Turbo-V Vent Device
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.Ili Varian, 54 - 10040 Leini (Torino) - Italy
E-MAIL:  marco.marzio@varianinc.com

<table>
<thead>
<tr>
<th>NAME</th>
<th>COMPANY</th>
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<tr>
<th>REFERENCE INFORMATION (model n°, serial n°, ordering information, time to failure after installation, etc.):</th>
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<table>
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<th>CORRECTIVE ACTION PLAN / ACTUATION</th>
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<td>(by VARIAN VTT)</td>
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XXX = Code for dialing Italy from your country (es. 01139 from USA; 00139 from Japan, etc.)

VARIAN
# INSTRUCTION FOR USE

## TECHNICAL INFORMATION

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<th>Page</th>
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<td>7</td>
</tr>
</tbody>
</table>
GENERAL 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.

All warnings and cautions should be read carefully and strictly observed. Address any safety, operation, and/or maintenance questions to your nearest Varian office.

The following format is used in this manual to call attention to hazards:

![WARNING!]

*WARNING!*

Warning are used when failure to observe instructions or precautions could result in injury or death.

![CAUTION]

*CAUTION*

Warning Cautions are used when failure to observe instructions could result in damage to equipment, whether Varian supplied or other associated equipment.

![NOTE]

*NOTE*

Information to aid the operator in obtaining the best performance from the equipment.

---

TURBO-V VENT DEVICE DESCRIPTION

The 969-9831 Turbo-V vent device, consisting of a vent control unit and a vent valve, is a complete unit suitable for automatic venting of the Turbo-V pump when it is switched off or during a power failure switch (refer to the following figure).

The Vent device is powered by the Turbo-V controller and a battery back-up capability is built in.

The vent control unit is provided with a delay time to avoid undesired venting during a temporary power failure and to allow closure of the system valves before venting. A second setting is also provided to control the venting time to atmosphere.

The Turbo-V pump must be vented when it is shut down to prevent the forepump oil from contaminating the Turbo-V and the connected chamber.

The 969-9831 Turbo-V vent device consists of:

- 03-660270 vent control unit
- 03-661835-02 vent valve
GENERAL

The 969-9831 Turbo-V vent device, consisting of a vent control unit and a vent valve, is a complete unit suitable for automatic venting of the Turbo-V pump when it is switched off or during a power failure switch (refer to the following figure).

The Vent device is powered by the Turbo-V controller and a battery back-up capability is built in.

---

Vent Valve

The vent valve consists of a small normally-closed straight through, electromagnetically-actuated and viton-sealed valve with an NW 10 KF flange on the high vacuum port and a filter or adapter tube 1/4” on the air entrance port. The valve closes under control of a metallic spring and opens when power is supplied to the valve electromagnet.

NOTE

A riffled nozzle is provided for use in lieu of the sintered filter when the Turbo-V pump is vented by the dry gas bottle (line).

---

Vent Control Unit

The vent control unit is powered by the Turbo-V controller (120 Vac, 50/60 Hz) via the power interconnecting connector. The vent control unit is provided with 4 rubber feet at the bottom and it is not suitable for rack mounting. Two LEDs indicate when the mains is supplied (yellow LED) and when the valve is open (red LED).

When the supply voltage is present (Turbo-V pump ON), relay RL1 allows the integral battery to be recharged, then the timer circuits are inhibited and reset. When the Turbo-V is shut off, RL1 still remains energized and the delay timer counter starts.

After the pre-set delay time, the valve opens and the venting time count starts. At the end of the venting time, relay RL1 de-energizes and the battery is disconnected. The battery is protected against short circuits.

Depth of discharge and the charging cycle are a function of ambient temperature. At high temperatures the battery capacity increases while it decreases at low temperatures.
**VENT DEVICE SPECIFICATIONS**

### Control Unit

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input: voltage</td>
<td>120 V ±10%</td>
</tr>
<tr>
<td>frequency</td>
<td>50 to 60 Hz</td>
</tr>
<tr>
<td>power</td>
<td>8 VA</td>
</tr>
<tr>
<td>fuse</td>
<td>T315 (mA)</td>
</tr>
<tr>
<td>Output: voltage</td>
<td>22.5 Vdc ±3%</td>
</tr>
<tr>
<td>power (max)</td>
<td>1.2 W</td>
</tr>
<tr>
<td>Delay time</td>
<td>Factory set to 15 seconds (adjustable up to 36 minutes)</td>
</tr>
<tr>
<td>Venting time</td>
<td>Factory set to 3 minutes (adjustable up to 36 minutes)</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>0 to 40 °C (32 °F to 104 °F)</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-20 °C to + 50 °C (-4 °F to +122 °F)</td>
</tr>
<tr>
<td>Connecting cables</td>
<td>1.5 metres long, two-conductor wire</td>
</tr>
<tr>
<td>Input line</td>
<td>5 metres long, two conductor wire</td>
</tr>
<tr>
<td>Weight</td>
<td>1.3 Kg (2.9 lbs)</td>
</tr>
</tbody>
</table>

### Vent Valve

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>High vacuum flange</td>
<td>NW 10 KF</td>
</tr>
<tr>
<td>Gas entrance</td>
<td>Rifflled nozzle 4.8 mm (0.19&quot;) O.D./Tube 1/4”</td>
</tr>
<tr>
<td>Orifice size</td>
<td>1.2 mm (0.05”)</td>
</tr>
<tr>
<td>Pressure range</td>
<td>10⁻⁶ mbar to 1bar (10⁻⁷ Torr to atm)</td>
</tr>
<tr>
<td>Leak rate</td>
<td>1x10⁻⁷ mbar l/s</td>
</tr>
<tr>
<td>Life cycle</td>
<td>One million cycles</td>
</tr>
<tr>
<td>Input: voltage</td>
<td>24 Vdc +10% -5%</td>
</tr>
<tr>
<td>power</td>
<td>1 W</td>
</tr>
<tr>
<td>Bakeout temperature</td>
<td>60 °C (140 °F)</td>
</tr>
<tr>
<td>Mounting position</td>
<td>Any</td>
</tr>
<tr>
<td>Weight</td>
<td>120 gr (0.27 lbs)</td>
</tr>
</tbody>
</table>

**TURBO-V VENT DEVICE OUTLINE**

The outline dimensions for the Turbo-V Vent Device are shown in the following figure.

![Turbo-V Vent Device Outline](image-url)
CONTROL UNIT INSTALLATION
Place the control unit free standing near the Turbo-V controller and connect the 1.5 metres long supply cable to the power interconnecting connector (120 Vac vent valve out, see the relevant Turbo-V controller instruction manual). Connect the 5 metres long valve cable to the valve connector ensuring that the positive lead (brown) is connected to pin 2 and the negative lead (blue) to pin 1.

NOTE
When first installed or after 6 months of non-use, leave the control unit under voltage for at least 3 hours in order to fully recharge the battery before use.

VENT VALVE INSTALLATION
Connect the NW 10 KF port to the chamber or pump vent port. This port is compatible with an NW 16 KF flange having an adaptive centering ring.

NOTE
Use the provided filter to prevent the ingress of dust, dirt or contaminants, when the pump is vented to atmosphere.

CAUTION
When a dry gas bottle (line) is used, never exceed 1 bar (15 psig) to the rifled nozzle connection, otherwise a leak in the Turbo-V pump may occur.

CAUTION
When a dry gas bottle line is used, check the correct venting time to prevent overpressuring the Turbo-V pump.

CAUTION
It is strongly recommended to power the vent unit using the 120 Vac terminal available on the Turbo-V controller rear panel. This will ensure that it is correctly sequenced.

NOTE
The Turbo-V vent device has been designed to vent the Turbo-V pump only. To vent the chamber, it is advisable to install a suitable vent valve.

OPERATION
When the Turbo-V pump starts, the yellow LED lights, indicating that the battery is being charged and the set timers are reset. If the pump is switched off or a power failure occurs, the yellow LED goes off and the delay time starts. At the end of delay, the valve (red) LED lights and the valve opens for the set time. At the end of the venting time the valve closes, the valve (red) LED goes off, and the battery is switched off. If during the delay or venting time the Turbo-V pump is switched on (even if only for a few seconds) both delay and venting time are reset.

NOTE
A charged battery is able to supply a minimum of 3 complete venting cycles with the maximum delay and venting time.

CAUTION
The life of the battery is affected by ambient temperature. Never exceed the specified operating temperature and replace the battery every 30 months.
TIME SETTING

![WARNING!]

High voltage present in the control unit can cause severe injury or death. Service must be carried out only by qualified and authorized personnel.

Disconnect the vent controller from the power interconnecting connector on the Turbo-V controller and remove the top cover of the vent control unit by undoing the four bottom screws.

Choose the appropriate times, make the appropriate jumper setting and position the rotary switch (refer to the following figure). Place only one jumper for each time and then turn the rotary switch multiplier for the desired value.

E.g: to set a delay time of 30 seconds and a venting time of 4 minutes proceed as follows:

- Adjust the delay time rotary switch to 8 and place the jumper across 1/16 minute.
- Adjust the venting time rotary switch to 8 and place the jumper across 1/2 minute.

![Times Selector](image)

**WARNING!**

Use the appropriate tool to adjust the time settings to avoid damages to the rotary switches.

The minimum venting times for each Turbo-V pump series with the high vacuum flange blanked off and leak tight, are listed below.

- Turbo-V 60/80 2/16 minute
- Turbo-V 200/250 3/6 minute
- Turbo-V 300 4/16 minute
- Turbo-V 450 7/16 minute
- Turbo-V 1000 0.5 minute
- Turbo-V 1800 1 minute
- Turbo-V 3500 1.5 minutes
- Turbo-V 6000 4 minutes

The minimum venting time is the time needed to reach a pressure of about 500 mbar (375 Torr) inside the pump in order to avoid mechanical pump oil backstreaming and contamination of the Turbo-V pump.
VENT CONTROL UNIT DESCRIPTION

The control unit has three main sections: power circuit, protection circuit, and time circuit (refer to following figure).

Power Circuit
The mains voltage is stepped down to 12 Vac, which is rectified by the full wave bridge rectifier smoothed by capacitor C1 and regulated by U8. The output voltage of U8 is adjusted by P3 to 6.9 V and feeds the battery timer circuit, and U7 which steps up the voltage at 23 V. The output of U7 adjusted by P2 drives the vent valve.

Protection Circuit
If the leads are shorted together or the vent valve coil is shorted, transistor Q2 detects the condition and drives Q1 to deenergize relay RL1 and consequently the battery is disconnected.

To avoid complete discharge of the battery, a sensor circuit is provided. When the battery voltage reaches 4.5 V, transistor Q4 is cut off.

Subsequently, relay RL1 deenergizes and the battery is disconnected.

Even though the battery is designed to accept overcharging, to avoid thermal runaway problems caused by overcharging, diodes D7 and D9 are provided. This circuit allows an automatic adjustment of the charging voltage in relation to the environment temperature.

Timer Circuit
Two similar timer circuits are provided, where U5, U4 are the clocks and U3, U2 are the step-down counters presettable by jumpers and rotary switches.

When the mains voltage is supplied, the step-down counter U3 is inhibited by a high preset enable signal at pin 1 and U5 is reset by a positive pulse at pin 6 (master reset).

When mains is switched off, U3 starts to count down and at the end of delay removes the enable signal from pin 1 of U2 that starts the venting time and allows the vent valve to open.
## TURBO-V VENT DEVICE REPLACEMENT PARTS

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>PART NUMBER</th>
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<tr>
<td>Vent valve (complete)</td>
<td>03-661718-02</td>
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<tr>
<td>Gas filter</td>
<td>28-900008-01</td>
</tr>
<tr>
<td>Battery 6 V 1Ah</td>
<td>74-103100-01</td>
</tr>
<tr>
<td>Relay 6V</td>
<td>72-114110-01</td>
</tr>
<tr>
<td>Transformer T1 (120/12V, 8VA)</td>
<td>03-660295</td>
</tr>
<tr>
<td>L.E.D. (yellow) LT4223</td>
<td>67-560005</td>
</tr>
<tr>
<td>L.E.D. (red) LT4253</td>
<td>67-560004</td>
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For a complete overview of Varian's extensive vacuum product line, please refer to the Varian Vacuum Catalogue.

![Turbo-V Vent Control Unit Schematic Diagram](image-url)
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**
  - Varian SpA
  - 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

<table>
<thead>
<tr>
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<th>Contact person: Name:</th>
<th>Tel:</th>
<th>Fax:</th>
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<th>USA only:</th>
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<td>Taxable</td>
</tr>
<tr>
<td>Customer Ship To:</td>
<td>Customer Bill To:</td>
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PRODUCT IDENTIFICATION

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<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 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**

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<tr>
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<th>Position</th>
<th>Parameters</th>
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<tr>
<td>Does not start</td>
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<td>Power: Rotational Speed:</td>
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<tr>
<td>Does not spin freely</td>
<td></td>
<td>Current: Inlet Pressure:</td>
</tr>
<tr>
<td>Does not reach full speed</td>
<td></td>
<td>Temp 1: Foreline Pressure:</td>
</tr>
<tr>
<td>Mechanical Contact</td>
<td></td>
<td>Temp 2: Purge flow:</td>
</tr>
<tr>
<td>Cooling defective</td>
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**POSITION PARAMETERS**

- Vertical
- Horizontal
- Upside-down
- Other: Overtemperature

**ION PUMPS/CONTROLLERS**

- Bad feedthrough
- Vacuum leak
- Error code on display

**TURBOCONTROLLER ERROR MESSAGE:**

**VALVES/COMPONENTS**

- Main seal leak
- Bellows leak
- Solenoid failure
- Damaged flange
- Damaged sealing area
- Other

**LEAK DETECTORS**

- Cannot calibrate
- Vacuum system unstable
- Failed to start

**INSTRUMENTS**

- Cannot calibrate
- No zero/high background
- Cannot reach test mode
- Other

**PRIMARY PUMPS**

- Pump doesn’t start
- Doesn’t reach vacuum
- Pump seized

**DIFFUSION PUMPS**

- Heater failure
- Electrical problem
- Doesn’t reach vacuum
- Cooling coil damage
- Vacuum leak
- Other

**Customer application:**

<table>
<thead>
<tr>
<th>Issue</th>
<th>Value</th>
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<tbody>
<tr>
<td>Bad feedthrough</td>
<td>Poor vacuum</td>
</tr>
<tr>
<td>Vacuum leak</td>
<td>High voltage problem</td>
</tr>
<tr>
<td>Error code on display</td>
<td>Other</td>
</tr>
<tr>
<td>Customer application</td>
<td></td>
</tr>
</tbody>
</table>

**OPERATION TIME:**

**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 Aufrage ist diese Unterlage auch auf Deutsch, Italienisch und Französisch erhältlich.*
Argentina
Varian Argentina Ltd.
Sucursals 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 6608 1530
Fax: (86) 10 6608 1534

France and Wallonie
Varian s.a.
7 avenue des Troiques
Z.A. de Courtaboef – 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
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