

***Turbo-V70  
controller  
Eurocard***

**Model 969-9514**

*INSTRUCTION MANUAL*

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**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.)



# SAFETY SUMMARY

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:



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

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

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## **NOTE**

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

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**1-1 General**

The Turbo-V70 controller eurocard is a microprocessor-controlled, solid-state, frequency converter with self-diagnosis and protection features.

The controller drives the Turbo V-70 pump series by controlling the voltage and current respect to the speed reached by pump.

It incorporates all the facilities required for the operation of the Turbo-V70 pump series: pump start/stop, digital current and speed control, analog signals for external indicators.

The power is externally supplied.

All the input/output connections are performed on three connectors (J2, J3 and J4).

The controller is also designed to be controlled by a host computer via an RS-232 connection (connector J5).

**1-2 Turbo-V70 controller eurocard description**

The controller is a solid-state frequency converter which is driven by a single chip microcomputer and is composed of a PCB which includes all the circuitry necessary for its operation.

The microcomputer generates the variable output voltage according to the software and the gas load condition of the pump.

Moreover, it manages signals from sensors, input/output connection information, and gives output for a fully automatic operation.

The controller can be operated via remote signals through an RS-232 connection. The RS-232 signals are available on J5 connector.

The controller can be operated in local mode through suitable switches connected between the input pins of J4 connector and ground (see para. 2-4 for a detailed description of the input signal present on J4 connector).

**1-3 Controller specifications**

Input: - Voltage - Power	20.4 to 32.2 Vdc with 2 Vpp max ripple 60 W min.
Output: - Voltage - Frequency - Power	42 Vac nominal $\pm 10\%$ , 3-phase 1250 Hz, $\pm 2\%$ 54 W maximum
Operating temperature	0°C to + 40 °C
Storage temperature	-20°C to + 70°C
Weight	0.5 Kg (1.1 lbs)

**1-4 Controller outline**

The outline dimension for the controller are shown in Fig. 1-1.

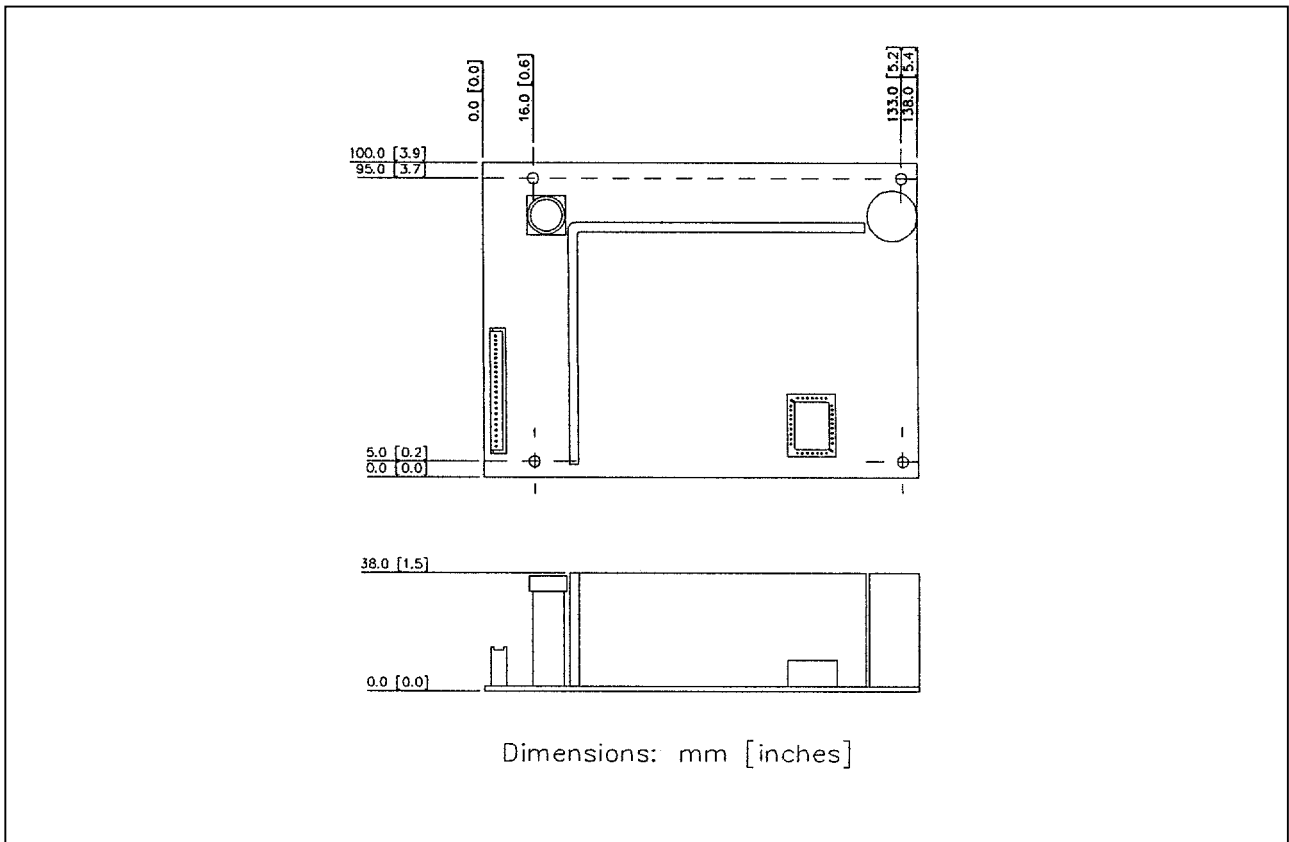


Figure 1-1 Controller outline

## 2-1 General

Inspect the controller for any shipping damage.

The controller is designed to be installed into a rack.

All the connections are fitted to J2, J3, J4 and J5 connectors.

Should the controller be connected to a host computer via the-RS-232 interface, a suitable cable must be prepared.

In the following paragraphs are detailed the input/output signals.

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### NOTE

The PCB installed into the customer system must be positioned so that cold air (forced or natural convection) can flow through the PCB components.

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## 2-2 J2 connector

The signals of J2 connector are the following:

- **Pins 1/2** Power supply 24. Vdc (20 to 32 Vdc) (pin 2 positive).
- **Pins 4/3** KI relay contacts. The relay switches when the output frequency overrides the set threshold (800 Hz). The threshold overriding is indicated also on pin 6 of J4 connector.

## 2-3 J3 connector

The signals of J3 connector are the following:

- **Pin 1** 42 Vac 3-phase output to pump motor stator (phase T).
- **Pin 2** 42 Vac 3-phase output to. pump motor stator (phase S).
- **Pin 3** 42 Vac 3-phase output to pump motor stator (phase R).
- **Pins 5/4** Pump temperature sensor.

## 2-4 J4 connector

The signals of J4 connector are the following:

- **Pin 3** Failure. When a fault condition is detected, the pump is stopped and a signal is present on this pin.
- **Pin 5** Low Speed mode activated. When the Low Speed mode is activated a signal is present on this pin.
- **Pin 6** When the output frequency is less than 800 Hz, a signal is present on this pin.
- **Pin 7** Analog output. A voltage from 0 to 10 Vdc proportional to the supply current (from 0 to 2.5 A).
- **Pin 8** Analog output. A voltage from 0 to 10 Vdc proportional to the output pump motor driving frequency (from 0 to 1250 Hz).
- **Pin 11** Error reset command. Should an operation fault be detected (presence of signal on pin 3 of J4), the pump is stopped. To reset the fault you must connect pin 11 to ground (pin 15 of J4) for at least 1 sec.
- **Pin 12** ON/OFF pump. To stop the pump you must connect pin 12 to ground (pin 15 of J4); to start the pump you must remove the contact between pin 12 and ground.
- **Pin 13** Low Speed mode activation. When the contact between pin 13 and ground (pin 15 of J4) closes, the turbopump runs at low speed and when the contact opens, the turbopump reverts to high speed mode. When the Low Speed mode is activated an output signal is present on pin 5 of J4. The Low Speed frequency is 830 Hz.

## 2-5 J5 RS-232 interface connector

The signal of J5, the RS-232 interface connector, are the following:

- **Pin 1** Ground.
- **Pin 2** RXD. Received data.
- **Pin 3** TXD. Transmitted data.







**3-1 General**

Make all vacuum manifold and electrical connections and refer to Turbo-V pump instruction manual prior to operating the Turbo-V controller.

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**WARNING**

To avoid injury to personnel and damage to the equipment, if the pump is laying on a table make sure it is steady.  
Never operate the Turbo-V pump if the pump inlet is not connected to the system or blanked off.

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The controller operates completely automatically after the remote start command is given.

**3-2 Switching on/off the pump**

To switch on the pump is necessary to remove the connection between pin 12 of J4 connector and pin 15 (ground) of the same connector.

To switch off the pump is necessary to connect pin 12 of J4 connector to pin 15 (ground) of the same connector.

**3-3 Low speed activation/deactivation**

To activate the Low Speed status it is necessary to connect pin 13 of J4 connector to pin 15 (ground) of the same connector.

To deactivate the Low Speed status it is necessary to disconnect pin 13 of J4 connector from pin 15 (ground) of the same connector.

The low speed status is available on pin 5 of the same connector.

The low speed frequency is equal to 830 Hz.

**3-4 Error reset**

If the controller identifies an error, the pump is switched off. After the error cause has been removed, the pump does not automatically run up. It is necessary to reset the error status: this is performed connecting pin 11 of J4 connector to pin 15 (ground) of the same connector for at least 1 second.

**4-1 General**

Replacement controllers are available on an advance exchange basis through Varian. If necessary, information is provided to aid the operator in determining malfunctions and corrective steps to be taken.

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**WARNING**

Voltages developed in the unit are dangerous and may be fatal. Service must be performed by authorized personnel only.

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**4-2 Error messages**

For a certain type of failure, the controller will self-diagnose the error and the following messages will be displayed.

The controller signals the error occurred by means of a diagnostic LED located on the board, and on the RS 232 port.

The LED blinks in a coded mode: it flashes a number of time equal to the error code (see the following table) and then stays off, and so on.

**Error Code Table**

LED BLINKING NUMBER	DESCRIPTION
0	No error
1	Output current > 15 A
2	Not connected pump
3	Output current > 1.5 A for 15 sec.
4	Bearing temperature > 60 °C
5	Heat exchanger temperature > 60 °C
6	Normal not reached at run up time
7	Input voltage < 16 V for 5 sec.
8	Operating voltage < 10 V for 5 sec.
9	Vp voltage 8V lower than nominal for 5 sec.
10	Soft start ramp not ended within the expected time

**4-3 Accessories and spare parts**

DESCRIPTION	PART NUMBER
Cable 60 cm long with connector	969-9868



# 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.

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**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.#: .....
<i>Europe only:</i> VAT reg. Number: .....	<i>USA only:</i> <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: <hr/> OPERATION TIME:
<b>TURBOCONTROLLER ERROR MESSAGE:</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 Aufrage ist diese Unterlage auch auf Deutsch, Italienisch und Französisch erhältlich.

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#### Customer Service & Technical Support:

[vtt.customer.service@varianinc.com](mailto:vtt.customer.service@varianinc.com)

#### Worldwide Web Site:

[www.varianinc.com/vacuum](http://www.varianinc.com/vacuum)

#### Order On-line:

[www.evarian.com](http://www.evarian.com)

Representatives in most countries



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