Getter Module

Model 919-0091
Model 919-0092
Model 919-0093
Getter Module
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

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ADDRESS: VARIAN S.p.A. - Via F.lli Varian, 54 - 10040 Leini (Torino) - Italy
E-MAIL: marco.marzio@varianinc.com

<table>
<thead>
<tr>
<th>NAME</th>
<th>COMPANY</th>
<th>FUNCTION</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>ADDRESS:</th>
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</table>

<table>
<thead>
<tr>
<th>TEL. N°:</th>
<th>FAX N°:</th>
</tr>
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<table>
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<tr>
<th>E-MAIL:</th>
</tr>
</thead>
</table>

PROBLEM / SUGGESTION:

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

DATE

CORRECTIVE ACTION PLAN / ACTUATION (by VARIAN VTT)

LOG N°

XXXX = Code for dialing Italy from your country (ex. 01139 from USA; 00139 from Japan, etc.)
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 VacIon Plus pumps.

Three Getter modules are available for the following VacIon pumps:
- VacIon Plus 150 pump: model 919-0091
- VacIon Plus 300 pump: model 919-0092
- VacIon Plus 500 pump: model 919-0093

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

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 H2 at Ultra High Vacuum
A freshly activated getter will increase pumping speed from the $10^{-6}$ Torr range to the lowest detectable UHV pressure. At UHV, the Getter can provide almost twice the nominal pumping speed of the VacIon 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 $2 \times 10^{-8}$ Torr (mbar). The pumping speed for most getterable gases will slowly decrease as the Getter saturates, whereas the pumping speed for H$_2$ 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.
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 VacIon 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.

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 2x10^-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 VacIon 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.

<table>
<thead>
<tr>
<th>Temp. (°C)</th>
<th>Getter Module</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>150 l/s</td>
</tr>
<tr>
<td></td>
<td>I (A)</td>
</tr>
<tr>
<td>200</td>
<td>18</td>
</tr>
<tr>
<td>280</td>
<td>22</td>
</tr>
<tr>
<td>400</td>
<td>33</td>
</tr>
<tr>
<td>500</td>
<td>43</td>
</tr>
<tr>
<td>700</td>
<td>66</td>
</tr>
</tbody>
</table>

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 VacIon pump (refer to the relevant paragraph of the VacIon Plus instruction manual).

3. When the VacIon pump heater is switched off and the pressure decreases to 2x10^-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 VacIon Plus Pump at Ambient Temperature](image)

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 VacIon Plus 500;
- curves 2: pump VacIon Plus 300;
- curves 3: pump VacIon 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](image)

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.

## CUSTOMER INFORMATION

<table>
<thead>
<tr>
<th>North and South America</th>
<th>Europe and Middle East</th>
<th>Asia and ROW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Varian Vacuum Technologies</td>
<td>Varian SpA</td>
<td>Varian Vacuum Technologies</td>
</tr>
<tr>
<td>121 Hartwell Ave</td>
<td>Via Flli Varian 54</td>
<td>Local Office</td>
</tr>
<tr>
<td>Lexington, MA 02421</td>
<td>10040 Leini (TO) – ITALY</td>
<td></td>
</tr>
<tr>
<td>Phone: +1 781 8617200</td>
<td>Phone: +39 011 9979111</td>
<td></td>
</tr>
<tr>
<td>Fax: +1 781 8609252</td>
<td>Fax: +39 011 9979330</td>
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</table>

## CUSTOMER INFORMATION

<table>
<thead>
<tr>
<th>Company name:</th>
<th>Contact person: Name:</th>
<th>Tel:</th>
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<tbody>
<tr>
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<table>
<thead>
<tr>
<th>Ship Method:</th>
<th>Shipping Collect #:</th>
<th>P.O. #:</th>
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**Europe only:** VAT reg. Number: | **USA only:** Taxable | Non-taxable

Customer Ship To: | Customer Bill To: | |
|-----------------|-------------------|-------|

## PRODUCT IDENTIFICATION

<table>
<thead>
<tr>
<th>Product Description</th>
<th>Varian P/N</th>
<th>Varian S/N</th>
<th>Purchase Reference</th>
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## 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 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.

<table>
<thead>
<tr>
<th>Toxic</th>
<th>Corrosive</th>
<th>Reactive</th>
<th>Flammable</th>
<th>Explosive</th>
<th>Biological</th>
<th>Radioactive</th>
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<tr>
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</tbody>
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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.

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Do not write below this line

<table>
<thead>
<tr>
<th>Notification (RA)#:</th>
<th>Customer ID#:</th>
<th>Equipment #:</th>
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<tbody>
<tr>
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</tbody>
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# FAILURE REPORT

**TURBO PUMPS and TURBOCONTROLLERS**

<table>
<thead>
<tr>
<th>TURBO CONTROLLER ERROR MESSAGE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Does not start</td>
</tr>
<tr>
<td>□ Does not spin freely</td>
</tr>
<tr>
<td>□ Does not reach full speed</td>
</tr>
<tr>
<td>□ Mechanical Contact</td>
</tr>
<tr>
<td>□ Cooling defective</td>
</tr>
<tr>
<td><strong>POSITION</strong></td>
</tr>
<tr>
<td>□ Vertical</td>
</tr>
<tr>
<td>□ Horizontal</td>
</tr>
<tr>
<td>□ Upside-down</td>
</tr>
<tr>
<td>□ Other:</td>
</tr>
<tr>
<td><strong>OPERATION TIME</strong>:</td>
</tr>
</tbody>
</table>

**ION PUMPS/CONTROLLERS**

<table>
<thead>
<tr>
<th>VALVES/COMPONENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Bad feedthrough</td>
</tr>
<tr>
<td>□ Vacuum leak</td>
</tr>
<tr>
<td>□ Error code on display</td>
</tr>
<tr>
<td><strong>Customer application:</strong></td>
</tr>
</tbody>
</table>

**LEAK DETECTORS**

<table>
<thead>
<tr>
<th>INSTRUMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Cannot calibrate</td>
</tr>
<tr>
<td>□ Vacuum system unstable</td>
</tr>
<tr>
<td>□ Failed to start</td>
</tr>
<tr>
<td><strong>Customer application:</strong></td>
</tr>
</tbody>
</table>

**PRIMARY PUMPS**

<table>
<thead>
<tr>
<th>DIFFUSION PUMPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Pump doesn’t start</td>
</tr>
<tr>
<td>□ Doesn’t reach vacuum</td>
</tr>
<tr>
<td>□ Pump seized</td>
</tr>
<tr>
<td><strong>Customer application:</strong></td>
</tr>
</tbody>
</table>

**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.**
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Representative in most countries

03/06