VARIAN

vacuum technologies

Turbo-V 250 Controller

Model 969-9504

- *(I) MANUALE DI ISTRUZIONI*
- *(D) BEDIENUNGSHANDBUCH*
- *(F) NOTICE DE MODE D'EMPLOI*
- *(E) MANUAL DE ISTRUCCIONES*
- *(P) MANUAL DE ISTRUÇÕES*
- *(NL) BEDRIJFSHANDLEIDING*
- *(DK) ISTRUKSTIONSBOG*
- *(S) BRUKSANVISNING*
- *(N) INSTRUKSJON MANUAL*
- *(FIN) OHJEKÄSIKIRJA*
- *(GR) ΟΔΗΓΙΕΣ ΧΡΗΣΕΩΣ*
- *(H) FELHASZNÁLÓI KÉZIKÖNYV*
- *(PL) PODRECZNIK INSTRUKCJI*
- *(CZ) NÁVOD K POUŽITÍ*
- *(SK) NÁVOD NA OBSLUHU*
- *(SLO) PRIROČNIK ZA NAVODILA*
- *(GB) INSTRUCTION MANUAL*

87-900-856-01 (D)
JULY 2006

Turbo-V 250 Controller

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

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 VARIAN VTT) LOG N° _____

_____

_____

_____

_____

_____

_____

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

VARIAN

GENERAL INFORMATION

This equipment is destined for use by professionals. The user should read this instruction manual and any other additional information supplied by Varian before operating the equipment. Varian will not be held responsible for any events occurring due to non-compliance, even partial, with these instructions, improper use by untrained persons, non-authorised interference with the equipment or any action contrary to that provided for by specific national standards. The Turbo-V 250 series controllers are microprocessor-controlled, solid-state, frequency converters with self-diagnostic and self-protection features.
The controllers drive (within ten steps) the Turbo-V 250 pump during the starting phase by controlling the voltage and current respect to the speed reached by the pump. They incorporate all the facilities required for the automatic operation of the Turbo-V 250 pump series. Remote start/stop, pump status signals, forepump start/stop, interlock control (for pressure switch, water flow switch, etc.) capability, are provided via auxiliary connectors. The following paragraphs contain all the information necessary to guarantee the safety of the operator when using the equipment. Detailed information is supplied in the appendix "Technical Information".

This manual uses the following standard protocol:

WARNING!

The warning messages are for attracting the attention of the operator to a particular procedure or practice which, if not followed correctly, could lead to serious injury.

CAUTION!

The caution messages are displayed before procedures which, if not followed, could cause damage to the equipment.

NOTE

The notes contain important information taken from the text.

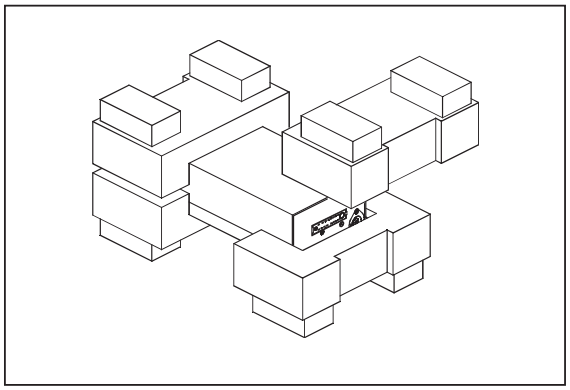
STORAGE

When transporting and storing the controllers, the following environmental requirements should be satisfied:

- temperature: from -20 C to + 70 C
- relative humidity: 0 - 95% (without condensation).

PREPARATION FOR INSTALLATION

The controller is supplied in a special protective packing. If this shows signs of damage which may have occurred during transport, contact your local sales office. When unpacking the controller, ensure that it is not dropped or subjected to any form of impact. Do not dispose of the packing materials in an unauthorized manner. The material is 100% recyclable and complies with EEC Directive 85/399.



Controller Packing

The controller model 969-9504 is factory set for a power supply: of 120 Vac.
If a change in line voltage operation is desired, proceed as follows:

- Disconnect the power cord from the controller P17 connector.
- Select the operating voltage on the left panel.
- Check voltage selector for correct set and connect power cord to P17 connector.

INSTALLATION

WARNING!

Connection to the mains must be made in accordance with the local law. Always connect the ground wire and use a properly grounded power socket to avoid electrical shock. High voltage developed in the controller can cause severe injury or death. Before servicing the unit, disconnect the input power cable.

NOTE

The Turbo-V controller can be used as a bench unit or a rack module, but it must be positioned so that free air can flow through the holes. Do not install or use the controller in an environment exposed to atmospheric agents (rain, snow, ice), dust, aggressive gases, or in explosive environments or those with a high fire risk.

During operation, the following environmental conditions must be respected:

- temperature: from O C to +40 C
- relative humidity: 0 - 95% (without condensation).

To connect the controller to the pump use the specific cable supplied with the controller.

NOTE

The controller model 969-9504 is not equipped with the pump cable. It can be requested as an accessory; detailed information is supplied in the paragraph "Accessories and Spare Parts" of the appendix "Technical Information". It must be connected between the controller connector J16 and the pump connector. The two connectors at the two cable extremity cannot be connected in a wrong way.

USE

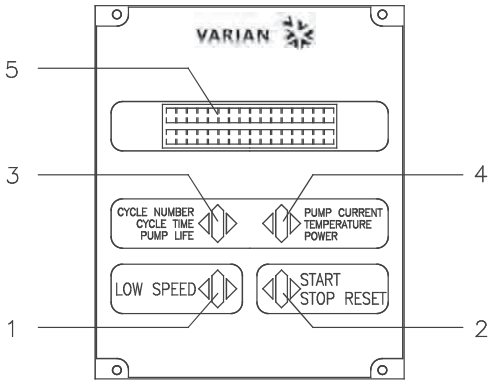
This paragraph describes the fundamental operating procedures. Detailed information and operating procedures that involve optional connections or options are supplied in the paragraph "USE" of the appendix "Technical Information". Some procedures can be executed with controller model 969-9504 only when the accessory "Hand held terminal" is available. 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.

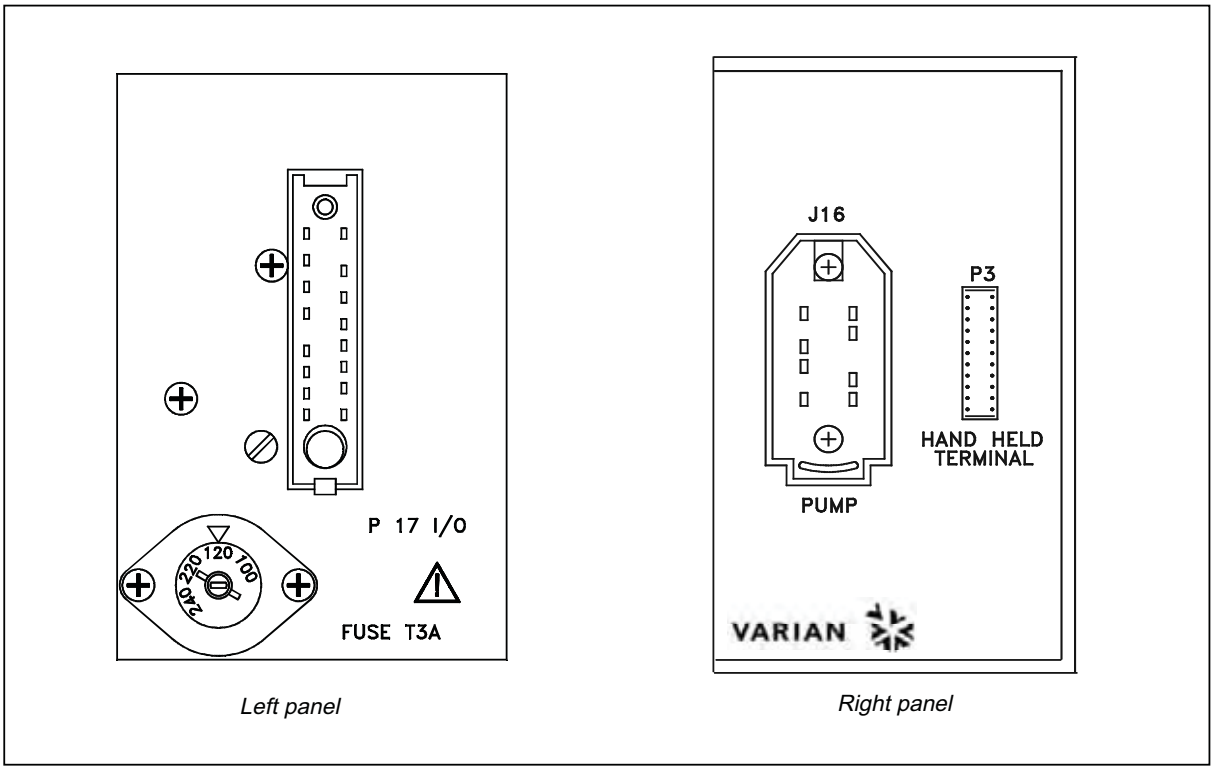
Controller controls, indicators and connectors

The following paragraph illustrates the hand held terminal control panel and interconnection panel.
More details are contained in the appendix "Technical Information".



1. Keyboard push-button for LOW SPEED mode selection. It is active only when the front panel operation has been selected. Pressed once, the pump runs at about 2/3 of the nominal speed. To unselect the mode, press the push-button again.
2. Keyboard push-button for START, STOP, RESET mode selection. It is active only when the front panel operation has been selected. By pressing once the starting phase begins; if pressed again it stops the pump. If the pump has been stopped automatically by a fault, this push-button must be pressed once to reset the controller and a second time to restart the pump.
3. Keyboard push-button to recall on the display the cycle number, cycle time and pumplife.
4. Keyboard push-button to recall on the display the pump current, pump temperature, pump power and rotational speed. It is always active regardless of the operating mode selected. Push-buttons 3 and 4, if pressed together for at least 2 seconds put the controller in a routine where it is possible to program some operation parameters.
5. LCD back-lighted alphanumeric display: dot matrix 2 lines x 16 characters.

Hand Held Terminal Control Panel



Left panel *Right panel*

Right and left panels of controller 969-9504

USE PROCEDURE

Controller and Pump Startup

To startup the controller and the pump apply mains to P17 connector.

Pump Shutdown

To stop the pump, you need to set jumpers b7-a5 on P17 connector, or press the STOP button on the Hand Held Terminal if the controller is configured in FRONT Mode.

MAINTENANCE

The Turbo-V 250 series controller does not require any maintenance. Any work performed on the controller must be carried out by authorized personnel. When a fault has occurred it is possible to use the Varian repair service. Replacement controllers are available on an advance exchange basis through Varian.

WARNING!

Before carrying out any work on the controller, disconnect it from the supply.

If a controller is to be scrapped, it must be disposed of in accordance with the specific national standards.

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.

ERROR MESSAGES

For a certain type of failure, the controller will self-diagnose the error and the messages described in the following table are displayed.
The error messages are displayed only when the option hand held terminal is available.

MESSAGE	DESCRIPTION	REPAIR ACTION
CHECK CONNECTION TO PUMP	Wrong connection between the pump and the controller.	Check connection between controller and pump. Press the START push-button twice to start the pump.
FAULT: OVERTIME SX	Within each step of the soft start mode the rotational speed of the pump does not reach the planned value within 15 minutes. (X) is the step number from 0 to 9 indicating the step number not passed).	Verify that system has no leaks. Press the START pushbutton twice to start the pump.
FAULT: PUMP OVERTEMP.	The upper bearing/pump temperature exceeds 60 C.	Wait until the temperature decrease below threshold value. Press the START push-button twice to start the pump.
FAULT: CONTROLLER OVERTEMPERATURE	The controller transformer temperature exceeds 90 C.	Wait until the temperature decrease below threshold value. Press the START push-button twice to start the pump.
FAULT: TOO HIGH L0AD	In normal operation (after the starting phase) the current drawn by the pump is higher than programmed (1.5 A)	Check that the pump rotor is free to rotate. Press the START push-button twice to start the pump.
FAULT: SHORT CIRCUIT	After the starting phase the output connection is shorted (output current higher than 2.2 A).	Check connections and shortages between pump and controller. Press the START push-button twice to start the pump.
FAULT: R2 DELAY OVER	The pump rotational speed decreased below the programmed speed thereshold value, and the controller OFF is selected, when R2 deenergizes.	Check for system leaks or gas load conditions. To restart the pump apply the reset signal to **b8** pin of **P17** connector.
OVERVOLTAGE	Controller power supply circuitry is faulty, or the Controller received a spike.	Press the START push-button twice to start the pump. Should the message still be present, call the Varian service.

TURBO-V 250 CONTROLLER DESCRIPTION

The controller model 969-9504 is a solid-state frequency converter which is driven by a single chip microcomputer and is composed of:

- Power transformer
- Left panel with input/output connector
- Right panel with pump connector and hand held terminal connector
- PCB including: power supply and 3-phase output, analog and input/output section, microprocessor and digital section
- PCB external input/output interface.

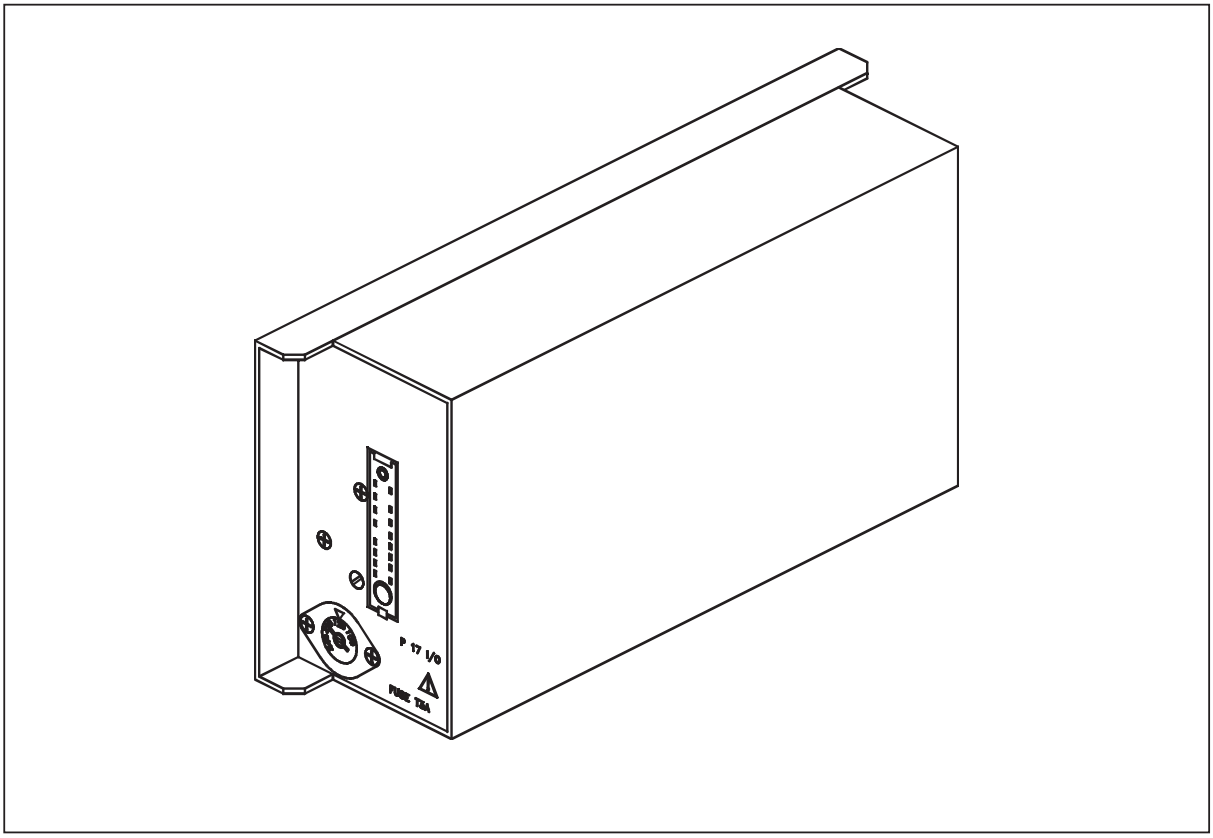
The following figure is a picture of the Turbo-V controller.
The power supply and the 3-phase output converts the single phase (50-60 Hz) AC mains supply into a 3-phase, low voltage, medium frequency output which is required to power the Turbo-V pump.

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 signals from sensors, input/output connection information to be displayed, and gives outputs 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.

The controller can be operated by remote signals via the left panel connector and may be monitored/reprogrammed using the optional hand held terminal via the right panel connector.



Turbo-V 250 controller

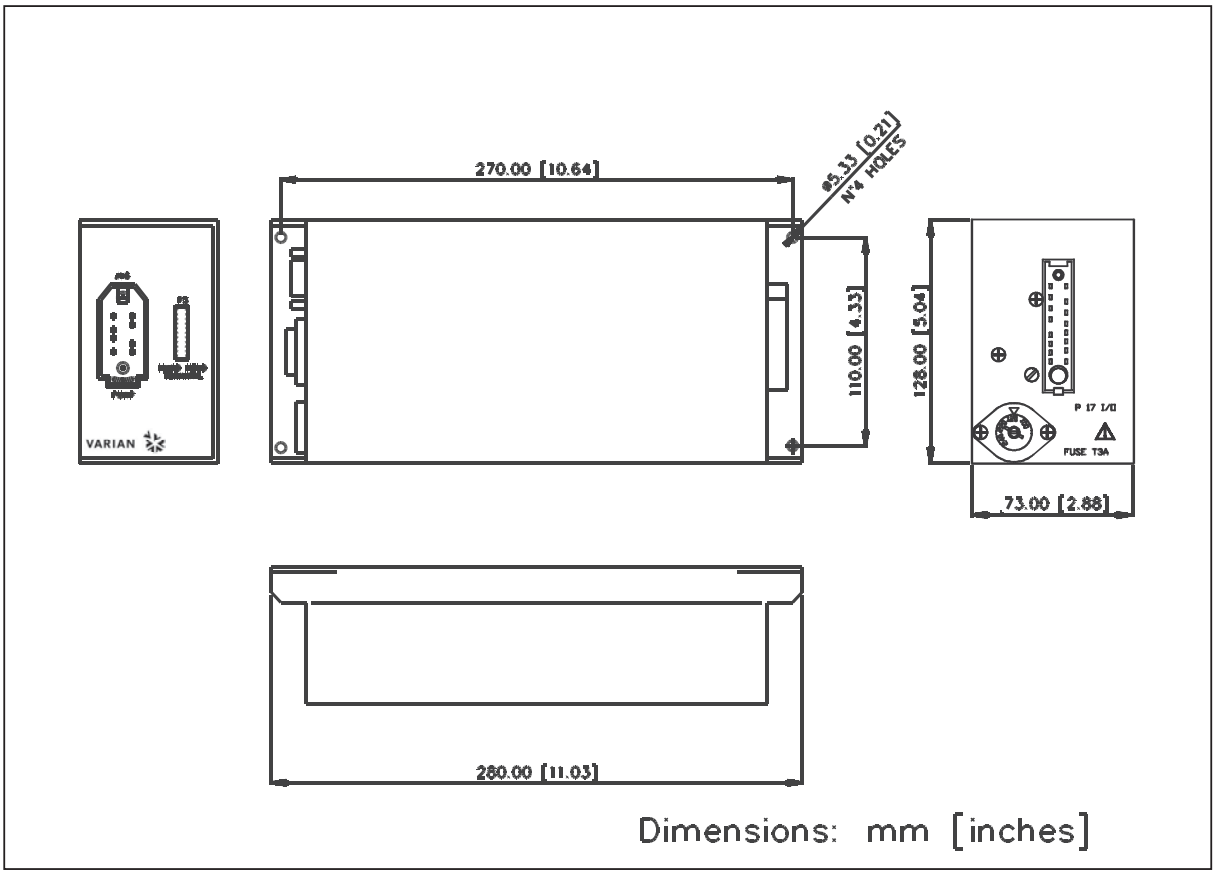
CONTROLLER SPECIFICATIONS

Input:	
Voltage	100, 120, 220, 240 Vac ±10%, 1-phase
Frequency	47 to 63 Hz
Power	450 VA maximum
Output:	
Voltage	54 Vac nominal ±10%, 3-phase
Frequency	933 Hz, ±2%
Power	150 W maximum
Operating temperature	0 C to +40 C
Storage temperature	-20 C to +70 C
Fuse (mains)	T3A (slow blow) disregarding the mains
Auxiliary connectors	P17 INPUT/OUTPUT mains and signals (pins) J16 pump connector (socket) P3 hand held terminal connector (pins)

Radio interference suppression	EN 55011 class A group 1 IEC1000-4-2, 1000-4-3, 1000-4-4
Safety standard	EN 61010-1
Weight	4 Kg (8.8 lbs)

CONTROLLER OUTLINE

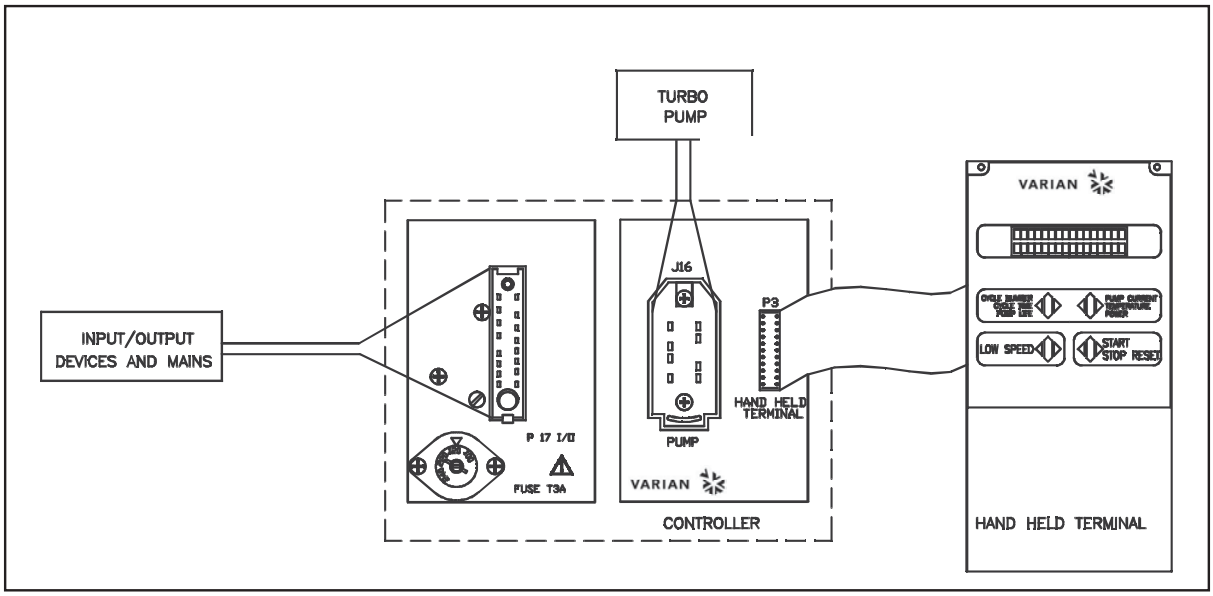
The outline dimensions for the Turbo-V 250 controller model 969-9504 are shown in the following figure.



Controller model outline

INTERCONNECTIONS

The following figure shows the Controller interconnections.

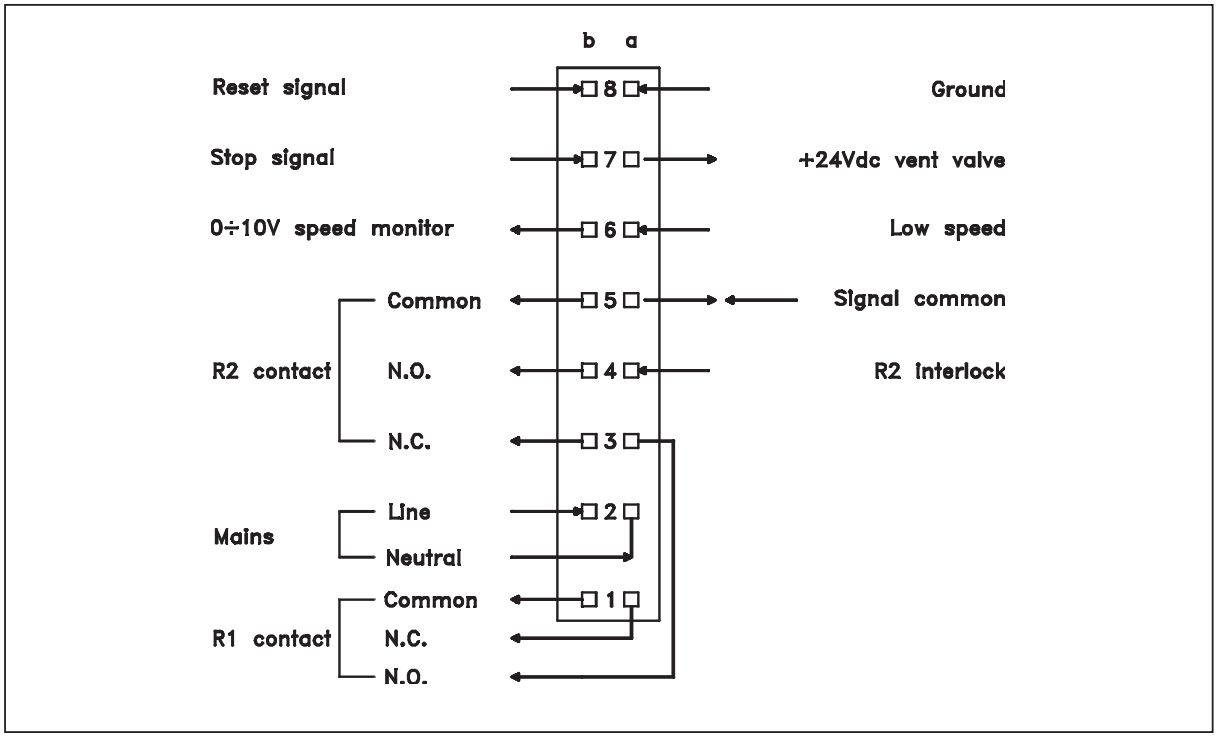


Controller interconnections

Connection P17 - Mains and Input/Output Interconnections

Input/output signals and mains must be connected to J17 mating connector (not provided). Make the connections with AWG 20 (0.5 mm^2) to the pins indicated in the following figure, to obtain the desired capability.
The following table describes the signals available on the connector.

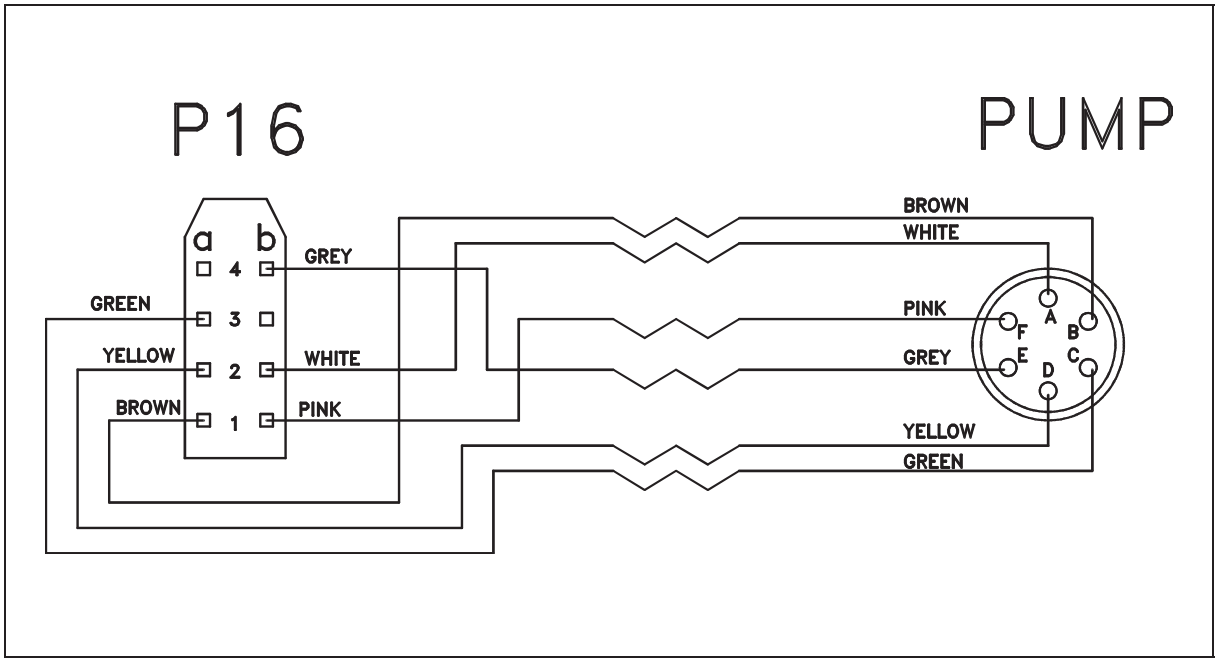
PIN	DESCRIPTION
a8	GROUND power connection.
a2	MAINS neutral connection.
b2	MAINS line connection.
a5	SIGNAL COMMON connection for all input/output signals.
a6-a5	Remote LOW SPEED, requires a permanently closed contact (relay contact, transistor etc). When the first time contact closes, the turbopump runs at low speed and when the contact opens, the turbopump reverts to high speed mode.
a4-a5	R2 INTERLOCK, requires a permanent closed contact to set at infinite the run-up time. After closure, when the contact is reopened, the run-up time is set to zero minutes.
b7-a5	Remote STOP signal, requires a closed contact and it is used to stop the pump. When the conract is closed, the turbopump and the interconnected devices are stopped.
b8-a5	Remote RESET, requires a momentarily closed contact for at least 0.5 seconds to reset the pump after failure.
b6-a5	ANALOG OUTPUT SPEED signal 0 to +10 Vdc proportional to pump rotational speed 0 to 56000 RPM.
a7-a5	VENT VALVE output voltage. +24 Vdc without load; +6.5 Vdc with vent valve load (430 Ohm). The output voltage is present when the turbopump is started, and will remain present for about 5 more seconds after the turbopump is stopped or after a power failure.



P17 I/O connector

Connection P16 - Controller-to-Pump Connection

The pin configuration of the cable that connectsthe controller to the pump using a 0.5 mm^2 (AWG 20) wires is shown in the following figure.



Controller to pump cable

USE

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.

NOTE

When the Turbo-V 250 pump is baked by a membrane pump, the Soft Start mode should be deselected.

Startup

If the forepump and the vent device are not operated by the controller, close the vent valve and switch on the forepump.
Apply mains to the I/O connector. Voltage and frequency output will be at the maximum level; then the frequency will decrease to a value proportional to the pump rotational speed (3 KRPM if the pump is completely stopped) and then it will accelerate until the normal condition has been reached.
The controller with the Soft Start mode allows the pump to ramp-up to Normal speed slowly with a minimum ramp-up time of 250 seconds and a maximum of about 45 minutes. If the Soft Start mode is deselected, the ramp-up will be done within 180 seconds. Plug the controller power cable into a suitable power source.

Monitor Mode

NOTE

The following instructions are applicable to Turbo-V 250 Controller model 969-9504 only when the optional "hand held terminal" is installed.

- After the main is applied to the I/O connector, the pump starts and the display shows:

S	O	F	T		S	T	A	R	T		O	N		
		[	-	-	-	-	-	-	-	-	-	]		

  Where the sign minus (-) become a square ( ) when the pump finish the ramp-up step. The active step is indicated by a flashing square (€).

- As the ten steps are fully covered, the pump will reach the Normal operation. If during the Soft Start mode the current drawn by the pump exceed 1.7 A the speed of the pump is decreased to maintain the maximum power allowable (1.7 A).

- If the Soft Start mode has been deselected the display will change and shows:

P	U	M	P		I	S		S	T	A	R	T	I	N	G
1	2			X	X		K	R	P	M					

  where:

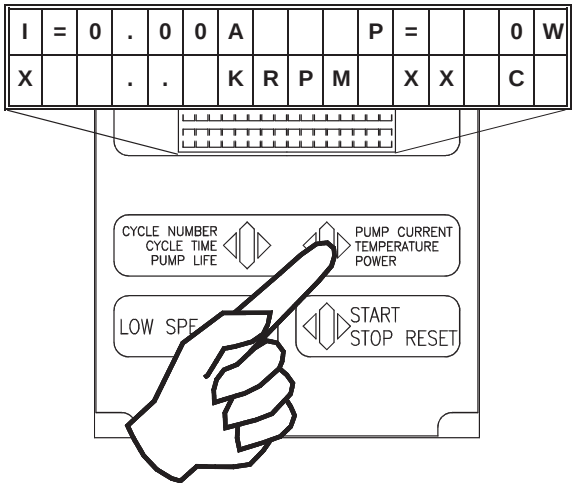
  1 2 = contrast inverted identifies the set point condition:
  – **1** is displayed when relay R1 is de-energized
  – **2** is displayed when relay R2 is energized.
  XX KRPM = indicates the actual theoretical rotational speed of the pump as a function of the controller output frequency (range 3 to 56 KRPM).

- After pump start-up, voltage and frequency output will be at the maximum level, then the frequency will decrease to a value proportional to the pump rotational speed (3 KRPM if the pump is completely stopped). The pump will accelerate to its normal rotational speed.
- When the normal rotational speed is reached, the display will be as follows, even if any previous display selection was made, and the normal condition has been reached.

N	O	R	M	A	L		O	P	E	R	A	T	I	O	N
				X	X		K	R	P	M					

  where: **XX** =indicates the rotational speed (56 KRPM for high speed, or 37 KRPM for low speed).

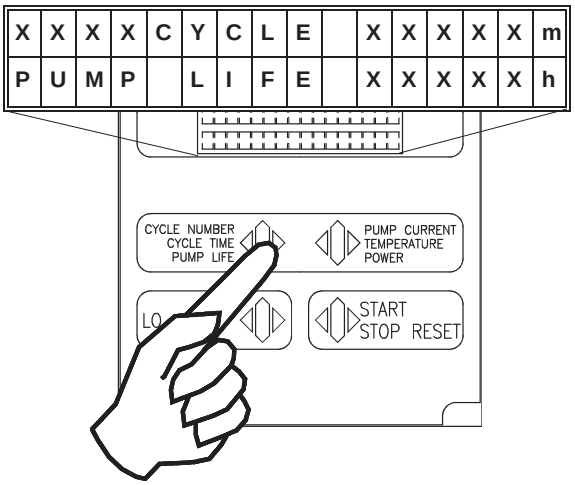
- During acceleration of the pump or during any operating condition, it is always possible to select the other parameters to be displayed pressing the PUMP CURRENT or the CYCLE NUMBER pushbuttons.
- At any time, pressing the CURRENT pushbutton, the display shows:



where:

- **I** = is the DC current drawn by the pump range (0.00 to 9.99 Ampere)
- **P** = is the DC power drawn by the pump (range 0 to 999 Watt)
- **KRPM** = is the theoretical rotational speed of the pump as a function of the controller output frequency (range 3 to 56 KRPM)
- **C** = is the temperature of the outer ring of the upper bearing (range 00 to 99 C)
- **X** = during operation a selected set point condition (1 or 2 contrast inverted) appears when the programmed threshold speed value is not reached.

- Press the CYCLE NUMBER twice and the display shows:



where:

- **CYCLE** = are the cycles performed (range 0 to 9999)
- **m** = is the elapsed time related to the cycle number displayed (range 0 to 99999 minutes)
- **PUMP LIFE** = is the total operation time of the pump (range 0 to 99999 hours).

Program Mode

NOTE

The following instructions are applicable to Turbo-V 250 Controller model 969-9504 only when the optional "hand held terminal" is installed.

FRONT / REMOTE Selection

- Press CYCLE NUMBER and PUMP CURRENT push-buttons together for at least 2 seconds and the processor enters in a routine where it is possible to program the controller.
  In this routine, the CYCLE push-button is used for choosing/changing the value or condition; the PUMP CURRENT push-button is used to enter and confirm the value. At any time it is possible to exit this routine by pressing the CYCLE and PUMP CURRENT push-buttons at the same time for at least 2 seconds. The display shows:

S	O	F	T		S	T	A	R	T		M	O	D	E	
S	E	L	E	C	T	I	O	N	:		X	X	X		

  where: **XXX** = YES or NO.

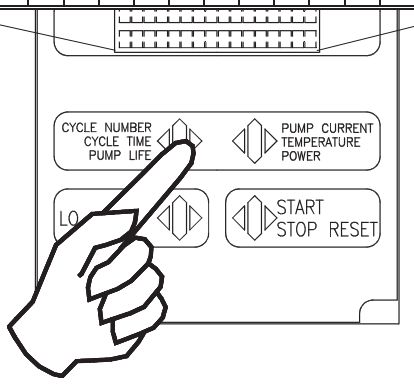
  If YES is selected, the Soft Start mode allows the pump to ramp-up the Normal speed within ten steps. When NO is selected, the Soft Start mode is deselected and the ramp-up of the pump will be done within 180 seconds.
  The controller is factory set to YES.

NOTE

The Soft Start mode may be deselected/selected only when the pump is stopped.

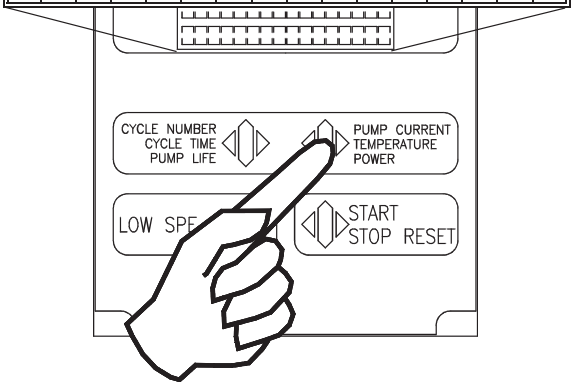
- Press CYCLE NUMBER to select YES or NO

S	O	F	T		S	T	A	R	T		M	O	D	E	
S	E	L	E	C	T	I	O	N	:		Y	E	S		



- Enter the selection by pressing the PUMP CURRENT push-button, and the display shows:

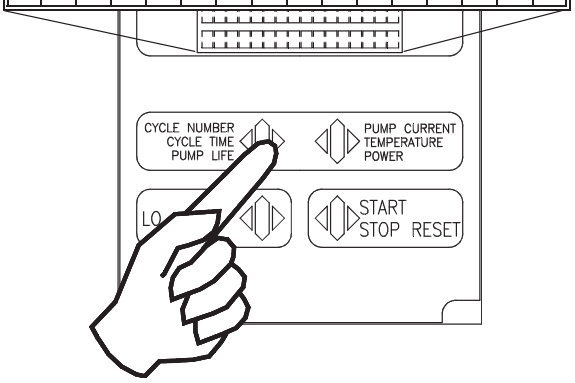
F	R	O	N	T	/	R	E	M	O	T	E			
S	E	L	E	C	T	I	O	N	:	X	X	X	X	X	X



  where: **XXXXXX** = means the word FRONT or REMOTE depending on the last selection.
  The controller is factory-set for FRONT panel operation.

- Choose the desired selection by pressing the CYCLE push-button:

F	R	O	N	T	/	R	E	M	O	T	E			
S	E	L	E	C	T	I	O	N	:	F	R	O	N	T	



- Press the PUMP CURRENT push-button to enter the value. In this way you enter into an operating phase named "Monitor Relay Programming" described in the following paragraph.

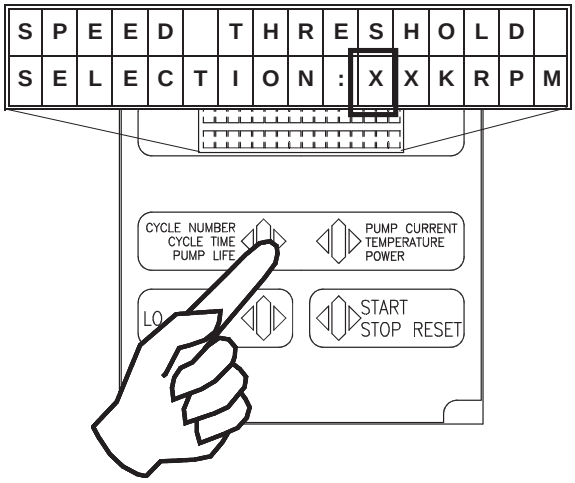
Monitor Rela Programming

- The display shows:

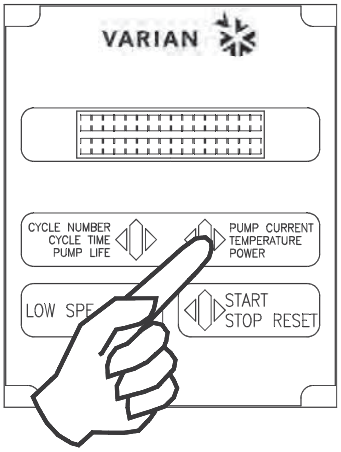
S	P	E	E	D		T	H	R	E	S	H	O	L	D	
S	E	L	E	C	T	I	O	N	:	X	X	K	R	P	M

where: **XXKRPM** = is the switch point of relay R1 at the preset turbopump speed, adjustable from 00 to 99 KRPM.
The speed threshold will condition the R1 and R2 operation (see the following cycle diagram) and it is factory-set to 32 KRPM.

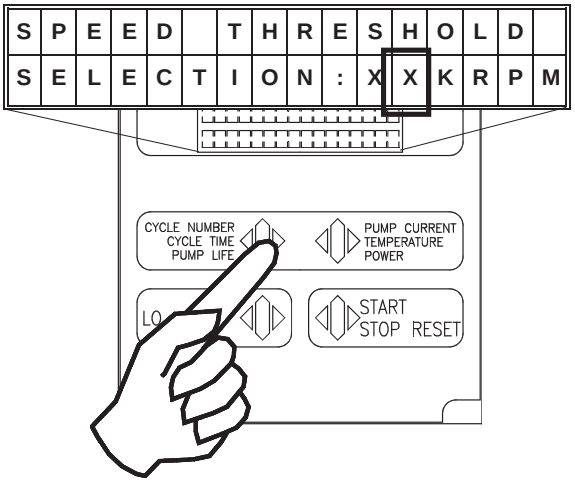
- Press the CYCLE NUMBER push-button to select the first number.



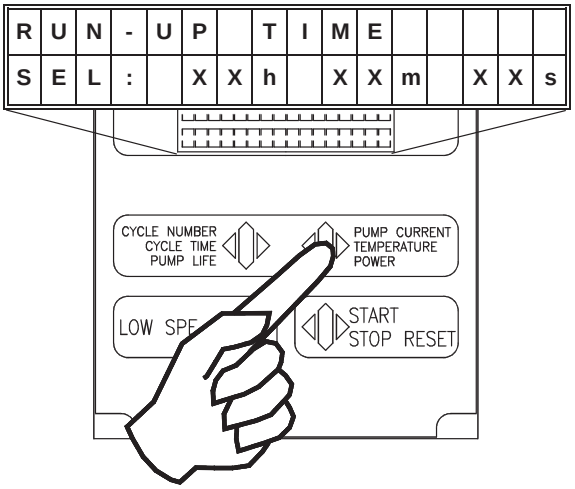
- Enter the value by pressing the PUMP CURRENT pushbutton.



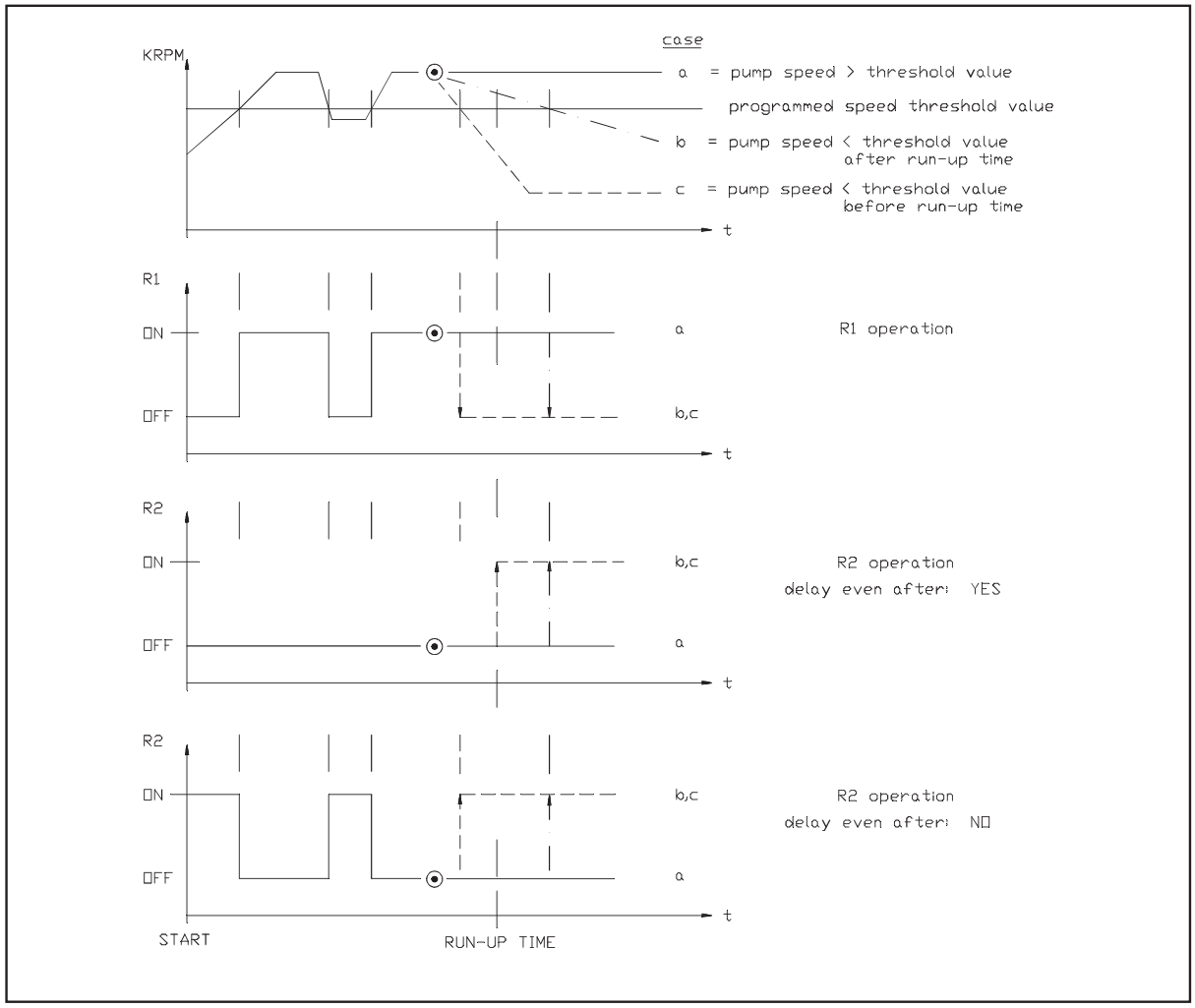
- Press the CYCLE NUMBER pushbutton to select the second number.



- Enter the value by pressing the PUMP CURRENT push-button, and the display shows:

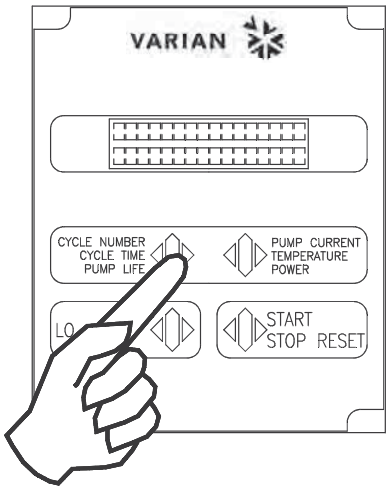


where: **RUN-UP TIME** = is the interval time from start to speed threshold value in hours, minutes, seconds. Select from 00 to 99 hours, and from 00 to 59 minutes or seconds.

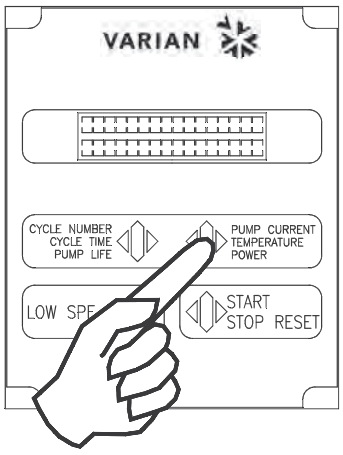


Cycle diagram

- Select the run-up time according to the chamber volume and/or operating cycle feature (see the preceeding cycle diagram) by pressing the CYCLE NUMBER pushbutton to select the desired number.



- Press the PUMP CURRENT push-button to enter the data.



The run up time is factory-set to:
00h 08m 00s.

- When the last digit is entered, the display shows:

D	E	L	A	Y		E	V	E	N		A	F	T	E	R
	T	H	R	E	S	H	O	L	D	:			X	X	X

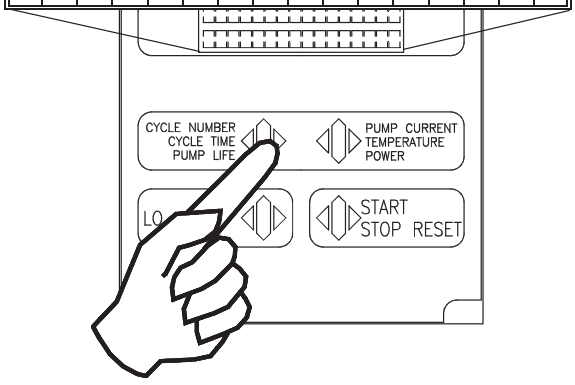
where: **XXX** = YES or NO.

- Press the CYCLE NUMBER pushbutton and select YES or NO.

  If YES is selected, R2 energizes from the start of the turbopump and deenergizes after the run-up time when the pump rotational speed becomes lower than the programmed threshold value.

  If NO is selected, R2 energizes from the start of the yutbopump and, after the rotational speed of the pump exceeds for the first time the speed threshold value, R2 deenergizes once the pump speed becomes lower than the programmed speed threshold value (see the preceding cycle diagram). This function is factory-set to YES.

D	E	L	A	Y		E	V	E	N		A	F	T	E	R
	T	H	R	E	S	H	O	L	D	:		Y	E	S	



- Press PUMP CURRENT to confirm; the display shows:

C	O	N	T	R	O	L	L	E	R		O	F	F		
W	H	E	N		R	2		O	F	F					

where: **XXX** = YES or NO.
If YES is selected when R2 deenergizes the controller, and the interconnecting devices are automatically switched off.
This function is factory set to YES.

- Press PUMP CURRENT to confirm, and the display shows:

P	U	M	P		L	I	F	E		X	X	X	X	X	h
			R	E	S	E	T	?		X	X	X			

where:
- **PUMP LIFE** = is the elapsed operating time range 000 to 99999 hours.
- **RESET XXX** = YES or NO.

The controller is factory-set to NO.

- If YES is selected, the pump life shall be reset to 000. After selecting YES, press the PUMP CURRENT push-button to enter the command and the display shows:

S	O	F	T		S	T	A	R	T		O	N			
		[	-	-	-	-	-	-	-	-	-	]			

NOTE

When PUMP LIFE is reset to 000, the CYCLE number is also reset to 000.

Operating the Pump

After the starting period, if the system has a vacuum leak or the pressure in the pump/chamber is high (from 1 mbar to atmosphere), the pump continues to operate indefinitely. If the gas load at the turbopump inlet flange continues to stay high, the power drawn by the turbopump increases up to the maximum value. Than the Turbo-V pump is slowed down in proportion to the gas load at least until it reaches 3 KRPM.

Even if any previous display selection was made.
This will occur either in NORMAL operation or with the LOW SPEED selected.
As soon as the gas load decreases, the pump will automatically accelerate to reach normal operation.
The pump can be stopped at any rotational speed and can be restarted at any rotational speed from either the front panel buttons or the remote connections.
The controller automatically synchronizes the output to the rotational speed of the pump and then accelerates linearly up to the nominal speed or within steps if the Soft Start has been selected.

Low Speed Operation

NOTE

With the FRONT panel operation selected, the remote operation is inoperative; conversely, the CYCLE NUMBER and PUMP CURRENT pushbuttons are always active, even when the operating mode selected is REMOTE.

This feature is provided for operating the pump at moderate high pressure with high gas throughput. To operate in this low speed mode, engage the LOW SPEED pushbutton once if the display shows:

N	O	R	M	A	L		O	P	E	R	A	T	I	O	N
				X	X		K	R	P	M					

or twice if the display shows other parameters, either before starting the pump or after it is operating.
If LOW SPEED is selected before starting the pump, the display shows:

R	E	A	D	Y		F	O	R		L	O	C	A	L	
S	O	F	T		S	T	A	R	T					L	S

The pump reaches the Normal high speed, then decrease the speed to the low speed value and the display shows:

A	P	P	R	O	A	C	H	I	N	G		L	S		
				X	X		K	R	P	M				L	S

If the Soft Start has been deselected the display shows:

P	U	M	P		R	E	A	D	Y	:		P	U	S	H
	S	T	A	R	T		B	U	T	T	O	N		L	S

where: **LS** = means low speed mode is selected.

After starting, a **LS** appears on the right bottom corner of the following displays:

S	O	F	T		S	T	A	R	T		O	N			
		[	-	-	-	-	-	-	-	-	-	]	L	S

P	U	M	P		I	S		S	T	A	R	T	I	N	G
1	2			X	X		K	R	P	M				L	S

N	O	R	M	A	L		O	P	E	R	A	T	I	O	N
				X	X		K	R	P	M				L	S

		H	I	G	H			L	O	A	D				
1	2			X	X		K	R	P	M				L	S

and when the pump reaches th low speed value, display reverts to:

N	O	R	M	A	L		O	P	E	R	A	T	I	O	N
				3	7		K	R	P	M				L	S

With normal LOW SPEED operation, the pump will run at about 2/3 of its nominal speed and achieves a base pressure somewhat higher than the standard specifications. If the gas load becomes higher, the controller output frequency and voltage start to decrease automatically, and the Turbo-V pump is slowed down in proportion to the gas load until it reaches 3 KRPM.
If the LOW SPEED mode is selected after normal operating condition is reached, the display shows:

A	P	P	R	O	A	C	H	I	N	G			L	S	
				X	X		K	R	P	M				L	S

while approaching the low speed value.

When the low speed mode is deselected, the pump starts to accelerate to its rotational speed.

Pump Shutdown

Press the hand held terminal STOP pushbutton; the power from the turbopump will be removed and the pump will begin to slow down.
When a stop signal is provided via a remote contact, the display shows:

	E	X	T	E	R	N	A	L		S	W	I	T	C	H
				b	7		C	L	O	S	E	D			

Power Failure

In the event of a power failure (momentary or long term), the Turbo-V controller will stop the turbopump and all the interconnected pumps/devices. The Turbo-V vent valve device, if used, will vent the turbopump only if the power failure is longer than the preset delay time.
When power is restored, the Turbo-V controller automatically restarts the interconnected devices and the turbopump in the proper sequence.
The display shows:

P	U	M	P		I	S		S	T	A	R	T	I	N	G
1	2			X	X		K	R	P	M					

or

S	O	F	T		S	T	A	R	T		O	N			
		[	-	-	-	-	-	-	-	-	-	-	]		

until normal operation achieved.

Remote Control Mode Operation

If remote signals are used to operate the controller, it must be programmed for remote operation (see paragraph "FRONT/REMOTE selection") and when ready to start, the display shows:

R	E	A	D	Y		F	O	R		R	E	M	O	T	E
S	O	F	T		S	T	A	R	T						

If the Soft Start has been deselected the display shows:

P	U	M	P		R	E	A	D	Y	:		U	S	E	
	R	E	M	O	T	E		S	T	A	R	T			

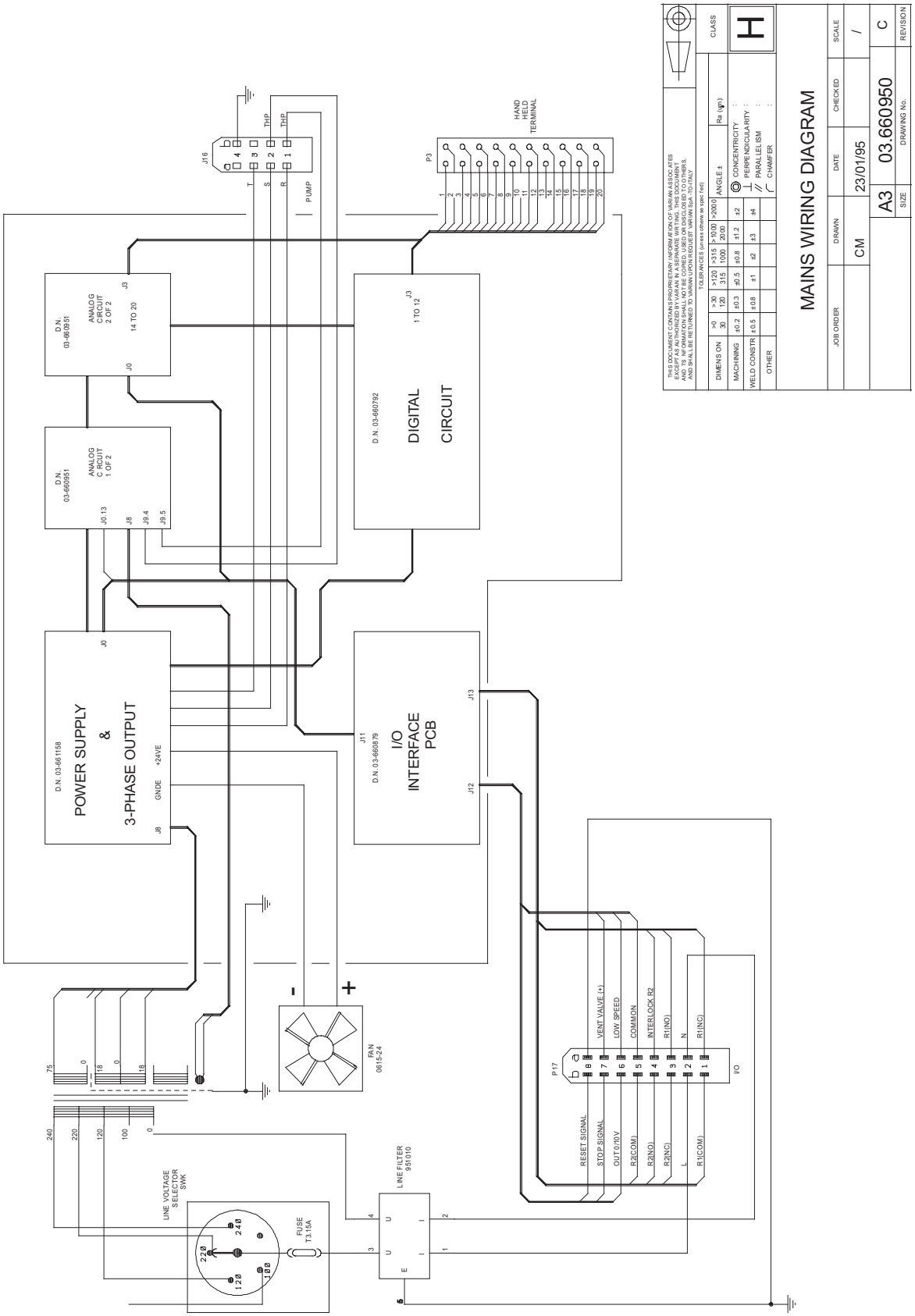
With or wihout Soft Start mode selected the START/STOP and LOW SPEED front panel pushbuttons are inoperative, while the CYCLE NUMBER and PUMP CURRENT pushbuttons are always active.

ACCESSORIES AND SPARE PARTS

DESCRIPTION	PART NUMBER
Input/output mating connector	969-9855

OPTIONS

DESCRIPTION	PART NUMBER
Controller to pump cable (3 m extension)	969-9863 L0300
Hand held terminal	969-9860


MAINS WIRING DIAGRAM
JOB ORDER
DRAWN
CM
DATE
23/01/95
CHECKED
SCALE
/
A3
03.660950
C
SIZE
DRAWING No.
REVISION
CLASS
H
THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION OF VARIAN ASSOC ATES
EXCEPT AS OTHERWISE EXPRESSLY AGREED IN WRITING, THIS DOCUMENT
AND ITS INFORMATION SHALL NOT BE COPIED, USED OR DISCLOSED TO OTHERS,
AND SHALL BE RETURNED TO VARIAN UPON REQUEST. VARIAN SpA - TO - ITALY
TOLERANCES (unless otherwise specified)
DIMENSION
MACHINING
WELD CONSTR
OTHER
ANGLE ±
Ra (μm)
CONCENTRICITY
PERPENDICULARITY
PARALLELISM
CHAMFER
D.N. 03-661158
POWER SUPPLY
&
3-PHASE OUTPUT
D.N. 03-660792
DIGITAL
CIRCUIT
D.N. 03-660879
I/O
INTERFACE
PCB
D.N. 03-660951
ANALOG
CIRCUIT
2 OF 2
D.N. 03-660951
ANALOG
CIRCUIT
1 OF 2
HAND HELD TERMINAL
PUMP
FAN
0615-24
LINE VOLTAGE SELECTOR SVK
FUSE T3.15A
LINE FILTER 991010
RESET SIGNAL
STOP SIGNAL
OUT 0/10V
R2(COM)
R2(NO)
R2(NC)
R1(COM)
R1(NC)
INTERLOCK R2
COMMON
LOW SPEED
VENT VALVE (+)
I/O

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	**Europe and Middle East**	**Asia and ROW**
Varian Vacuum Technologies	Varian SpA	Varian Vacuum Technologies
121 Hartwell Ave	Via Flli Varian 54	Local Office
Lexington, MA 02421	10040 Leini (TO) – ITALY	
Phone : +1 781 8617200	Phone: +39 011 9979111	
Fax: +1 781 8609252	Fax: +39 011 9979330	

CUSTOMER INFORMATION

Company name: ..……..……..……..……..……..……..….

Contact person: Name: ……..… Tel: ……..…..……....

Fax: ……..…..…..…… E-Mail: ..……..……..…..…..…..

Ship Method: ……..……..…… Shipping Collect #: ……..…… P.O.#: ……..…….

Europe only: VAT reg. Number: ……..……... *USA only:* ☐ Taxable ☐ 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)*

☐ 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 #: ……..

VARIAN

Request for Return

ISO 9001 REGISTERED

FAILURE REPORT

TURBO PUMPS and TURBOCONTROLLERS

☐ Does not start	☐ Noise	POSITION	PARAMETERS	
☐ Does not spin freely	☐ Vibrations	☐ Vertical	Power:	Rotational Speed:
☐ Does not reach full speed	☐ Leak	☐ Horizontal	Current:	Inlet Pressure:
☐ Mechanical Contact	☐ Overtemperature	☐ Upside-down	Temp 1:	Foreline Pressure:
☐ Cooling defective		☐ Other:	Temp 2:	Purge flow:
		……	OPERATION TIME:	
TURBOCONTROLLER ERROR MESSAGE:				

ION PUMPS/CONTROLLERS

☐ Bad feedthrough	☐ Poor vacuum
☐ Vacuum leak	☐ High voltage problem
☐ Error code on display	☐ Other
Customer application:	

VALVES/COMPONENTS

☐ Main seal leak	☐ Bellows leak
☐ Solenoid failure	☐ Damaged flange
☐ Damaged sealing area	☐ Other
Customer application:	

LEAK DETECTORS

☐ Cannot calibrate	☐ No zero/high backround
☐ Vacuum system unstable	☐ Cannot reach test mode
☐ Failed to start	☐ Other
Customer application:	

INSTRUMENTS

☐ Gauge tube not working	☐ Display problem
☐ Communication failure	☐ Degas not working
☐ Error code on display	☐ Other
Customer application:	

PRIMARY PUMPS

☐ Pump doesn't start	☐ Noisy pump (describe)
☐ Doesn't reach vacuum	☐ Over temperature
☐ Pump seized	☐ Other
Customer application:	

DIFFUSION PUMPS

☐ Heater failure	☐ Electrical problem
☐ Doesn't reach vacuum	☐ Cooling coil damage
☐ Vacuum leak	☐ 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.

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
121 Hartwell Avenue
Lexington, MA 02421
USA
Tel: (781) 861 7200
Fax: (781) 860 5437
Toll Free # 1 (800) 882 7426

China
Varian Technologies - Beijing
Rm 1648 Central Tower South Wing
Beijing Junefield Plaza
No. 10 XuanWuMenWai Street
Beijing 100052
P.R. China
Tel: (86) 10 63108550
Fax: (86) 10 63100141
Toll Free: 800 820 6556

Germany and Austria
Varian Deutschland GmbH
Alsfelder Strasse 6
Postfach 11 14 35
64289 Darmstadt
Germany
Tel: (49) 6151 703 353
Fax: (49) 6151 703 302

India
Varian India PVT LTD
101-108, 1st Floor
1010 Competent House
7, Nangal Raya Business Centre
New Delhi 110 046
India
Tel: (91) 11 28521171
Fax: (91) 11 28521173

Italy
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

Japan
Varian Vacuum Technologies
Sumitomo Shibaura Building, 8th Floor
4-16-36 Shibaura
Minato-ku, Tokyo 108
Japan
Tel: (81) 3 5232 1253
Fax: (81) 3 5232 1263
Toll Free: 0120 655 040

Korea
Varian Technologies Korea, Ltd
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
Varian, S. de R.L. de C.V.
Concepcion Beistegui No 109
Col Del Valle
C.P. 03100
Mexico, D.F.
Tel: (52) 5 523 9465
Fax: (52) 5 523 9472

Taiwan
Varian Technologies Asia Ltd.
14F-6, No.77, Hsin Tai Wu Rd., Sec. 1
Hsi chih, Taipei Hsien
Taiwan, R.O.C.
Tel: (886) 2 2698 9555
Fax: (886) 2 2698 9678
Toll Free: 0800 051342

UK and Ireland
Varian Ltd.
6 Mead Road
Oxford Industrial Park - Yarnton
Oxford OX5 1QU - England
Tel: (44) 1865 291570
Fax: (44) 1865 291571

United States
Varian Vacuum Technologies
121 Hartwell Avenue
Lexington, MA 02421
USA
Tel: (781) 861 7200
Fax: (781) 860 5437

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
vtw.technical.support@varianinc.com

Worldwide Web Site, Catalog and Order On-line:
www.varianinc.com

Representative in most countries

VARIAN

03/06