

## ***Getter Module***

**Model 919-0091**

**Model 919-0092**

**Model 919-0093**

*(GB) INSTRUCTION MANUAL*

# ***Getter Module***



**VARIAN**



*vacuum technologies*

*Dear Customer,*

*Thank you for purchasing a VARIAN vacuum product. At VARIAN Vacuum Technologies 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 product. 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,*

**Sergio PIRAS**

*Vice President and General Manager  
VARIAN Vacuum Technologies*

*Note: Fax or mail the Customer Request for Action (see backside page) to VARIAN Vacuum Technologies (Torino) - Quality Assurance or to your nearest VARIAN representative for onward transmission to the same address.*

**CUSTOMER REQUEST FOR CORRECTIVE / PREVENTIVE / IMPROVEMENT ACTION**

TO : VARIAN VACUUM TECHNOLOGIES TORINO - QUALITY ASSURANCE

FAX N° : XXXX - 011 - 9979350

ADDRESS: VARIAN S.p.A. - Via F.lli Varian, 54 - 10040 Leinì (Torino) - Italy

E-MAIL : marco.marzio@varianinc.com

NAME _____	COMPANY _____	FUNCTION _____
<p>ADDRESS : _____</p> <p>TEL. N° : _____ FAX N° : _____</p> <p>E-MAIL : _____</p>		
<p>PROBLEM / SUGGESTION :</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>		
<p>REFERENCE INFORMATION (model n°, serial n°, ordering information, time to failure after installation, etc.) :</p> <p>_____</p> <p>_____</p> <p>_____</p> <p style="text-align: right;">DATE _____</p>		

<p>CORRECTIVE ACTION PLAN / ACTUATION (by VARIAN VTT)</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>	<p>LOG N° _____</p>
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XXXX = Code for dialing Italy from your country ( es. 01139 from USA; 00139 from Japan, etc.)



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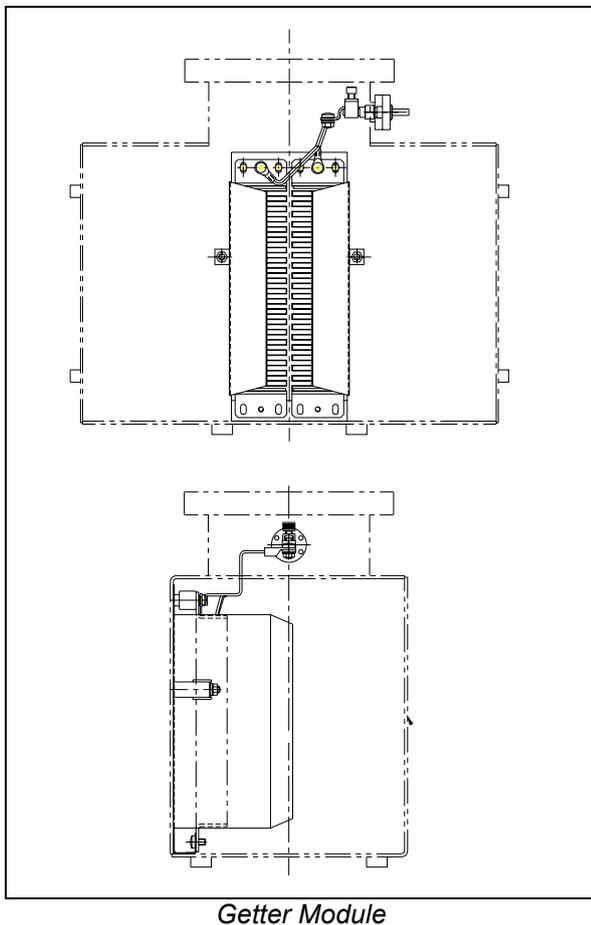
**GENERAL**

The Varian Getter Module utilizes a non-evaporable getter (NEG) material of a Zirconium-Vanadium-Iron (Zr-V-Fe) composition which is sintered onto constantan strips and formed into easy-to-mount cartridges. These cartridges can only be mounted in large Vaclon Plus pumps.

Three Getter modules are available for the following Vaclon pumps:

- Vaclon Plus 150 pump: model 919-0091
- Vaclon Plus 300 pump: model 919-0092
- Vaclon Plus 500 pump: model 919-0093

The following figure shows the Getter Module mounted inside a Vaclon Plus 300.



Getter Module

**Working Principle**

The Getter Modules are selective capture pumps only for the getterable gases (for example H<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub>, CO, CO<sub>2</sub>).

At ambient temperature the module will saturate after a typical gas load of:

- 3 Torr litres for 150 l/s module
- 6 Torr litres for 300 l/s module
- 12 Torr litres for 500 l/s module.

Once saturated the Getter Module can be reactivated up to thirty times.

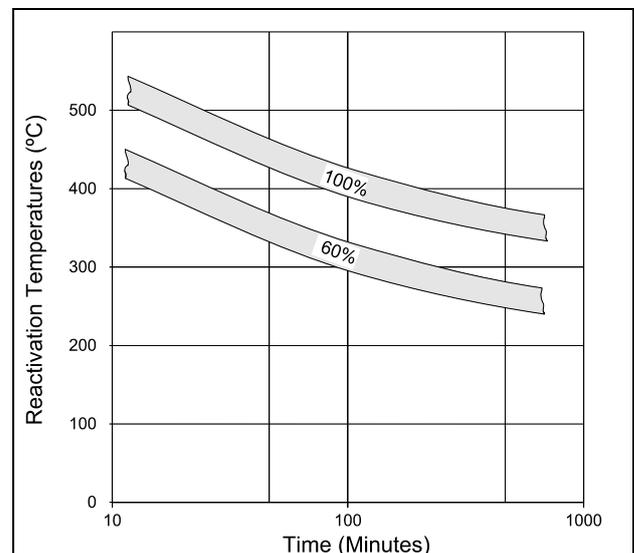
**High Pumping Speed for H<sub>2</sub> at Ultra High Vacuum**

A freshly activated getter will increase pumping speed from the 10<sup>-6</sup> Torr range to the lowest detectable UHV pressure. At UHV, the Getter can provide almost twice the nominal pumping speed of the Vaclon pump. While the Getter is capable of operation at higher pressure, for optimum performance, it is recommended that an activated Getter not be exposed to pressure higher than 2x10<sup>-8</sup> Torr (mbar). The pumping speed for most getterable gases will slowly decrease as the Getter saturates, whereas the pumping speed for H<sub>2</sub> remains constant over the full cycle. This makes it the ideal pumping mechanism for ultra-clean UHV applications.

**Ease of Regeneration/Activation**

A simple power supply is all that is necessary to activate the module. The regeneration/activation of the Getter Module is obtained by heating it to a suitably high temperature for an appropriate time. The heating is provided by passing an AC or DC current through the wafer module coated strip.

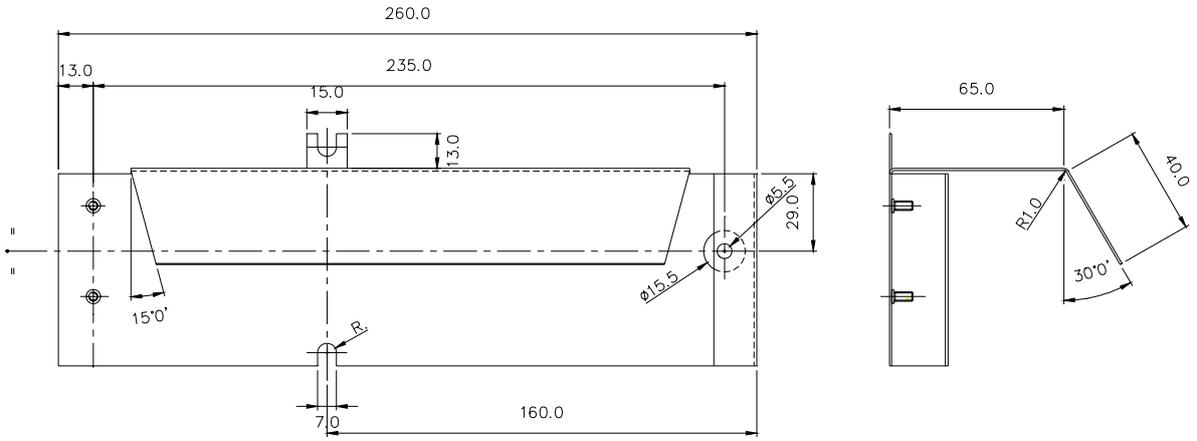
The following figure shows the time vs temperature activation/regeneration curves.



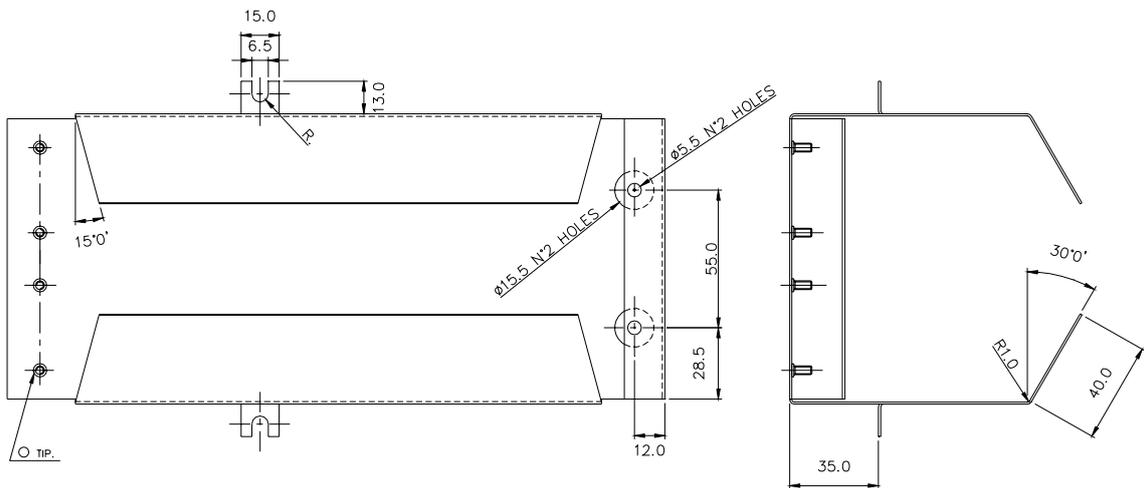
Activation/Regeneration Curves for Wafer Module

**OUTLINE DIMENSIONS**

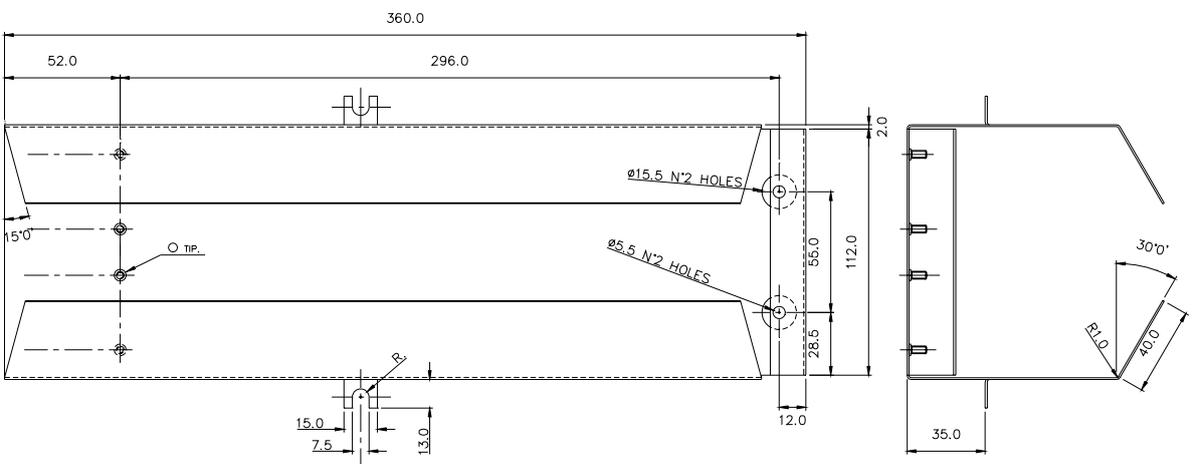
The following figure shows the outline dimensions of the Getter Modules.



*Model 919-0091*



*Model 919-0092*



*Model 919-0093*

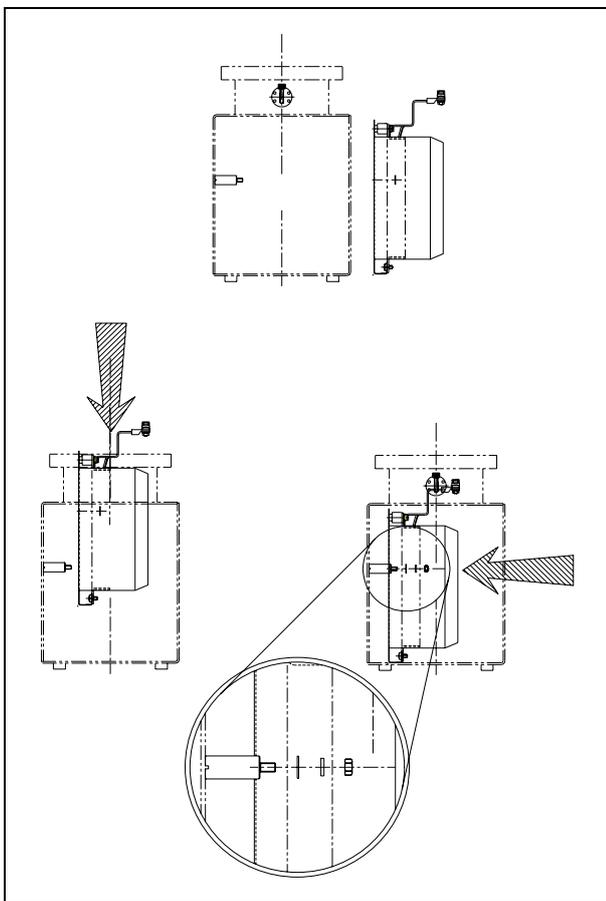
*Getter Modules Physical Dimensions*

**MOUNTING OF THE MODULE**

Refer to the following figure

1. Insert the getter module into the Vaclon pump through the flange.
2. Fix the getter module to the pump by means of two screws fixed to the relevant brackets of the module.
3. Make sure that the bottom plate of the cartridge is inserted correctly into the bottom plate of the pump body.

To remove the getter module execute the above procedure in reverse order.



*Getter Module Installation*

**OPERATION OF THE GETTER MODULE**

**General**

To ensure meaningful lifetime (greater than 500h between regeneration cycles) and optimum pumping performance, it is recommended that an activated getter module not be exposed to vacuum pressure higher than  $2 \times 10^{-8}$  Torr (mbar).

Typical applications are: "load locked" UHV systems for MBE or surface analysis, particle accelerators and device exhaust stations.

**Activation/Regeneration Procedure**

A getter module that is inserted for the first time into a large Vaclon pump needs initial activation. The initial activation (and later sequential regenerations) is performed by applying 350 °C/662 °F for minimum 5 hours under vacuum better than  $10^{-4}$  Torr (mbar). This is provided by heating the module.

Some typical values of the requested current to heat the Getter Modules at various temperatures are shown in the following table.

Temp. (°C)	Getter Module					
	150 l/s		300 l/s		500 l/s	
	I (A)	P (W)	I (A)	P (W)	I (A)	P (W)
200	18	34	36	68	24	90
280	22	50	44	100	30	130
400	33	115	66	230	46	300
500	43	198	86	396	60	520
700	66	480	132	960	94	1260

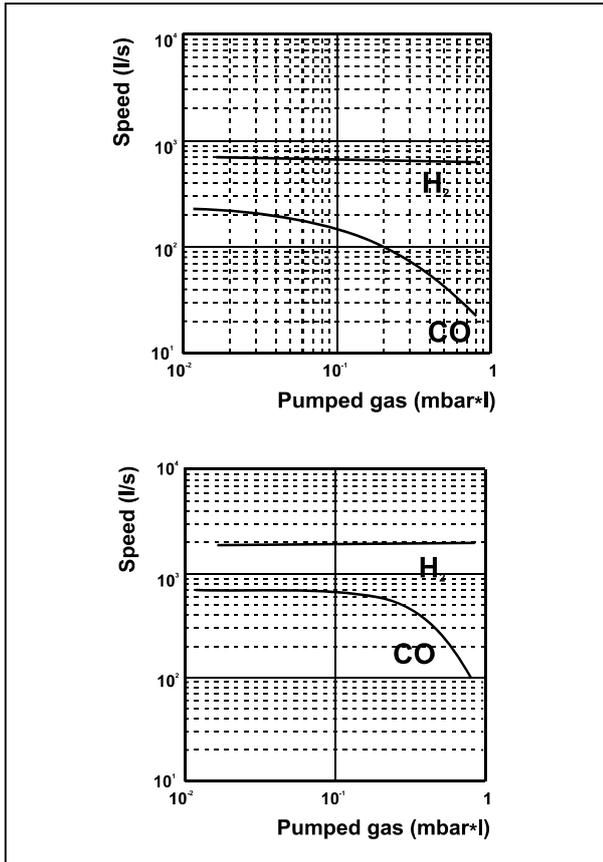
**Activation and Heating Procedure**

To activate the Getter module execute the following procedure:

1. Connect a power supply to the Getter Module (the power supply positive terminal to the Getter feedthrough and the negative to the contact on the pump flange).
2. Bake out the Vaclon pump (refer to the relevant paragraph of the Vaclon Plus instruction manual).
3. When the Vaclon pump heater is switched off and the pressure decreases to  $2 \times 10^{-8}$  Torr (mbar) or less, switch on the Getter Module power supply and heat the Getter Module for the appropriate time (see the paragraph "Activation/Regeneration Procedure" and the chart above).

**Getter Lifetime**

A freshly activated getter will saturate over time in dependence of the amount of gas absorbed. This basic rule applies to all getterable gases except hydrogen. Hydrogen is sorbed directly into the bulk of the NEG-material, whereas all other getterable gases form stable chemical compounds on the surface. Therefore the hydrogen pumping speed remains almost constant while the pumping speed for other gases decreases over saturation (see the following figure).



*Sorption Characteristics of a Getter Module Placed into a Vaclon Plus Pump at Ambient Temperature*

The lifetime of a getter module in between regeneration cycles is about:

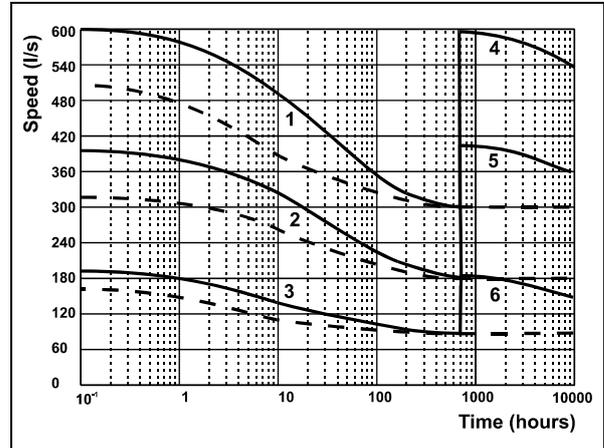
- 500 h at  $10^{-8}$  Torr (mbar)
- 5000 h at  $10^{-9}$  Torr (mbar)
- 50000 h at  $10^{-10}$  Torr (mbar)

In the following figure the three curves are relative to:

- curves 1: pump Vaclon Plus 500;
- curves 2: pump Vaclon Plus 300;
- curves 3: pump Vaclon Plus 150

The curves with a solid line show an ion pump with Getter Module. The curves with a dashed line show an ion pump without the Getter Module. The

decrease in pump speed shown by the dashed line reflects the normal saturation of the ion pump, which cannot be regained. The solid lines show the normal decrease of getter pump speed due to saturation of the getter surface. The getter can be regenerated to regain most of its initial pumping speed as shown by curves 4, 5 and 6.



*Lifetime of a Getter Module at  $10^{-8}$  mbar*

During a regenerative bake-out, the solid chemical compounds diffuse into the bulk material of the getter leaving a fresh, active surface for the next pump cycle. The sorbed hydrogen is released from the bulk material of the NEG-module and been pumped by the titanium of the ion pump elements.

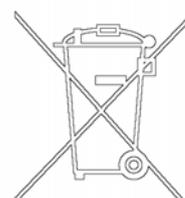
The maximum number of regeneration cycles of a getter module is 30. After this, the module has to be replaced by a new one.

**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.





# Request for Return



1. A Return Authorization Number (RA#) **WILL NOT** be issued until this Request for Return is completely filled out, signed and returned to Varian Customer Service.
2. Return shipments shall be made in compliance with local and international **Shipping Regulations** (IATA, DOT, UN).
3. The customer is expected to take the following actions to ensure the **Safety** of workers at Varian: (a) Drain any oils or other liquids, (b) Purge or flush all gasses, (c) Wipe off any excess residues in or on the equipment, (d) Package the equipment to prevent shipping damage, (for Advance Exchanges please use packing material from replacement unit).
4. Make sure the shipping documents clearly show the RA# and then return the package to the Varian location nearest you.

### North and South America

Varian Vacuum Technologies  
 121 Hartwell Ave  
 Lexington, MA 02421  
 Phone : +1 781 8617200  
 Fax: +1 781 8609252

### Europe and Middle East

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 Via Flli Varian 54  
 10040 Leini (TO) – ITALY  
 Phone: +39 011 9979111  
 Fax: +39 011 9979330

### Asia and ROW

Varian Vacuum Technologies  
 Local Office

### **CUSTOMER INFORMATION**

Company name: .....	
Contact person: Name: .....	Tel: .....
Fax: .....	E-Mail: .....
Ship Method: .....	Shipping Collect #: ..... P.O.#: .....
<u>Europe only:</u> VAT reg. Number: .....	<u>USA only:</u> <input type="checkbox"/> Taxable <input type="checkbox"/> Non-taxable
Customer Ship To: .....	Customer Bill To: .....
.....	.....
.....	.....

### **PRODUCT IDENTIFICATION**

Product Description	Varian P/N	Varian S/N	Purchase Reference

### **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**

Varian Vacuum Technologies **CAN NOT ACCEPT** any equipment which contains **BIOLOGICAL HAZARDS** or **RADIOACTIVITY**. Call Varian Customer Service to discuss alternatives if this requirement presents a problem.

The equipment listed above (check one):

**HAS NOT** been exposed to any toxic or hazardous materials

OR

**HAS** been exposed to any toxic or hazardous materials. In case of this selection, check boxes for any materials that equipment was exposed to, check all categories that apply:

Toxic  Corrosive  Reactive  Flammable  Explosive  Biological  Radioactive

List all toxic or hazardous materials. Include product name, chemical name and chemical symbol or formula.

.....

Print Name: ..... Customer Authorized Signature: .....

Print Title: ..... Date: ...../...../.....

**NOTE:** If a product is received at Varian 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 Varian employees as well as to any third party occurring as a result of exposure to toxic or hazardous materials present in the product.

Do not write below this line

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

**FAILURE REPORT**

**TURBO PUMPS and TURBOCONTROLLERS**

<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	<b>POSITION</b> <input type="checkbox"/> Vertical <input type="checkbox"/> Horizontal <input type="checkbox"/> Upside-down <input type="checkbox"/> Other: .....	<b>PARAMETERS</b> Power:                      Rotational Speed: Current:                     Inlet Pressure: Temp 1:                      Foreline Pressure: Temp 2:                      Purge flow:
<b>TURBOCONTROLLER ERROR MESSAGE:</b>			<b>OPERATION TIME:</b>

**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
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
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
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
Customer application:	

**PRIMARY PUMPS**

<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"/> Over temperature <input type="checkbox"/> Other
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
Customer application:	

**FAILURE DESCRIPTION**

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

**NOTA:** Su richiesta questo documento è disponibile anche in Tedesco, Italiano e Francese.  
**REMARQUE :** Sur demande ce document est également disponible en allemand, italien et français.  
**HINWEIS:** Auf Anfrage ist diese Unterlage auch auf Deutsch, Italienisch und Französisch erhältlich.

## Sales and Service Offices

### France and Benelux

#### 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 84  
Fax: (33) 1 69 86 29 88  
From Benelux Tel: (31) 118 67 15 70  
From Benelux Fax: (31) 118 67 15 69

### Canada

#### Central coordination through:

#### Varian Vacuum Technologies

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Lexington, MA 02421  
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Fax: (86) 10 63100141  
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Fax: (49) 6151 703 302

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New Delhi 110 046  
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Fax: (91) 11 28521173

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#### Vacuum Technologies

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Fax: (39) 011 997 9 350

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Fax: (81) 3 5232 1263  
Toll Free: 0120 655 040

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Toll Free: 080 222 2452

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Tel: (52) 5 523 9465  
Fax: (52) 5 523 9472

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Fax: (886) 2 2698 9678  
Toll Free: 0800 051342

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Fax: (44) 1865 291571

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#### Varian Vacuum Technologies

121 Hartwell Avenue  
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### Other Countries

#### Varian Inc.

#### 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 & Service:

#### North America

Toll-Free: 1 800 882 7426  
vtl.technical.support@varianinc.com

#### Europe

Tel: 00 800 234 234 00  
vtt.technical.support@varianinc.com

#### China

Toll-Free: 800 820 8266  
vtc.technical.support@varianinc.com

#### Japan

Toll-Free: 0120 655 040  
vtj.technical.support@varianinc.com

#### Korea

Toll-Free: 080 222 2452  
vtk.technical.support@varianinc.com

#### Taiwan

Toll-Free: 0 800 051 342  
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### Worldwide Web Site, Catalog and Order On-line:

www.varianinc.com

Representative in most countries

