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Turbo-V60 Leak Detector PCB Controller

Model
969-9840

User Manual

87-900-865-01 (C)
04/2011



Agilent Technologies

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Vacuum Products Division

Via F.lli Varian, 54

10040 Leini (TO)

ITALY

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Safety Notices

CAUTION

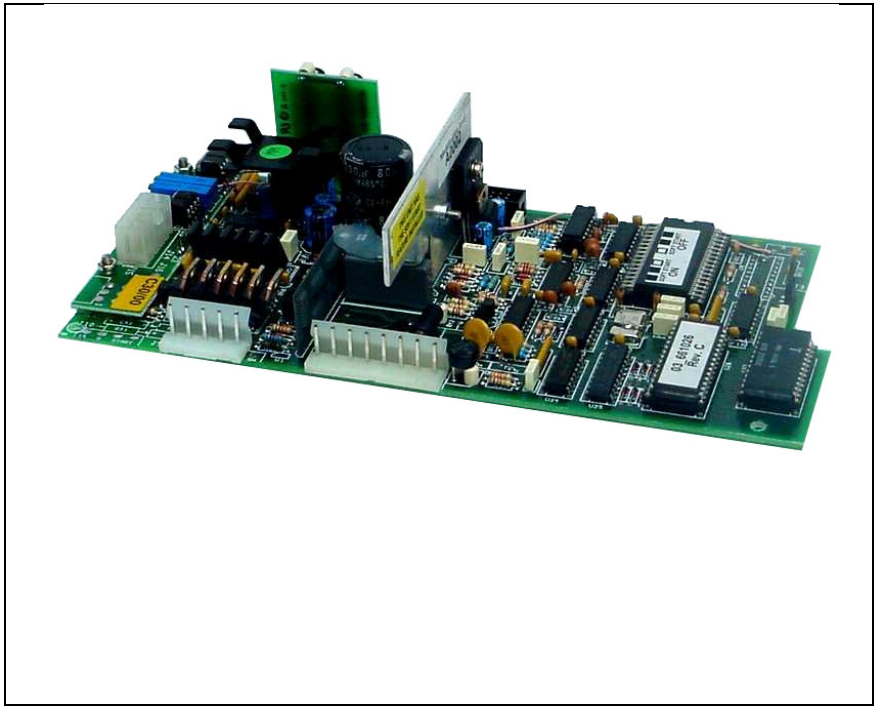
A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

WARNING

A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

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Turbo-V 60 Leak Detector PCB Controller



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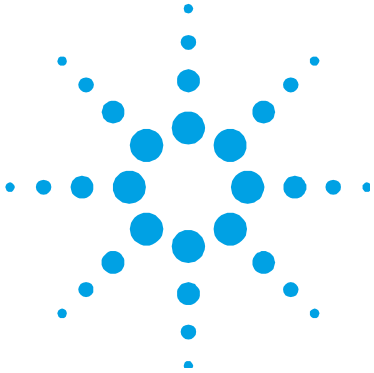
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Safety Summary

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 Agilent.

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

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

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

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



NOTE Infomation to aid the operator in obtaining the best performance from the equipment.

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Description

General

The Turbo-V60 Leak Detector PCB controller is a microprocessor-controlled, solid-state, frequency converter with self-diagnostic and protection features.

The controller drives (within ten steps) the Turbo V-60 pump during the starting phase by controlling the voltage and current respect to the speed reached by the pump.

It incorporates all the facilities required for the automatic operation of the Turbo-V60 pump series. Remote start/stop and output control capability are provided via auxiliary connectors.

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Turbo-V60 Controller Description

The controller is a solid-state frequency converter which is driven by a single chip microcomputer. The package composition is:

- Power transformer with interconnection cables
- PCB including: power supply and 3-phase output, analog and input/output section, microprocessor and digital section
- Controller to pump interconnection cable.

The power supply and the 3-phase output converts the single phase (50-60 Hz) AC mains supply into a 3-phase, low voltage, medium frequency output which is required to power the Turbo-V pump.

The microcomputer generates the variable output frequency and controls the 3-phase output voltage according to the software and the gas load condition of the pump.

Moreover, it manages input and output signals for a fully automatic operation.

A dedicated non-volatile RAM is used to store pump operating parameters and the input/output programmed information upon failure for a period of 10 years accumulated off time.

Two adjustable trimmers are provided to set the pump rotational speed as follows:

- P1 – High speed trimmer: 50 to 70 KRPM
- P2 – Low speed trimmer: 30 to 50 KRPM

The controller can be operated via remote signals through input/output connector.

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Controller Specifications

Input:	
Voltage	Two ranges selectables on a three pin connector on the transformer primary: - 120 Vac±20%, - 220 Vac±20%, 1-phase
Frequency	47 to 63 Hz
Power	350 VA maximum
Output:	
Voltage	54 Vac nominal ±10%, 3-phase
Frequency	1167 Hz, ±2%
Power	150 W maximum
Operating temperaure	0 °C to + 40 °C
Storage temperature	-20 °C to + 70 °C
J2 optoisolator input	4 to 12 Vdc
J2 optoisolator output	ICsat 1.6 mA VCE max 0.6 V VCEO 70 V
Interconnecting cables	Pump cable (5-wire,55 cm long)
Weight	0.5 Kg (1.1 lbs)

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Controller Outline

The outline dimensions for the Turbo-V60 Leak Detector PCB controller are shown in Fig. 1

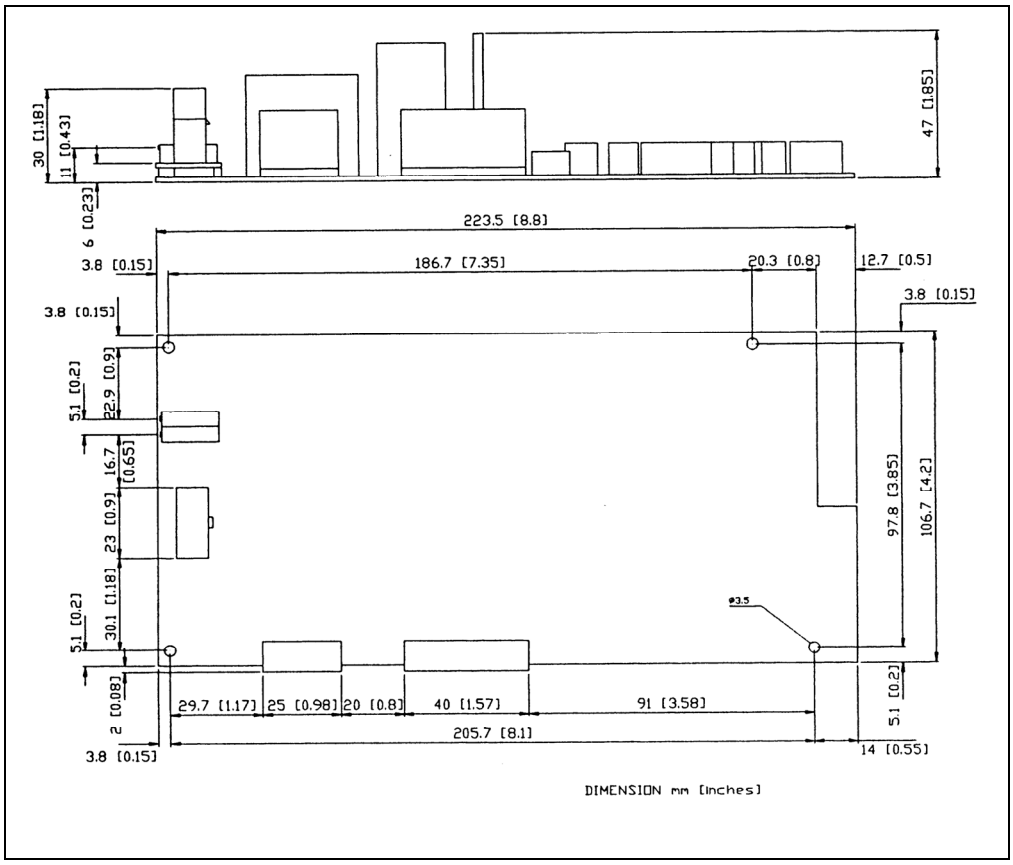


Figure 1 Controller outline

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Installation

General

Inspect the controller for any shipping damage.

WARNING! **High voltage developed in the controller can cause severe injury or death. Before servicing the unit, disconnect the input power cable.**



NOTE The PCB installed into the customer system must be positioned so that cold air (forced or natural convec-tion) can flow through the PCB components

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Line Voltage Selection

The controller can operates with two ranges of input voltage:

- 120 Vac ±20%
- 220 Vac ±20%

The line voltage selection is done on the three pin male connector on the primary wires of the transformer:

- for 120 Vac connect the line wires as follows:
  - 120 Vac to pin 2 (white)
  - 0 V to pin 3 (bleu)
- for 220 Vac connect the line wires as follows:
  - 220 Vac to pin 1 (brown)
  - 0 V to pin 3 (bleu)

NOTE The mating connector and the female pins are provided

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Power Interconnections

The power supply from the external transformer must be connected to J8 connector

See Fig. 2 for interconnections detail.

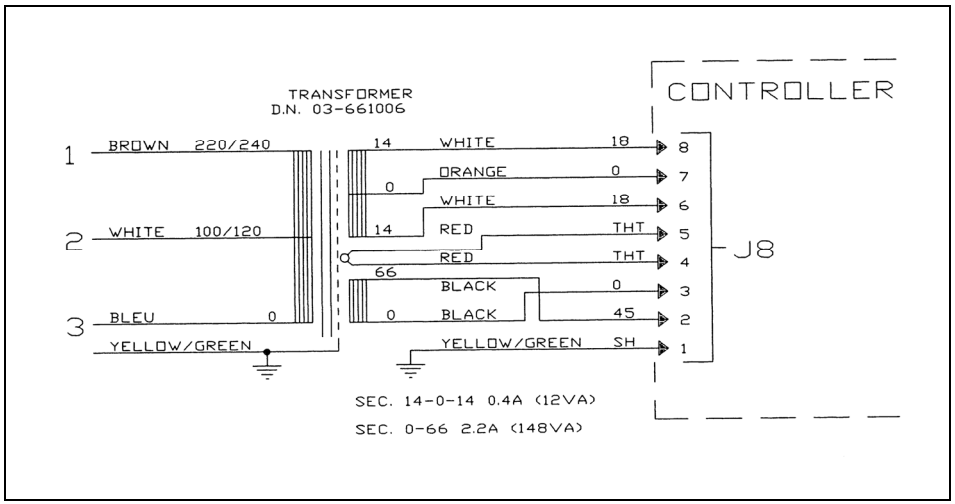


Figure 2 J8 connector interconnections

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Input/Output Interconnections

All the input/output signals to the controller must be connected at J15 mating connector (see Fig. 3).

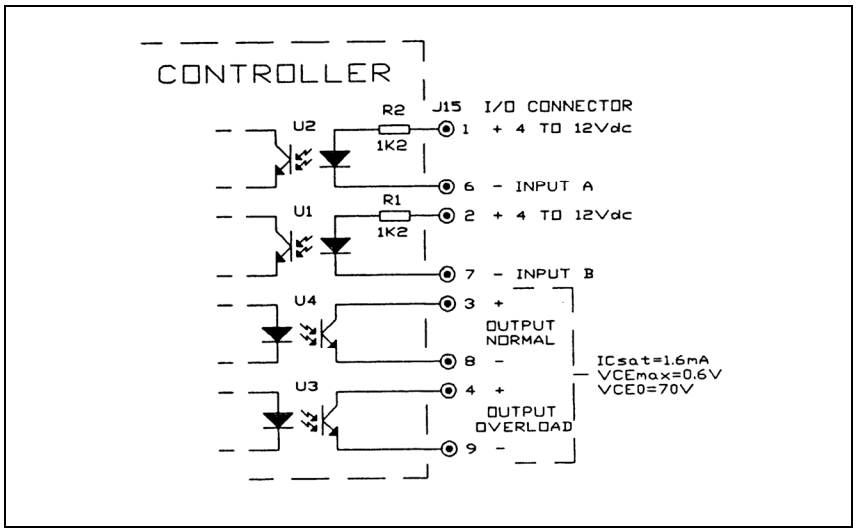


Figure 3 Input/Output connector

Pin 1-6 Input A optically isolated from the internal circuit.

In conjunction with the Input B determines the controller mode of operation according to the following truth table.

Pin 2-7 Input B optically isolated from the internal circuit.

In conjunction with the Input A determines the controller mode of operation according to the following truth table.

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INPUT SIGNAL LOGIC LEVEL		CONTROL UNIT CONDITION
A	B	
LOW	LOW	LOW FREQUENCY
LOW	HIGH	HIGH FREQUENCY
HIGH	LOW	HIGH FREQUENCY
HIGH	HIGH	LOW FREQUENCY

Pin 3-8 Output Normal optically isolated from the internal circuit.

Pin 4-9 Output Overload optically isolated from the internal circuit.

Turbo-V Pump Connection

A 55 cm long cable is provided to connect the controller to the pump.

Figure 4 shows the pump output connector configuration where pins:

Pins A-F = pump temperature sensor

Pins B-C-D = 54 Vac 3-phase output to pump motor stator

Pin E = ground.

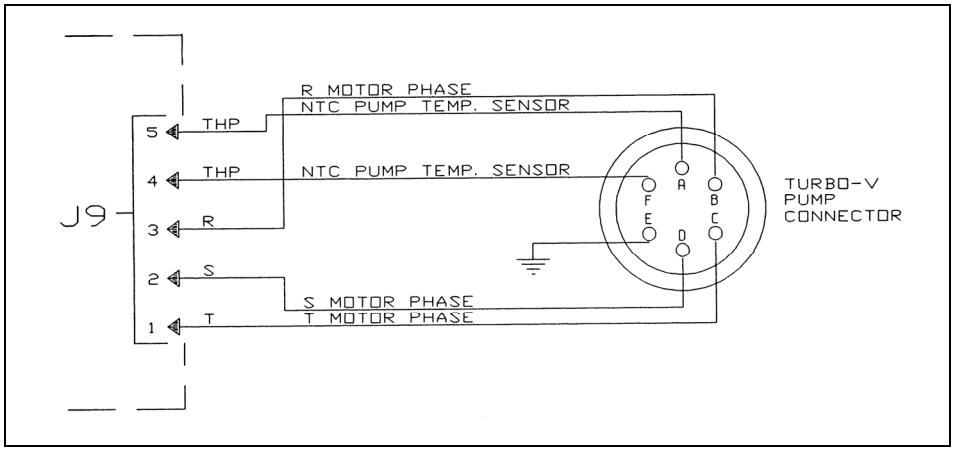


Figure 4 Turbo-V pump connector

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Operation

General

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

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.

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

The only user available commands are two trimmers to set the pump rotational speed: the first one (P1) sets the high speed, the second (P2) sets the low speed.

The two trimmers are factory preset as follows:

- P1 (high speed) to 60 KRPM
- P2 (low speed) to 33 KRPM

To select different rotational speeds, act on the appropriate trimmer. The variation ranges are:

- P1: 50 to 70 KRPM
- P2: 30 to 50 KRPM

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Startup

Plug the controller power cable into a suitable power source.

The controller is factory preset with the Soft Start mode enabled that allows the pump to ramp-up to Normal speed slowly with a minimum ramp-up time of 75 seconds and a maximum of about 45 minutes.

If it is necessary to deselct this mode refer to paragraph 3-3.

If the Soft Start mode is deselected, the ramp-up will be done within 60 seconds.

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Soft Start Mode Deselection

The Soft Start mode is enabled and disabled by means of a jumper located on the controller PCB.

To deselect the Soft Start mode operate as follows:

- Disconnect the power from the controller.
- Move the red jumper from the actual position to the other according to the label attached over the integrated circuit near the jumper (see Fig. 5).
- Connect the power.

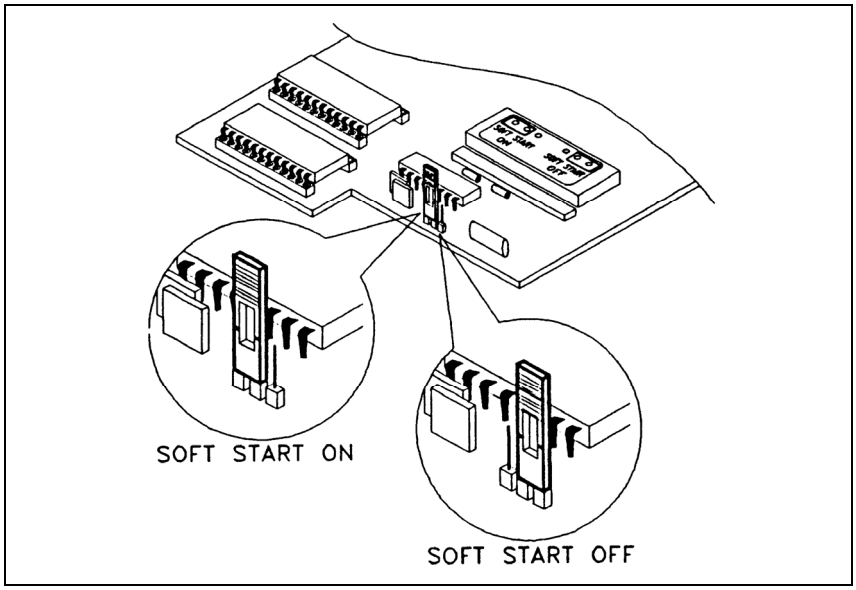


Figure 5 Soft Start jumper

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Starting the Pump

To start the pump it is necessary to set the Input A and Input B signals on J15 connector both to low logic level, or one to low and the other to high logic level.

In the first case the output to the pump is at low frequency, in the other case the output is at high frequency.

The time to change the speed from low frequency (33 KRPM) to high frequency (60 KRPM) is 12 sec.

The time to change from high frequency (60 KRPM) to low frequency (33 KRPM) is 3 sec.

Pump Shutdown

To shutdown the pump it is necessary to set the Input A and Input B signals on J15 connector both to high logic level.

Power Failure

In the event of a power failure (momentary or long term), the Turbo-V controller will stop the turbopump.

When power is restored, the Turbo-V controller automatically restarts the turbopump.

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Maintenance

General

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

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



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Controller Test

a) Equipment required

- Digital voltmeter (DVM) true RMS.
- Dummy load: 3 x 48Ω, 50W each or 3 x 78Ω, 50W each.
- Potentiometer 50KΩ, 1/4W minimum.

b) Test set up

- Remove the power cable.
- Disconnect the Turbo-V controller.
- Set potentiometer to 30KΩ and connect it as directed in Fig. 6.

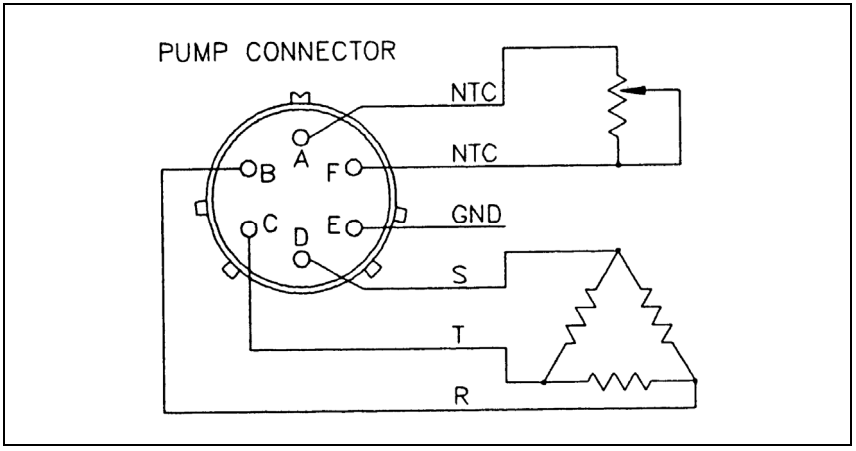


Figure 6 Dummy load connections

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Power supply test

a) DC voltage test

Check the DC voltages referring to test points indicated in Fig. 4-2. Refer also to Figg. 4-3 and 4-4. The meter should read:

- + 5Vdc ± 5%
- ± 12 Vdc ± 5%
- Ground reference = case of Q3.

Switch on the controller and check:

- 54 Vdc ± 10% between TP3(-) a TP5(+) (Fig. 4-2).

b) AC three-phase output voltage test

On the pump connector connect the DVM in turn between:

pins B and C, B and D, C and D.

The meter should read 44 Vac ±15%; a different value of 0.4 Vac is tolerable between phase and phase.

Test with dummy load

- Connect the 48Ω or the 78Ω dummy loads to the pump connector pins B, C, D as shown in Fig. 4-1.
- Disconnect the potentiometer, set it to 10KΩ, and then reconnect it.
- Connect the power cable.
- Switch on the controller and check the values as per he following table.

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	During start-up without Soft Start mode		After start-up	
	With 48Ω dummy load	With 78Ω dummy load	With 48Ω dummy load	With 78Ω dummy load
Current ±10%	1.62 A	1.1 A	1 A	1 A
Power ±10%	80 W	58 W	30 W	48 W
Speed ±4KRPM	17	70	40	63
Temperature ±2°C	52° C	52° C	52° C	52° C

- Check the 3-phase ac output voltage.

  After start up it should be:

  36 Vac with 78Ω dummy load and

  21 Vac with 48Ω du y load.

Switch off the controller and remove the power cable.

Pump over-temperature test

- Disconnect the potentiometer, set it to 5KΩ, and then reconnect it.
- Disconnect the dummy loads.
- Connect the power cable.
- Switch on the controller.
- Check the 3-phase ac output voltage. It should be zero.
- Switch off the controller and remove power cable.

Functional test

Perform the functional test with the turbo-pump, taking care to check the ramp sequence and start up time.

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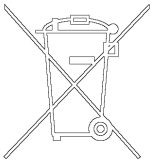
Disposal

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.



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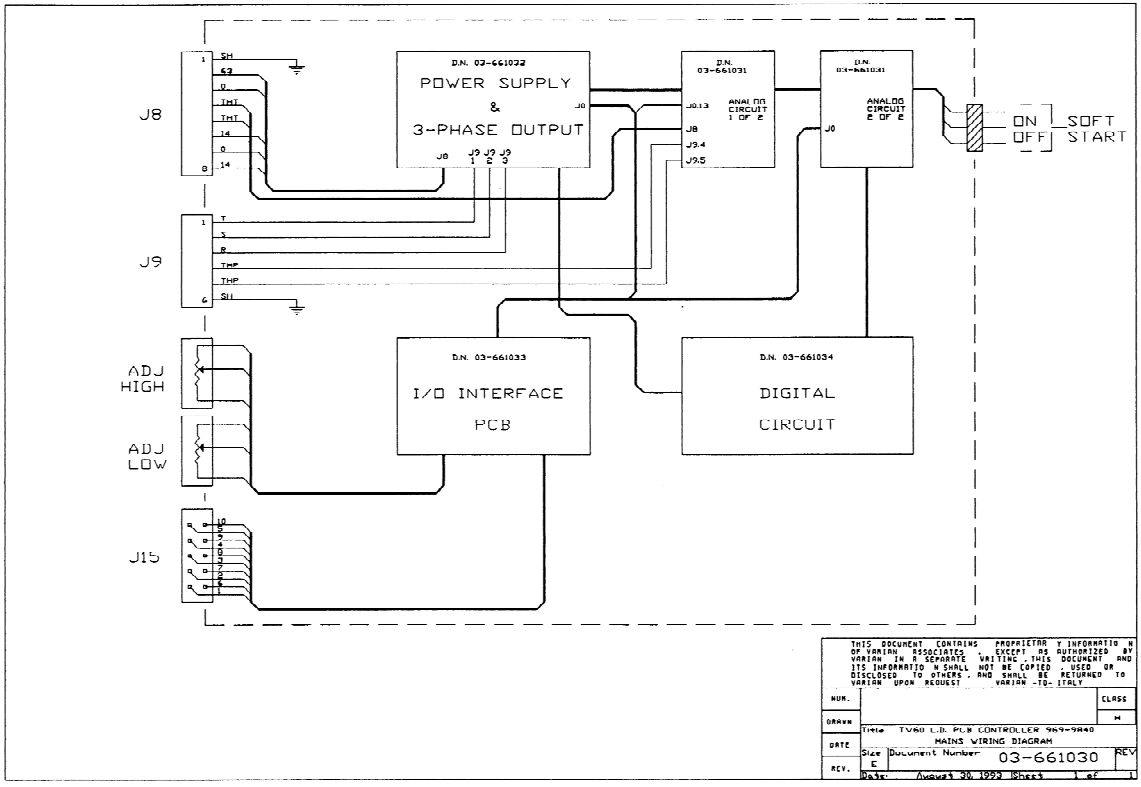


Figure 1

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Agilent Technologies

Vacuum Products Division

Dear Customer,

Thank you for purchasing an Agilent vacuum product. At Agilent Vacuum Products Division 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 products. 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.



Giampaolo LEVI

Vice President and General Manager
Agilent Vacuum Products Division

Note: Fax or mail the Customer Request for Action (see backside page) to Agilent Vacuum Products Division (Torino) – Quality Assurance or to your nearest Agilent representative for onward transmission to the same address.

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CUSTOMER REQUEST FOR CORRECTIVE / PREVENTIVE / IMPROVEMENT ACTION

TO: AGILENT VACUUM PRODUCTS DIVISION TORINO – QUALITY ASSURANCE

FAX N°: XXXX-011-9979350

ADDRESS: AGILENT TECHNOLOGIES ITALIA S.p.A. – Vacuum Products Division –

Via F.lli Varian, 54 – 10040 Leinì (TO) – Italy

E-MAIL: vpd-qualityassurance_pdl-ext@agilent.com

NAME	COMPANY	FUNCTION
_____	_____	_____

ADDRESS:

_____

TEL. N° : _____ FAX N° : _____

E-MAIL: _____

PROBLEM / SUGGESTION :

_____

_____

_____

_____

_____

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

_____

_____

_____

DATE _____

CORRECTIVE ACTION PLAN / ACTUATION (by AGILENT VPD) LOG N° _____

_____

_____

_____

_____

_____

_____

XXX = Code for dialing Italy from your country (es. 01139 from USA; 00139 from Japan, etc.)

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Agilent Technologies

Vacuum Products Division
Instructions for returning products

Dear Customer:

Please follow these instructions whenever one of our products needs to be returned.

1) Complete the attached Request for Return form and send it to Agilent Technologies (see below), taking particular care to identify all products that have pumped or been exposed to any toxic or hazardous materials.

2) After evaluating the information, Agilent Technologies will provide you with a Return Authorization (RA) number via email or fax, as requested.
Note: Depending on the type of return, a Purchase Order may be required at the time the Request for Return is submitted. We will quote any necessary services (evaluation, repair, special cleaning, eg).

3) **Important steps for the shipment of returning product:**
   - Remove all accessories from the core product (e.g. inlet screens, vent valves).
   - Prior to shipment, drain any oils or other liquids, purge or flush all gasses, and wipe off any excess residue.
   - If ordering an Advance Exchange product, **please use the packaging from the Advance Exchange to return the defective product.**
   - Seal the product in a plastic bag, and package product carefully to avoid damage in transit. You are responsible for loss or damage in transit.
   - Agilent Technologies is not responsible for returning customer provided packaging or containers.
   - **Clearly label package with RA number.** Using the shipping label provided will ensure the proper address and RA number are on the package. Packages shipped to Agilent without a RA clearly written on the outside cannot be accepted and will be returned.

4) Return only products for which the RA was issued.

5) **Product being returned under a RA must be received within 15 business days.**

6) **Ship to the location specified on the printable label, which will be sent, along with the RA number, as soon as we have received all of the required information.** Customer is responsible for freight charges on returning product.

7) Return shipments must comply with all applicable **Shipping Regulations** (IATA, DOT, etc.) and carrier requirements.

RETURN THE COMPLETED **REQUEST FOR RETURN** FORM TO YOUR NEAREST LOCATION:

EUROPE:	**NORTH AMERICA:**	**PACIFIC RIM:**
Fax: 00 39 011 9979 330		
Fax Free: 00 800 345 345 00	Fax: 1 781 860 9252	please visit our website for individual
Toll Free: 00 800 234 234 00	Toll Free: 800 882 7426, Option 3	office information
vpt-customercare@agilent.com	vpl-ra@agilent.com	http://www.agilent.com

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Vacuum Products Division
Request for Return Form
(Health and Safety Certification)

Please read important policy information on Page 3 that applies to all returns.

1) CUSTOMER INFORMATION

Company Name:	**Contact Name:**
Tel: **Email:**	**Fax:**
Customer Ship To:	**Customer Bill To:**
Europe only: **VAT reg. Number:**	USA/Canada only: ☐ **Taxable** ☐ **Non-taxable**

2) PRODUCT IDENTIFICATION

Product Description	Agilent P/N	Agilent S/N	Original Purchasing Reference

3) TYPE OF RETURN (**Choose one from each row** and supply Purchase Order if requesting a billable service)

3A. ☐ Non-Billable ☐ Billable ➡ New PO # (hard copy must be submitted with this form):

3B. ☐ Exchange ☐ Repair ☐ Upgrade ☐ Consignment/Demo ☐ Calibration ☐ Evaluation ☐ Return for Credit

4) HEALTH and SAFETY CERTIFICATION

AGILENT TECHNOLOGIES CANNOT ACCEPT ANY PRODUCTS CONTAMINATED WITH BIOLOGICAL OR EXPLOSIVE HAZARDS, RADIOACTIVE MATERIAL, OR MERCURY AT ITS FACILITY.
Call Agilent Technologies to discuss alternatives if this requirement presents a problem.

The equipment listed above (check one):

☐ **HAS NOT** pumped or been exposed to any toxic or hazardous materials. OR

☐ **HAS** pumped or been exposed to the following toxic or hazardous materials. If this box is checked, the following information must also be filled out. Check boxes for all materials to which product(s) pumped or was exposed:

☐ Toxic ☐ Corrosive ☐ Reactive ☐ Flammable ☐ Explosive ☐ Biological ☐ Radioactive

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

_____

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

Print Name: **Authorized Signature:** ..... **Date:**

5) FAILURE INFORMATION:

Failure Mode (REQUIRED FIELD. See next page for suggestions of failure terms):
Detailed Description of Malfunction: (Please provide the error message)
Application (system and model):

I understand and agree to the terms of Section 6, Page 3/3.
Print Name: **Authorized Signature:** ..... **Date:**

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Agilent Technologies

Vacuum Products Division
Request for Return Form
(Health and Safety Certification)

Please use these Failure Mode to describe the concern about the product on Page 2.

TURBO PUMPS and TURBO CONTROLLERS

APPARENT DEFECT/MALFUNCTION		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	.....	OPERATING TIME:	

ION PUMPS/CONTROLLERS

- Bad feedthrough	- Poor vacuum
- Vacuum leak	- High voltage problem
- Error code on display	- Other

VALVES/COMPONENTS

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

LEAK DETECTORS

- Cannot calibrate	-No zero/high backround
- Vacuum system unstable	- Cannot reach test mode
- Failed to start	- Other

INSTRUMENTS

- Gauge tube not working	- Display problem
- Communication failure	- Degas not working
- Error code on display	- Other

SCROLL AND ROTARY VANE PUMPS

- Pump doesn't start	- Noisy pump (describe)
- Doesn't reach vacuum	- Over temperature
- Pump seized	- Other

DIFFUSION PUMPS

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

Section 6) *ADDITIONAL TERMS*

Please read the terms and conditions below as they apply to all returns and are in addition to the Agilent Technologies Vacuum Product Division – Products and Services Terms of Sale.

- Customer is responsible for the freight charges for the returning product. Return shipments must comply with all applicable **Shipping Regulations** (IATA, DOT, etc.) and carrier requirements.
- Customers receiving an Advance Exchange product agree to return the defective, rebuildable part to Agilent Technologies **within 15 business days**. Failure to do so, or returning a non-rebuildable part (crashed), will result in an invoice for the non-returned/non-rebuildable part.
- Returns for credit toward the purchase of new or refurbished Products are subject to prior Agilent approval and may incur a restocking fee. Please reference the original purchase order number.
- Units returned for evaluation will be evaluated, and a quote for repair will be issued. If you choose to have the unit repaired, the cost of the evaluation will be deducted from the final repair pricing. A Purchase Order for the final repair price should be issued within 3 weeks of quotation date. Units without a Purchase Order for repair will be returned to the customer, and the evaluation fee will be invoiced.
- A Special Cleaning fee will apply to all exposed products per Section 4 of this document.
- If requesting a calibration service, units must be functionally capable of being calibrated.

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Sales and Service Offices

United States
Agilent Technologies
Vacuum Products Division
121 Hartwell Avenue
Lexington, MA 02421 - USA
Tel.: +1 781 861 7200
Fax: +1 781 860 5437
Toll-Free: +1 800 882 7426

Benelux
Agilent Technologies Netherlands B.V.
Vacuum Products Division
Herculesweg 8
4338 PL Middelburg
The Netherlands
Tel.: +31 118 671570
Fax: +31 118 671569
Toll-Free: 00 800 234 234 00

Canada
Central coordination through: Agilent Technologies
Vacuum Products Division
121 Hartwell Avenue
Lexington, MA 02421 - USA
Tel.: +1 781 861 7200
Fax: +1 781 860 5437
Toll-Free: +1 800 882 7426

China
Agilent Technologies (China) Co. Ltd
Vacuum Products Division
No.3, Wang Jing Bei Lu,
Chao Yang District,
Beijing, 100102
China
Tel.: +86 (10) 6439 7718
Toll-Free: 800 820 6556

France
Agilent Technologies France
Vacuum Products Division
7 Avenue des Tropiques
Z.A. de Courtaboeuf - B.P. 12
91941 Les Ulis cedex - France
Tel.: +33 (0) 1 69 86 38 84
Fax: +33 (0) 1 69 86 29 88
Toll free: 00 800 234 234 00

Germany and Austria
Agilent Technologies
Vacuum Products Division Alsfelder Strasse 6 Postfach 11 14 35
64289 Darmstadt – Germany
Tel.: +49 (0) 6151 703 353
Fax: +49 (0) 6151 703 302
Toll free: 00 800 234 234 00

India
Agilent Technologies India Pvt. Ltd.
Vacuum Product Division
G01. Prime corporate Park,
230/231, Sahar Road, Opp. Blue Dart Centre,
Andheri (East), Mumbai – 400 099.India
Tel: +91 22 30648287/8200
Fax: +91 22 30648250
Toll Free: 1800 113037

Italy
Agilent Technologies Italia S.p.A.
Vacuum Products Division
Via F.lli Varian 54
10040 Leini, (Torino) - Italy
Tel.: +39 011 997 9111 Fax: +39 011 997 9350
Toll-Free: 00 800 234 234 00

Japan
Agilent Technologies Japan, Ltd.
Vacuum Products Division
8th Floor Sumitomo Shibaura Building
4-16-36 Shibaura Minato-ku Tokyo 108-0023 - Japan
Tel.: +81 3 5232 1253
Fax: +81 3 5232 1710
Toll-Free: 0120 655 040

Korea
Agilent Technologies Korea, Ltd.
Vacuum Products Division
Shinsa 2nd Bldg. 2F 966-5 Daechi-dong
Kangnam-gu, Seoul
Korea 135-280
Tel.: +82 2 3452 2452
Fax: +82 2 3452 2451
Toll-Free: 080 222 2452

Mexico
Agilent Technologies
Vacuum Products Division
Concepcion Beistegui No 109 Col Del Valle
C.P. 03100 – Mexico, D.F.
Tel.: +52 5 523 9465
Fax: +52 5 523 9472

Singapore
Agilent Technologies Singapore Pte. Ltd,
Vacuum Products Division
Agilent Technologies Building,
1 Yishun Avenue 7,
Singapore 768923
Tel : (65) 6215 8045
Fax : (65) 6754 0574

Southeast Asia
Agilent Technologies Sales Sdn Bhd
Vacuum Products Division
Unit 201, Level 2 uptown 2,
2 Jalan SS21/37, Damansara Uptown
47400 Petaling Jaya,
Selangor, Malaysia
Tel : +603 7712 6106
Fax: +603 6733 8121

Taiwan
Agilent Technologies Taiwan Limited
Vacuum Products Division (3F)
20 Kao-Shuang Rd.,
Pin-Chen City, 324
Taoyuan Hsien , Taiwan, R.O.C.
Tel. +886 34959281
Toll Free: 0800 051 342

UK and Ireland
Agilent Technologies UK, Ltd.
Vacuum Products Division
6 Mead Road Oxford Industrial Park
Yarnton, Oxford OX5 1QU – UK
Tel.: +44 (0) 1865 291570
Fax: +44 (0) 1865 291571
Toll free: 00 800 234 234 00

Other Countries
Agilent Technologies Italia S.p.A.
Vacuum Products Division
Via F.lli Varian 54 10040 Leini, (Torino) - Italy
Tel.: +39 011 997 9111
Fax: +39 011 997 9350
Toll-Free: 00 800 234 234 00

Customer Support & Service

NORTH AMERICA:
Toll Free: 800 882 7426, Option 3
vpl-ra@agilent.com
EUROPE:
Toll Free: 00 800 234 234 00
vpt-customercare@agilent.com
PACIFIC RIM:
please visit our website for individual office information http://www.agilent.com

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