl_2	0.68 2.6 1.6
Chlorobenzene	C_6H_5Cl	7.0
Chloroethane	C_2H_5Cl	4.0
Chloroform	$CHCl_3$	4.7 4.8 4.8
Chloromethane	CH_3Cl	2.6 3.2 3.1
Cyanogen	$(CN)_2$	2.8 3.6 2.7
Cyclohexylene	C_6H_{12}	7.9 6.4
Deuterium	D_2	0.35 0.38
Dichlorodifloromethane	CCl_2F_2	2.7 4.1
Dichloromethane	CH_2Cl_2	3.7
Dinitrobenzene o· m· p·	$C_6H_4(NO_2)_2$	 7.8 7.8 7.6
Ethane	C_2H_6	2.6 2.8 2.5
Ethanol	C_2H_5OH	3.6 2.9
Ethyl Acetate	$CH_3COOC_2H_5$	5.0

Table 9 Gas Correction Factors, continued

Substance	Formula	Relative Ionization Gauge Gas Correction F5tor
Ethyl ether	$(C_2H_5)_2O$	5.1 5.1
Ethylene	C_2H_4	2.3 2.4 2.2 2.2 to 2.5
Ethylene oxide	$(CH_2)_2O$	2.5
Helium	He	0.18 0.15 0.13 0.12
Heptane	C_7H_{16}	8.6
Hexadiene: 1.5· cyclo·	 $1.5{\cdot}C_5H_{10}$ $CY{\cdot}C_6H_{10}$	 6.4 6.0
Hexane	C_6H_{14}	6.6
Hexene: 1· cyclo	 $1{\cdot}C_6H_{12}$ $CY{\cdot}C_6H_{10}$	 5.9 6.4
Hydrogen	H_2	0.46 0.38 0.41 0.45 0.44
Hydrogen Bromide	HBr	2.0
Hydrogen Chloride	HCl	1.5 1.6 2.0 1.5
Hydrogen Cyanide	HCN	1.5 1.6
Hydrogen Floride	HF	1.4
Hydrogen Iodide	HI	3.1
Hydrogen Sulfide	H_2S	2.2 2.2 2.3 2.1
Iodine	I_2	5.4
Iodomethane	CH_3I	4.2
Isoamyl Alcohol	$C_5H_{11}OH$	2.9
Isobutylene	C_4H_8	3.6
Krypton	Kr	1.9 1.7 1.7
Lithium	Li	1.9
Mercury	Hg	3.6
Methane	CH_4	1.4 1.5 1.6 1.4 to 1.8 1.5 1.5
Methanol	CH_3OH	1.8 1.9
Mehtyl Acetate	CH_3COOCH_3	4.0
Mythyl ether	$(CH_3)_2O$	3.0 3.0

Substance	Formula	Relative Ionization Gauge Gas Correction Factor
Naphthalene	$C_{10}H_8$	9.7
Neon	Ne	0.30 0.31
Nitrobenzene	$C_6H_5NO_2$	7.2
Nitrogen	N_2	1.0
Nitrotoluene (o·, m·, p·)	$C_6H_4CH_3NO_2$	8.5
Nitric Oxide	NO	1.3 1.2 1.0
Nitrous Oxide	N_2O	1.5 1.7 1.7 1.3 to 2.1
Oxygen	O_2	1.0 1.1 0.9 0.9
Pentane n· ISO· neo·	 $n{\cdot}C_5H_{17}$ $ISO{\cdot}C_5H_{17}$ $(CH_3)_4C$	 6.2 6.0 5.7 6.0 5.7
Phenol	C_6H_5OH	6.2
Phosphine	PH_3	2.6
Potassium	K	3.6
Propane	C_3H_8	4.2 3.7 3.7 to 3.9 3.6
Propene oxide	C_3H_6O	3.9
Propene: n· cyclo·	 $n{\cdot}C_3H_6$ $cy{\cdot}C_3H_6$	 3.3 3.2 to 3.7 3.6
Rubidum	Rb	4.3
Silver perchlorate	$AgClO_4$	3.6
Sodium	Na	3.0
Stannic iodide	SnI_4	6.7
Sulphur Dioxide	SO_2	2.1 2.3
Sulphur Hexafloride	SF_6	2.3 2.8
Toluene	$C_6H_5CH_3$	6.8
Trinitrobenzene	$C_6H_3(NO_2)_3$	9.0
Water	H_2O	1.1 1.0 0.8
Xenon	Xe	2.9 2.2 2.4
Xylene: o· p·	 $o{\cdot}C_6H_4(CH_3)_2$ $p{\cdot}C_6H_4(CH_3)_2$	 7.8 7.9

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VARIAN

Request for Return
Health and Safety Certification

ISO 9001 REGISTERED

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.
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:

North and South America	**Europe and Middle East**	**Asia and ROW**
Varian Vacuum Technologies	Varian S.p.A.	Varian Vacuum Technologies
121 Hartwell Ave.	Via F.lli Varian, 54	Local Office
Lexington, MA 02421	10040 Leini (TO) – ITALY	
Fax: (781) 860-9252	Fax: (39) 011 997 9350	

For a complete list of phone/fax numbers see www.varianinc.com/vacuum

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: ……

Contact person: Name: …… Tel: ……

Fax: …… E-mail: ……

Ship Method: …… Shipping Collect #: …… P.O.#:……

Europe only: VAT Reg. Number: …… *USA only*: ❒ Taxable ❒ Non-taxable

Customer Ship To: …… Customer Bill To: ……

……

……

PRODUCT IDENTIFICATION

Product Description	Varian P/N	Varian S/N

TYPE OF RETURN *(check appropriate box)*

❒ Paid Exchange ❒ Paid Repair ❒ Warranty Exchange ❒ Warranty Repair ❒ Loaner Return
❒ Credit ❒ Shipping Error ❒ Evaluation Return ❒ Calibration ❒ Other ……..

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: …… Signature: …… Date: ……/……/……

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

Do not write below this line

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

VARIAN

Request for Return
Health and Safety Certification

ISO 9001 REGISTERED

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	
❒ 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	……	OPERATION TIME:	
Describe Failure :				
TURBOCONTROLLER ERROR MESSAGE:				

ION PUMPS/CONTROLLERS

❒ Bad feedthrough	❒ Poor vacuum
❒ Vacuum leak	❒ High voltage problem
❒ Error code on display	❒ Other
Describe failure:	
Customer application:	

VALVES/COMPONENTS

❒ Main seal leak	❒ Bellows leak
❒ Solenoid failure	❒ Damaged flange
❒ Damaged sealing area	❒ Other
Describe failure:	
Customer application:	

LEAK DETECTORS

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

INSTRUMENTS

❒ Gauge tube not working	❒ Display problem
❒ Communication failure	❒ Degas not working
❒ Error code on display	❒ Other
Describe failure:	
Customer application:	

ALL OTHER VARIAN PUMPS

❒ Pump doesn't start	❒ Noisy pump (describe)
❒ Doesn't reach vacuum	❒ Overtemperature
❒ Pump seized	❒ Other
Describe failure:	
Customer application:	

DIFFUSION PUMPS

❒ Heater failure	❒ Electrical problem
❒ Doesn't reach vacuum	❒ Cooling coil damage
❒ Vacuum leak	❒ Other
Describe failure:	
Customer application:	

varian
vacuum products

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 separate forms if more than one model no.)

Varian Model No. _____ Serial No. _____ Quantity _____

Part Description _____

Purchase Information (if product is being returned for warranty evaluation, show your original purchase order number and date purchased)

Varian Sales Order No. (if available) _____ Machine # _____

Original Purchase Order No. _____ Purchase Order Date _____

Company Name _____ **Contact** _____

Address _____

City _____ **State** _____ **Zip** _____

Telephone _____

Failure Report (describe in detail suspected cause or nature of malfunction)

_____

_____

_____

_____

_____

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
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