



Turbo-V 150HT Pumps

**Model 969-9369
Model 969-9370
Model 969-9371
Model 969-9372**

MANUALE DI ISTRUZIONI

BEDIENUNGSHANDBUCH

NOTICE DE MODE D'EMPLOI

MANUAL DE INSTRUCCIONES

MANUAL DE INSTRUÇÕES

BEDRIJFSHANDLEIDING

INSTRUKSTIONSBOG

BRUKSANVISNING

INSTRUKSJON MANUAL

OHJEKÄSIKIRJA

ΟΔΗΓΙΕΣ ΧΡΗΣΕΩΣ

INSTRUCTION MANUAL

Turbo-V 150HT





Dear Customer,

Thank you for purchasing a VARIAN vacuum product. At VARIAN Vacuum Technologies we make every effort to ensure that you will be satisfied with the product and/or service you have purchased.

As part of our Continuous Improvement effort, we ask that you report to us any problem you may have had with the purchase or operation of our product. On the back side you find a Corrective Action Request form that you may fill out in the first part and return to us.

This form is intended to supplement normal lines of communications and to resolve problems that existing systems are not addressing in an adequate or timely manner.

Upon receipt of your Corrective Action Request we will determine the Root Cause of the problem and take the necessary actions to eliminate it. You will be contacted by one of our employees who will review the problem with you and update you, with the second part of the same form, on our actions.

Your business is very important to us. Please, take the time and let us know how we can improve.

Sincerely,

Sergio PIRAS

Vice President and General Manager
VARIAN Vacuum Technologies

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

CUSTOMER REQUEST FOR CORRECTIVE / PREVENTIVE / IMPROVEMENT ACTION

TO : VARIAN VACUUM TECHNOLOGIES TORINO - QUALITY ASSURANCE

FAX N° : XXXX - 011 - 9979350

ADDRESS: VARIAN S.p.A. - Via F.Ili Varian, 54 - 10040 Leini (Torino) - Italy

E-MAIL : marco.marzio@varianinc.com

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



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INFORMACION GENERAL

Este equipo se ha concebido para un uso profesional. El usuario deberá leer atentamente el presente manual de instrucciones y cualquier otra información suplementaria facilitada por Varian antes de utilizar el equipo. Varian se considera libre de cualquier responsabilidad debida al incumplimiento total o parcial de las instrucciones, al uso poco apropiado por parte de personal sin adiestrar, a las intervenciones no autorizadas o al uso que no cumpla con las normas nacionales específicas.

Las bombas de la serie Turbo-V150HT son bombas turbomoleculares para aplicaciones de vacío alto y ultra alto que pueden bombeo cualquier tipo de gas o de compuesto gaseoso. No son apropiadas para bombar líquidos o partículas sólidas.

El efecto de bombeo se obtiene a través de una turbina que gira a gran velocidad (62000 r.p.m. máx.) movida por un motor eléctrico trifásico de grandes prestaciones. En las bombas Turbo-V150HT no hay agentes contaminantes y, por lo tanto, son apropiadas incluso para las aplicaciones que necesitan un vacío "limpio".

En los párrafos siguientes se indica toda la información necesaria para garantizar la seguridad del operador durante el uso del equipo. Una información más detallada se facilita en el Suplemento "Technical Information".

Este manual utiliza los símbolos convencionales siguientes:



¡PELIGRO!

Los mensajes de peligro atraen la atención del operador sobre un procedimiento o una operación específica que, al no realizarse correctamente, podría provocar graves lesiones personales.



¡ATENCION!

Los mensajes de atención se visualizan antes de procedimientos que, al no respetarse, podrían provocar daños al equipo.

NOTA

Las notas contienen información importante extraída del texto.

ALMACENAMIENTO

Durante el transporte y el almacenamiento de las bombas se deberá cumplir con las condiciones ambientales siguientes:

- temperatura: de -20°C a +70°C
- humedad relativa: 0 - 95% (no condensadora)

Si el periodo de almacenamiento es muy largo, poner en marcha la bomba en modalidad SOFT START (véase el manual de la unidad de control).

PREPARACION PARA LA INSTALACION

La bomba se suministra en un embalaje de protección dimensional; si se observan señales de daños, que podrían haberse producido durante el transporte, ponerse en contacto con la oficina de venta más cercana.

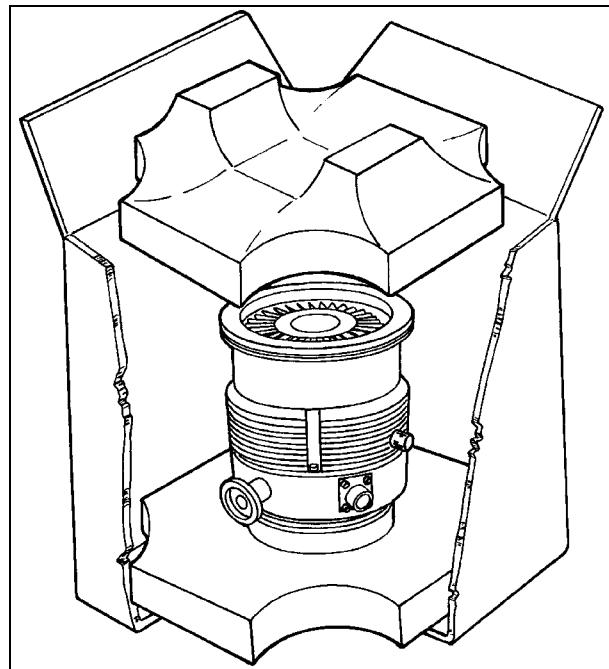
Durante la operación de desembalaje, prestar una atención especial a no dejar caer la bomba ni someterla a golpes.

No dispersar el embalaje en el medio ambiente. El material es totalmente recicitable y se ajusta a la directiva CEE/399 para la preservación del medio ambiente.



¡ATENCION!

Para evitar la degasificación, no tocar con las manos sin guantes los componentes destinados a someterse al vacío. Utilizar siempre los guantes u otra protección apropiada.



NOTA

La bomba no se puede dañar sólo por quedar expuesta a la atmósfera. De todas formas, se aconseja mantenerla cerrada hasta el momento de la instalación en el sistema para evitar una posible contaminación debida al polvo.

INSTALACION

No instalar ni utilizar la bomba en ambientes expuestos a agentes atmosféricos (lluvia, hielo, nieve), polvos, gases agresivos, en ambientes explosivos o con alto riesgo de incendio.

Durante el funcionamiento es preciso que se respeten las condiciones ambientales siguientes:

- presión máxima: 2 bar por encima de la presión atmosférica
- temperatura: de +5°C a +35°C
- humedad relativa: 0 - 95% (no condensadora)

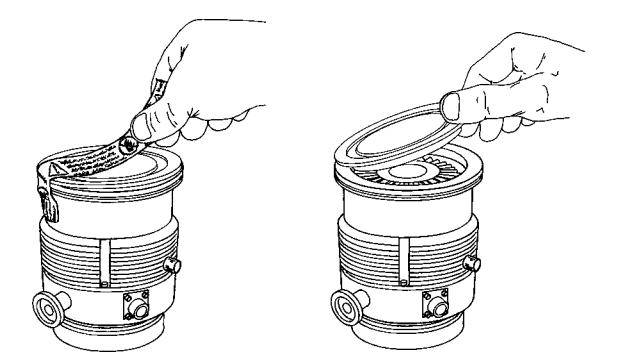
Cuando hay campos electromagnéticos la bomba ha de protegerse mediante pantallas oportunas. Véase el apéndice "Technical Information" para más detalles.

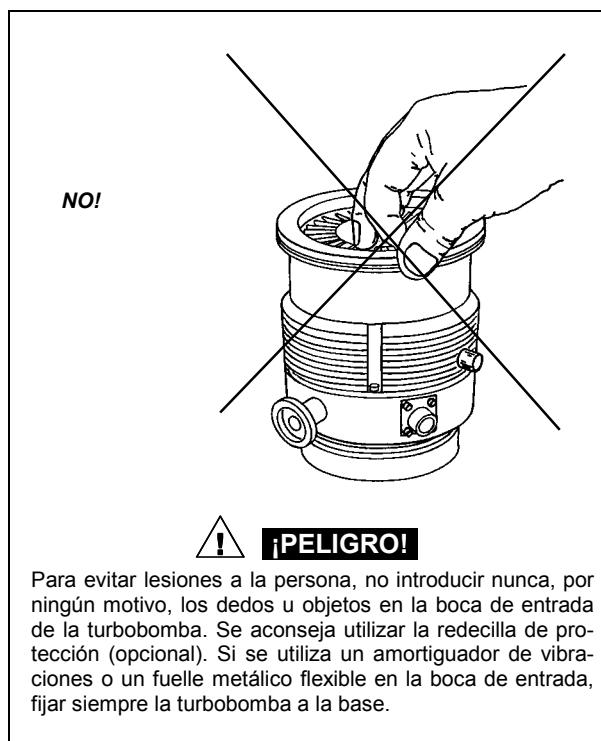
Las bombas turbomoleculares de la serie V150HT se deberán utilizar sólo con uno de los controladores apropiados Varian (serie 969-9405, 969-9505, 969-9423, 969-9523) y se deberán acoplar a una bomba primaria (véase esquema en "Technical Information").



¡ATENCION!

Eliminar el adhesivo y quitar el tapón de protección sólo en el momento en que se conecte la turbobomba al sistema.





La turbobomba se puede instalar en cualquier posición. Fijar la turbobomba en posición estable acoplando la brida de entrada de la turbobomba a una falsa brida fija que pueda soportar un par de 221 Nm alrededor de su eje.

La turbobomba con brida de entrada ISO ha de fijarse a la cámara de vacío mediante mordazas dobles o sencillas. La tabla siguiente describe, para cualquier dimensión de la brida y tipo de mordaza, el número de mordazas necesarias y a que par de apriete apretarlas.

BRIDA	TIPO DE MORDAZA	Nº	PAR DE APRIETE
ISO 63	Mordaza doble con roscado M10	4	22 Nm
	Mordaza sencilla con roscado M8	4	11 Nm
ISO 100	Mordaza doble con roscado M10	4	22 Nm
	Mordaza sencilla con roscado M8	8	11 Nm

La turbobomba con brida de entrada ConFiat ha de fijarse a la cámara de vacío mediante accesorios mecánicos Varian. Para más detalles véase el apéndice "Technical Information".

Para fijar la bomba mediante su base, es necesario utilizar tres tornillos M6 fijados en los orificios correspondientes que se encuentran en la base de la bomba. Los tornillos utilizados han de tener una carga de deformación elástica de 500 N/mm², y han de fijarse a un par de 3,1 Nm.

Para la instalación de los opcionales, véase "Technical Information".

UTILIZACION

Todas las instrucciones para el funcionamiento correcto de la turbobomba se encuentran en el manual de la unidad de control.

Leer atentamente dicho manual antes de utilizarla.

Para obtener mejores presiones límite, se puede calentar la envoltura de la bomba utilizando el calentador opcional. Durante el posible calentamiento de la cámara de vacío, la temperatura de la brida de entrada no deberá superar 120°C.

Utilizar siempre la refrigeración por agua durante las operaciones de calentamiento.

! PELIGRO!

No tocar la turbobomba y sus posibles accesorios durante las operaciones de calentamiento. La alta temperatura puede provocar lesiones a las personas.

! ATENCION!

Para el envío de aire de la bomba utilizar aire o gas inerte sin polvo o partículas. La presión de entrada a través de la puerta apropiada deberá ser inferior a 2 bar por encima de la presión atmosférica.

! ATENCION!

Evítense golpes, oscilaciones o bruscos desplazamientos de la turbobomba durante su funcionamiento. Los cojinetes podrían dañarse.

! ATENCION!

Para bombear gases agresivos estas bombas están dotadas de una puerta específica mediante la cual es necesario suministrar a la bomba un caudal de gas inerte (Nitrógeno o Argón) para proteger los rodamientos (véase el apéndice "Technical Information").

! PELIGRO!

Cuando la bomba se utiliza para bombear gases tóxicos, inflamables o radioactivos, seguir los procedimientos apropiados típicos de cada gas.

No usar la bomba cuando haya gases explosivos.

MANTENIMIENTO

Las bombas de la serie Turbo-V150HT no necesitan ningún mantenimiento. Cualquier intervención deberá ser realizada por personal autorizado.

! PELIGRO!

Antes de realizar cualquier intervención en la turbobomba, desempalmar el conector de alimentación, enviar aire a la bomba abriendo la válvula apropiada y esperar hasta que el rotor se pare completamente y esperar a que la bomba esté por debajo de 50 °C.

En caso de avería se podrá utilizar el servicio de reparación Varian o el "Varian advanced exchange service", que permite obtener una bomba regenerada para sustituir la averiada.

NOTA

Antes de enviar al fabricante una bomba para su reparación o "advanced exchange service", es imprescindible cumplimentar y remitir a la oficina de Ventas más cercana la ficha de "Seguridad y Salud" adjunta al presente manual de instrucciones. Una copia de la misma se deberá introducir en el embalaje de la bomba antes de enviarla.

En caso de que la bomba se tenga que desguazar, efectuar su eliminación respetando las normas nacionales específicas.

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 150HT series pumps are turbo-molecular pumps for high and ultra-high vacuum applications and can pump any type of gas or gas compound. They are not suitable for pumping liquids or solid particles. The pumping action is obtained through a high speed turbine (max. 62000 rpm) driven by a high-performance 3-phase electric motor. The Turbo-V 150HT pumps are free of contaminating agents and, therefore, are suitable for applications requiring a "clean" vacuum.

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 pumps, the following environmental requirements should not be exceeded:

- temperature: from -20° to +70 °C
- relative humidity: 0 - 95% (non-condensing)

If the storage time is long start the pump using the SOFT START mode (see control unit manual).

PREPARATION FOR INSTALLATION

The pump 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 pump, be sure not to drop it and avoid any kind of sudden impact or shock vibration to it.

Do not dispose of the packing materials in an unauthorized manner. The material is 100% recyclable and complies with EEC Directive 85/399.

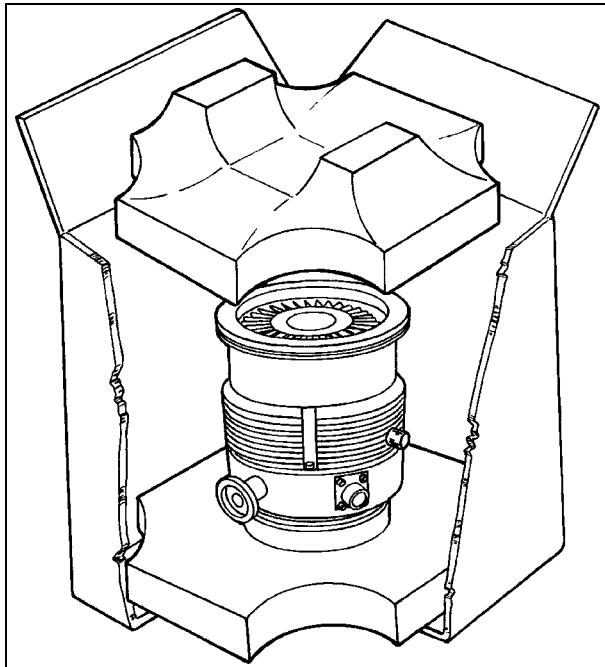


CAUTION

In order to prevent outgassing problems, do not use bare hands to handle components which will be exposed to vacuum. Always use gloves or other appropriate protection.

NOTE

Normal exposure to the environment cannot damage the pump. Nevertheless, it is advisable to keep it closed until it is installed in the system, thus preventing any form of pollution by dust.



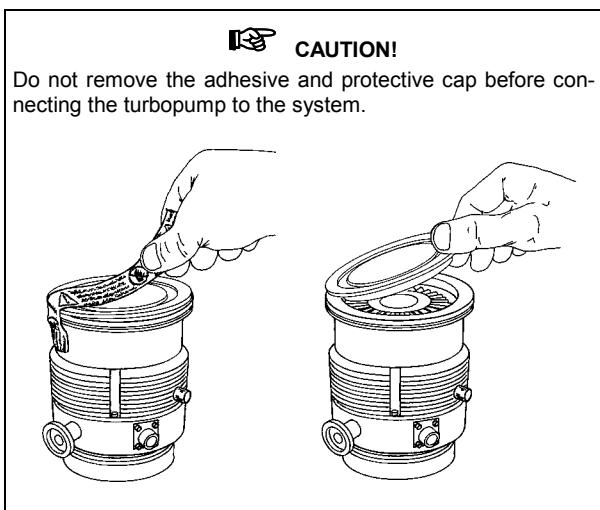
INSTALLATION

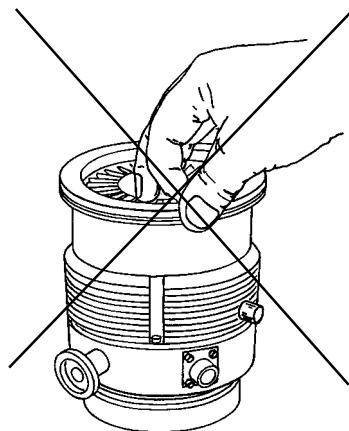
Do not install or use the pump in an environment exposed to atmospheric agents (rain, snow, ice), dust, aggressive gases, or in explosive environments or those with a high fire risk. During operation, the following environmental conditions must be respected:

- maximum pressure: 2 bar above atmospheric pressure
- temperature: from +5 °C to +35 °C
- relative humidity: 0 - 95% (non-condensing)

In the presence of magnetic fields the pump must be protected using a ferromagnetic shield. See the appendix "Technical Information" for detailed informations.

The Turbo - V 150HT series pumps must only be used with one of the special Varian controllers (series 969-9405, 969-9505, 969-9423, 969-9523) and must be connected to a primary pump (see "Technical Information").



NO!**WARNING!**

To avoid injury, never put fingers or any objects whatsoever in the inlet port of the turbopump. The use of the protective screen is strongly advised (optional extra). If a vibration damper or flexible metallic bellows are used on the inlet port, make sure that the pump is fixed to the base.

The turbopump can be installed in any position. Fix the turbopump in a stable position connecting the inlet flange of the turbopump to a fixed counter-flange capable of withstanding a torque of 221 Nm around its axis.

The turbopump with ISO inlet flange must be fixed to the vacuum chamber by means of clamps or claws. The following table shows, for each flange and fixing device, the necessary number of clamps or claws and the relevant fixing torque.

FLANGE	FIXING DEVICE	N.	FIXING TORQUE
ISO 63	M10 clamps	4	22 Nm
	M8 claws	4	11 Nm
ISO 100	M10 clamps	4	22 Nm
	M8 claws	8	11 Nm

The turbopump with ConFlat inlet flange must be fixed to the vacuum chamber by means of the appropriate Varian hardware. See the appendix "Technical Information" for a detailed description.

To fix the pump by means of its base, it is necessary to use three M6 screws fixed to the foreseen holes of the pump base. The used screws must have a minimum strength point of 500 N/mm² and must be fixed with a torque of 3.1 Nm. For installation of optional accessories, see "Technical Information".

USE

All the instructions for the correct use of the turbopump are contained in the control unit manual.

Read the manual carefully before using the pump.

In order to achieve a better (lower) base pressure, the pump casing may be heated using the optional heater. While heating the pump, the temperature of its inlet flange must not exceed 120 °C.

Always use the water cooling system during the heating operations.



Do not touch the turbopump or any of its accessories during the heating process. The high temperatures may cause burns.



Use air or inert gas free from dust or particles for venting the pump. The pressure at the vent port must be less than 2 bar (above atmospheric pressure).



Avoid impacts, oscillations or harsh movements of the pump when in operation. The bearings may become damaged.



For pumping aggressive gases, these pumps are fitted with a special port to allow a steady flow of inert gas (like N₂, Ar) for pump bearing protection (see the appendix "Technical Information").



When employing the pump for pumping toxic, flammable, or radioactive gases, please follow the required procedures for each gas disposal.

Do not use the pump in presence of explosive gases.

MAINTENANCE

The Turbo-V 150HT series pump does not require any maintenance. Any work performed on the pump must be carried out by authorized personnel.



Before carrying out any work on the turbopump, disconnect it from the supply, vent the pump by opening the appropriate valve, wait until the rotor has stopped turning and wait until the surface temperature of the pump falls below 50 °C.

In the case of breakdown, contact your local Varian service center who can supply a reconditioned pump to replace that broken down.

NOTE

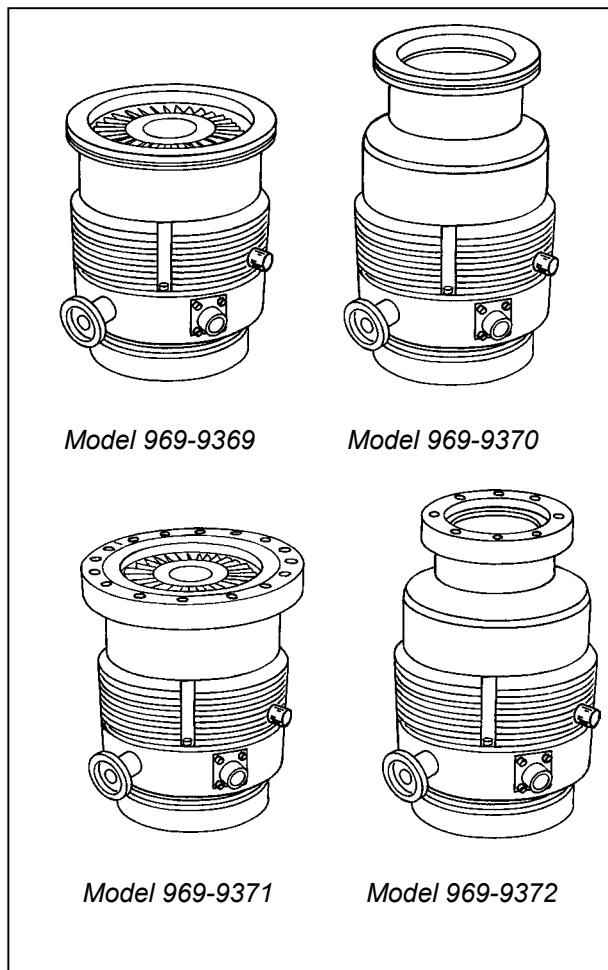
Before returning the pump to the constructor for repairs, or replacement with a reconditioned unit, the "Health and Safety" sheet attached to this instruction manual must be filled-in and sent to the local sales office. A copy of the sheet must be inserted in the pump package before shipping.

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

DESCRIPTION OF THE TURBOPUMP

The Turbo-V150HT pump is available in four models. The four models, which differ only in the high vacuum flange, are:

- Model 969-9369 with ISO 100 high vacuum flange
- Model 969-9370 with ISO 63 external diameter high vacuum flange
- Model 969-9371 with ConFlat 6" external diameter high vacuum flange
- Model 969-9372 with ConFlat 4.5" external diameter high vacuum flange.



The Turbo-V150HT pump consists of a high frequency motor driving a turbine fitted with 7 bladed stages and 6 Macrotorr stages. The turbine rotates in an anticlockwise direction when viewed from the high vacuum flange end.

The turbine is made of high-strength aluminium alloy, machined from a single block.

Proceeding from the high vacuum to the forevacuum region, the turbine stages sequence is:

1 stage with a blade angle of 42°, 1 stage with a blade angle of 28°, 3 stages with a blade angle of 20°, and 3 final stages with a blade angle of 10°. The Macrotorr stages are in the form of six discs.

The turbine rotor is supported by permanently lubricated high precision ceramic ball bearings installed on the forevacuum side of the pump.

The static blades of the stator are made of stainless steel. These are supported and accurately positioned by spacer rings.

The Macrotorr stators are in the form of self-positioning machined discs with pumping channels and an opening restricted by the corresponding rotor discs. These are made of aluminium alloy.

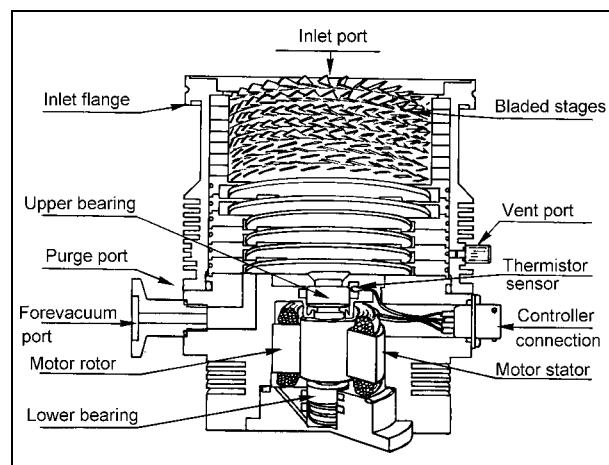
During normal operation, the motor is fed with a voltage of 120 Vac three-phase at 1050 Hz. To reduce losses during start-up to a minimum, the frequency increases according to a ramp with a higher initial voltage/frequency ratio.

The external body of the pump is shaped so that the pump can function with natural convection air cooling. Kits are available for water cooling or forced air cooling to cool the pump in the cases where it is used under heavy load or when natural convection is insufficient for cooling purposes.

A thermistor sensor is mounted near the upper bearing to prevent the pump from overheating. The thermistor sensor, the motor stator windings and the earth are connected to a Turbo-V controller through a 6 pin socket on the side of the pump.

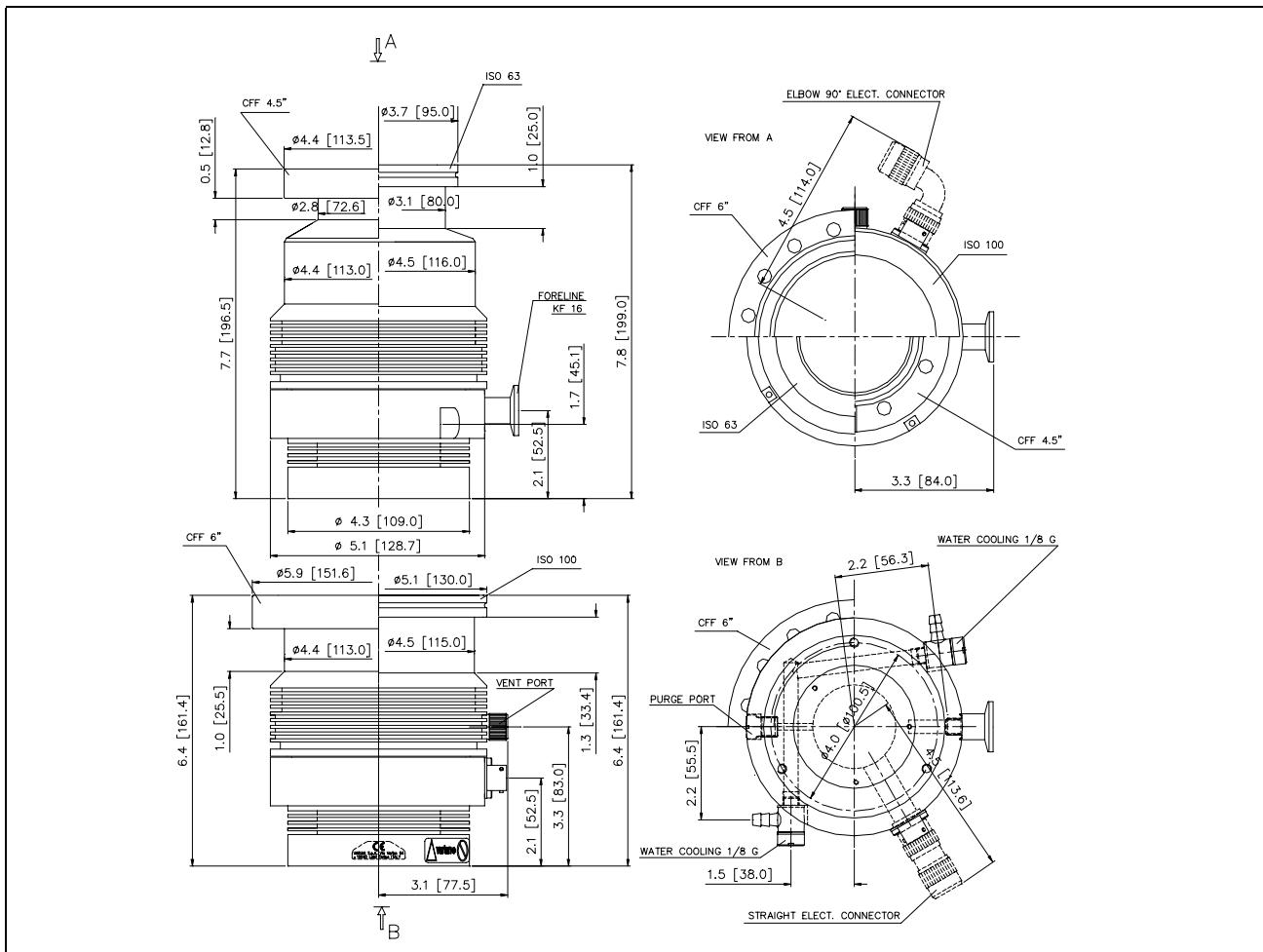
The pump is balanced after assembly with a residual vibration amplitude less than 0.01 µm.

The pump can operate in any position and can be supported on the high vacuum flange or on its base. The connection of the forevacuum on the side of the pump is a KF 16 NW flange.



TECHNICAL SPECIFICATION

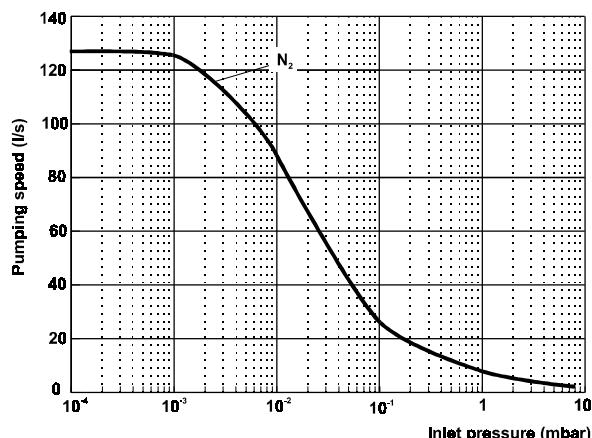
The following figure shows the Turbo-V 150HT outline drawing. Dimensions are in inches [mm].



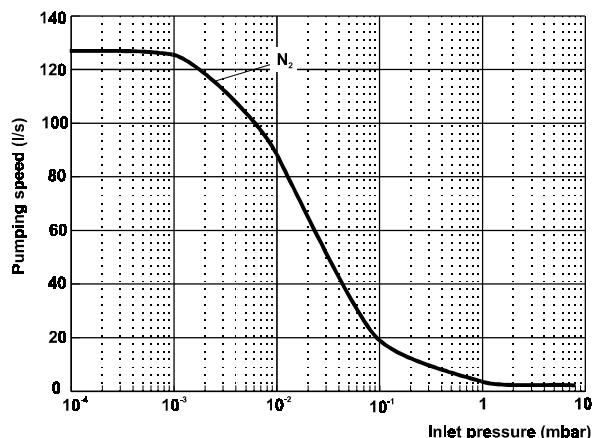
Pumping speed N ₂ : He: H ₂ :	ISO 100: 130 l/s 120 l/s 110 l/s	ISO 63: 100 l/s 105 l/s 100 l/s
Compression ratio	N ₂ : 3×10^8 He: 8×10^5 H ₂ : 8×10^4	
Base pressure*	with minimum recommended mechanical pump: $< 2 \times 10^{-10}$ mbar ($< 1.5 \times 10^{-10}$ Torr) with minimum recommended diaphragm pump: 2×10^{-8} mbar (1.5×10^{-8} torr)	
Inlet flange	ISO 100, ISO 63, CFF 6", CFF 4.5"	
Foreline flange	KF 16 NW	
Rotational speed	62000 rpm	
Start-up time	< 90 seconds	
Recommended forepump	Mechanical: Varian SD 40 Diaphragm: MD12	
Operating ambient temperature	+ 5° C to + 35° C	

Operating position	Any
Cooling requirements	Forced air or water
Coolant water	minimum flow: 30 l/h (0.13 GPM) temperature: + 10° C to + 30° C pressure: 3 to 4 bar
Bakeout temperature	120° C max. at inlet flange (CF flange) 80° C max. at inlet flange (ISO flange)
Vibration level (displacement)	< 0.01 μm at inlet flange
Input	120 Vac, three phase, 1050 Hz
Lubricant	permanent lubrication
Storage temperature	- 20° C to + 70° C
Weight kg (lbs)	CFF: 5.6 (12.3) ISO: 3.6 (7.9)

* According to standard DIN 28 428, the base pressure is that measured in a leak-free test dome, 48 hours after the completion of test dome bake-out, with a Turbopump fitted with a ConFlat flange and using the recommended pre-vacuum pump.

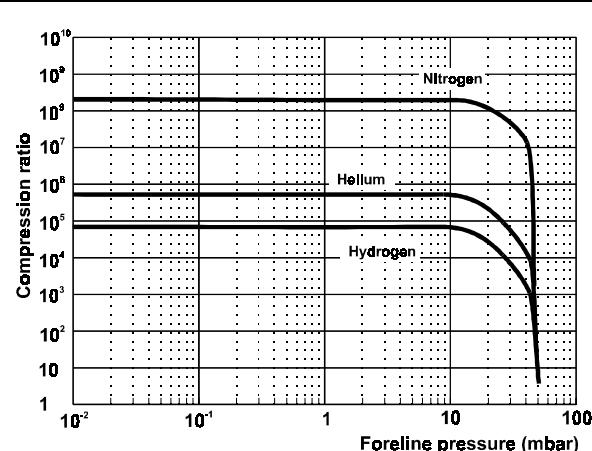


Pump fed by standard controller

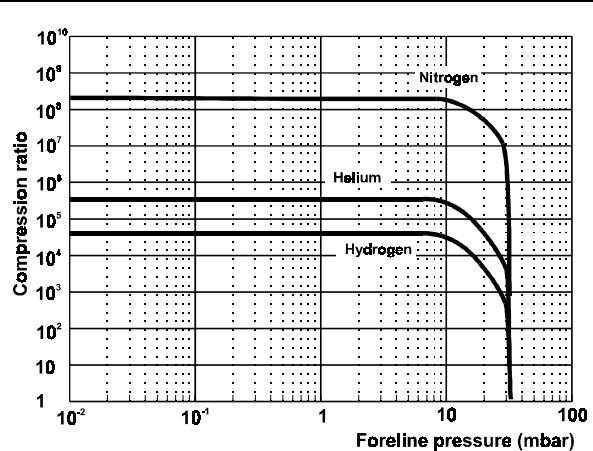


Pump fed by controller model 969-9436, 969-9536

Graph of nitrogen pumping speed vs inlet pressure

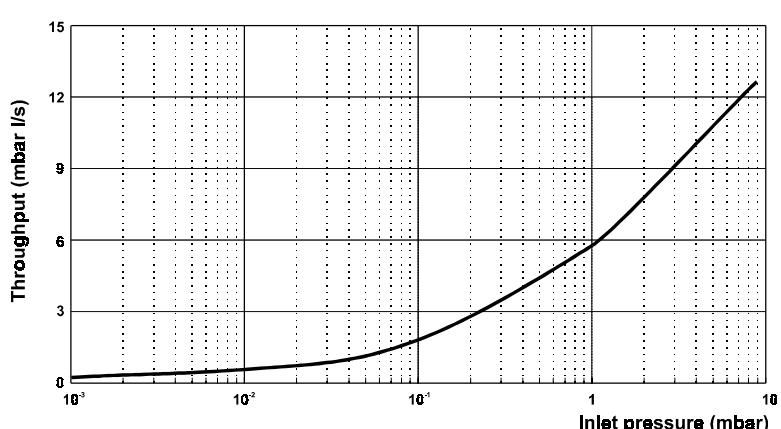


Pump fed by standard controller

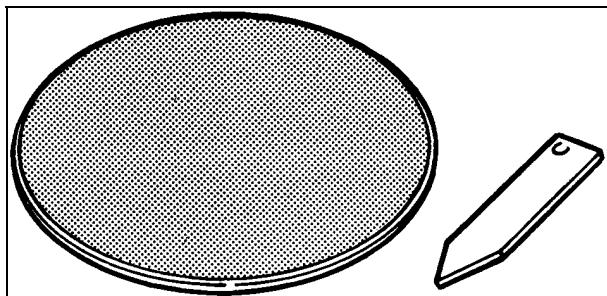


Pump fed by controller model 969-9436, 969-9536

Graph of compression ratio vs foreline pressure



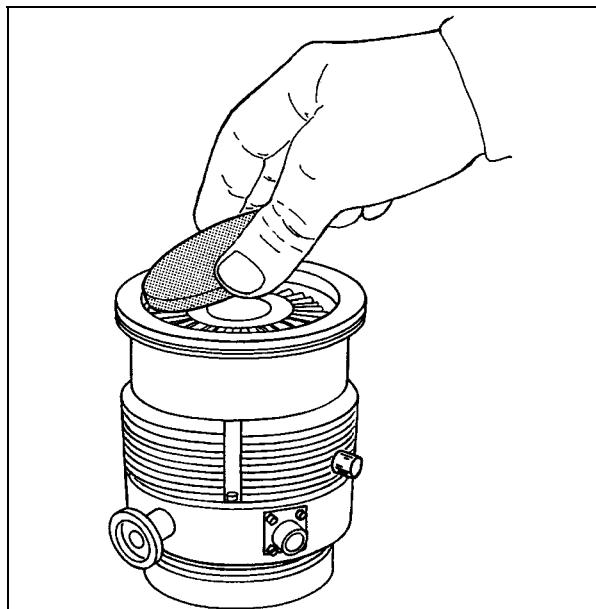
Graph of nitrogen throughput vs inlet pressure using the recommended mechanical forevacuum pump

INLET SCREEN INSTALLATION

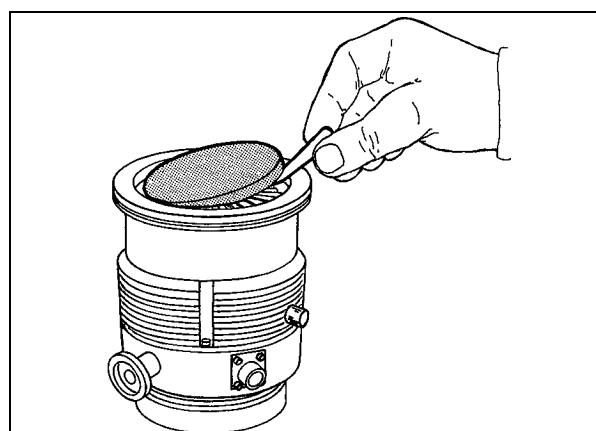
The inlet screens mod. 969-9300 and 969-9302 prevent the blades of the pump from being damaged by debris greater than 2 mm diameter.

The inlet screen, however, will reduce the pumping speed by about 10%.

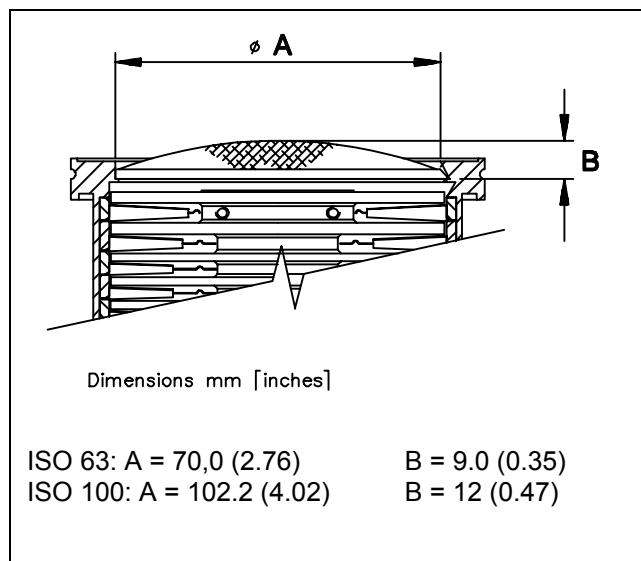
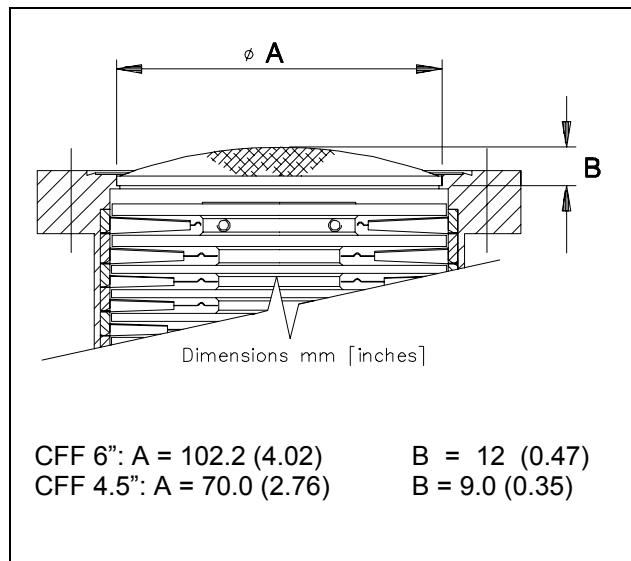
The inlet screen is fitted in the upper part of the pump, as shown in the figure.



The screen can be mounted on each pump model and is supplied with a small tab for easy removal (see figure).



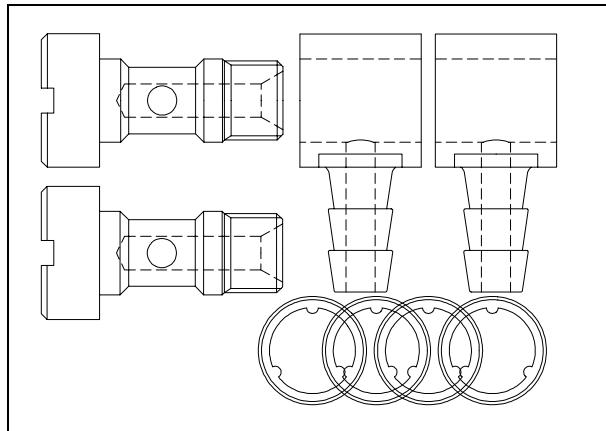
The following figures show the overall flange dimensions with the protection screen fitted on pump with ISO flange and pump with CFF flange.



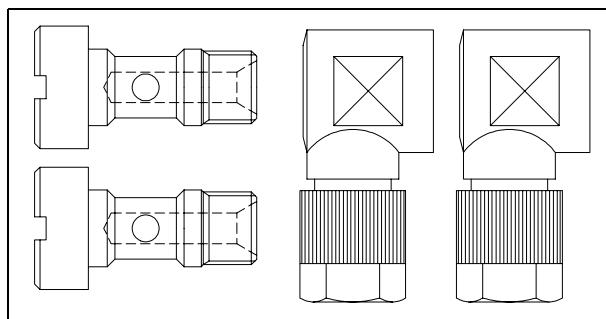
WATER COOLING INSTALLATION

Two types of water cooling kits are available to be mounted when the pump is used under heavy load conditions or when air cooling is insufficient.

The two model part numbers are: 969-9337 (metallic model), and 969-9347 (plastic model).



Model 969-9337

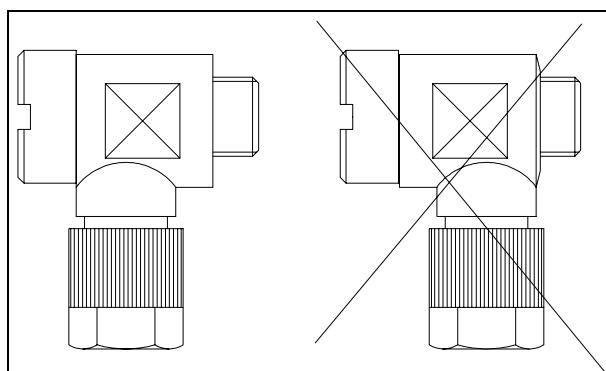


Model 969-9347



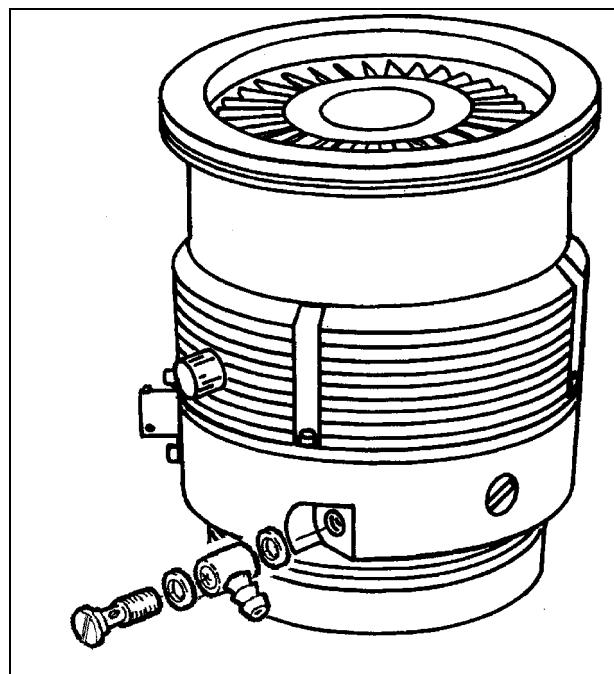
CAUTION

The items of the plastic model kit must be assembled as shown in the following figure



The assembled kit must be screwed into the suitable holes of the pump body with a recommended closing torque of 5 Nm.

The metallic model is assembled as shown in the figure.



Two 6 mm (1/4") internal diameter rubber or plastic hoses from the water supply must be fitted to the two nozzles.

NOTE

These hoses must be held on the respective nozzles using hose clips to avoid that the tube(s) gets loose or disconnected during operation.

The plastic model must be screwed into the suitable holes of the pump.

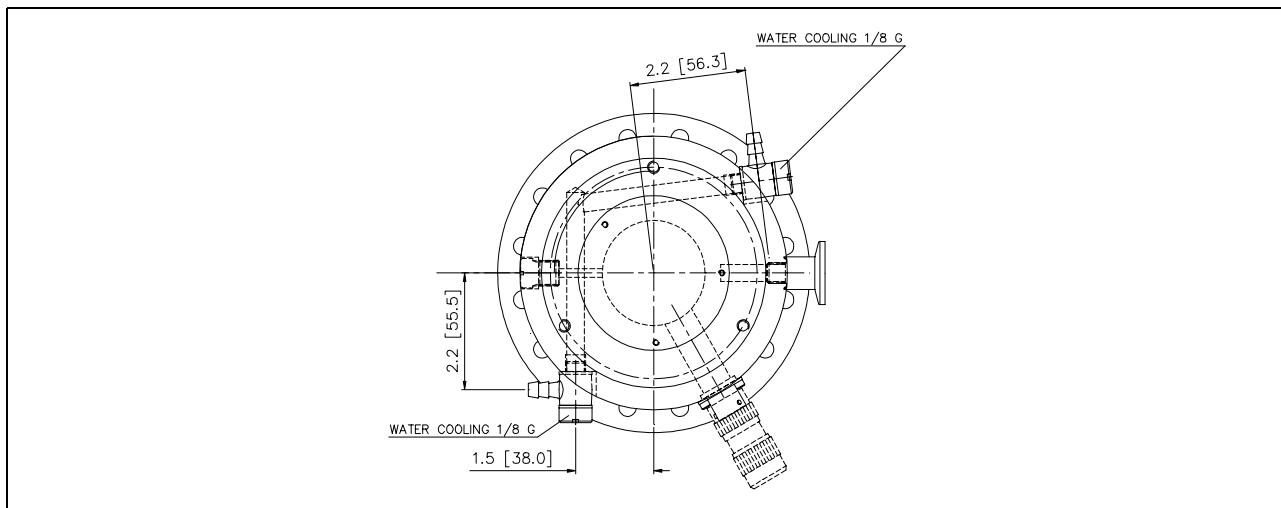
Cooling may be carried out either through an open circuit with eventual discharge of the water, or using a closed circuit cooling system.

The water temperature must be between +10°C and +30°C, with an inlet pressure between 3 and 5 bar. This allows a flow of about 200 l/h.

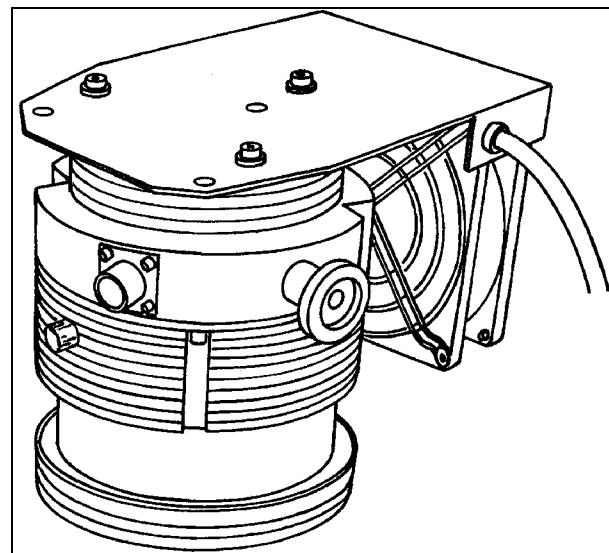
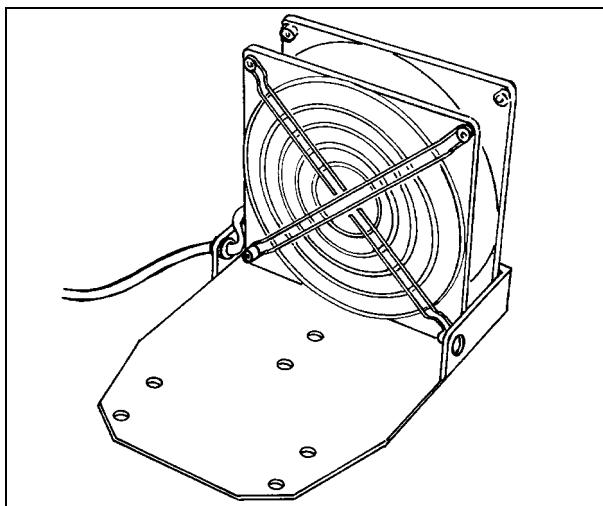
NOTE

The water electrical conductance must be $\leq 500 \mu\text{s/cm}$. When the conductance is higher, in closed water circuit, the use of up to 20% of Ethyl-Glycole is suggested.

The overall dimensions of the pump when equipped with the water cooling kit mounted are shown in the following figure (dimensions are in inches [mm]).



AIR COOLING KIT INSTALLATION



A fan kit model 969-9314 is available for air cooling the pump.

Fan specification:

- air flow: 59 l/s (120 CFM)
- input voltage: 120 Vac 50-60 Hz
- maximum power: 17 W
- dimensions: 127 x 127 mm (5 x 5 inches)

Position the fan on the pump, ensuring that the holes in the plate line up with those in the pump base.

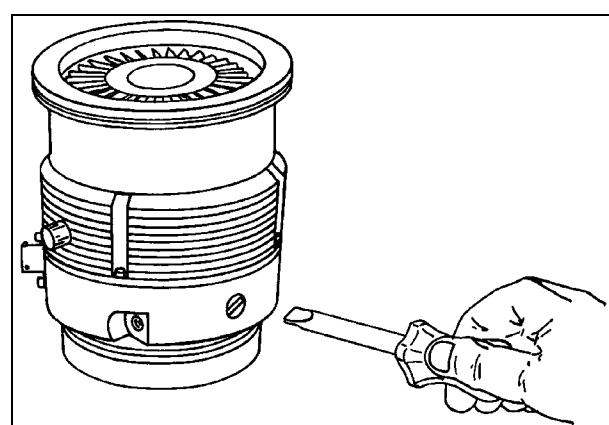
Insert the respective washers and screws and tighten with a screwdriver.

Connect the fan to the controller.

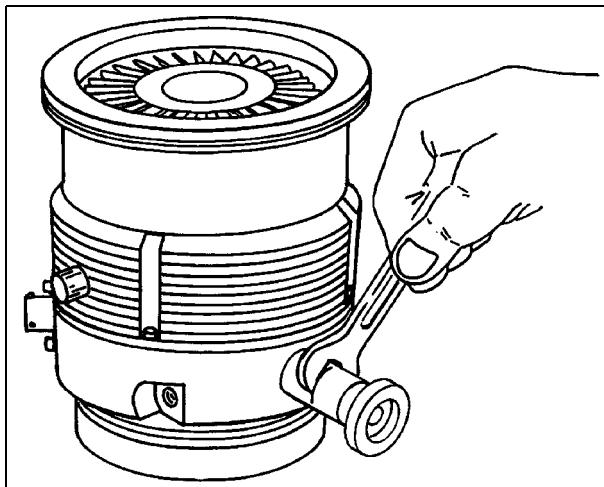
GAS PURGE VALVE INSTALLATION

A gas purge valve is available to protect the pump bearings against particulate and corrosive gases that could move into the pump.

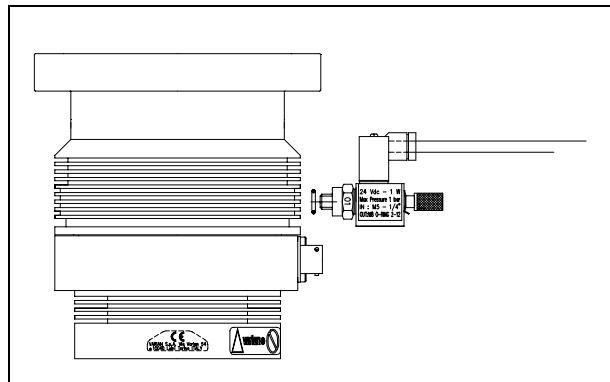
To install the gas purge valve it is necessary to unscrew the purge port cover as shown in the following figure,



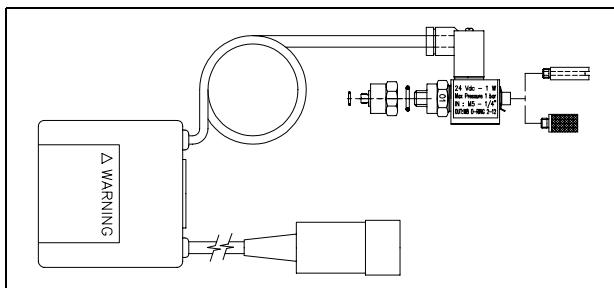
and then screw the gas purge valve (with a torque of 2.5 Nm) as shown in the following figure.



Screw the vent valve into the pump without using the supplied adapter.

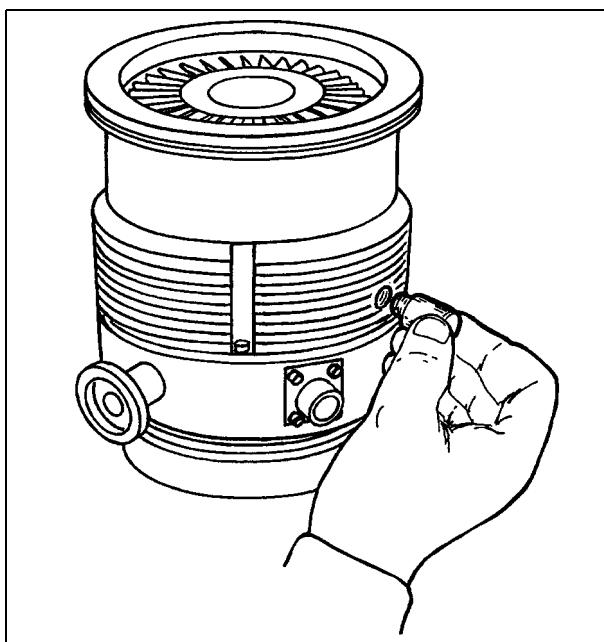


VENT VALVE INSTALLATION



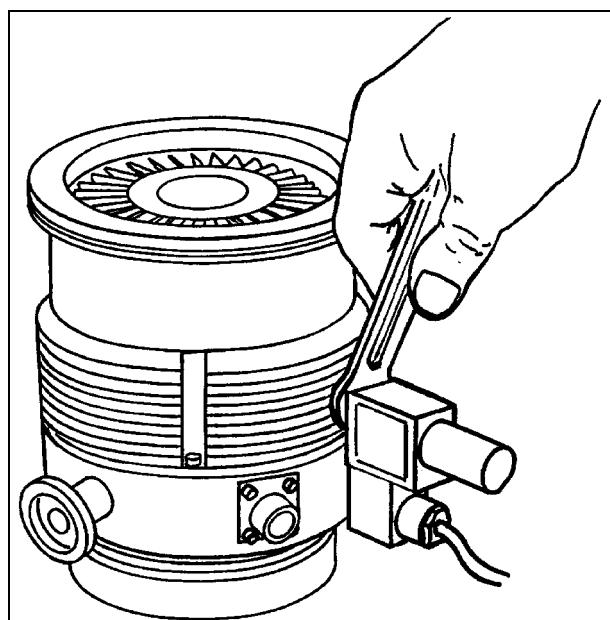
The vent valve mod. 969-9833 allows to avoid undesired venting of the pump during a temporary power failure (5 sec maximum), and enables an automatic vent operation.

Unscrew the threaded plug (see figure below).

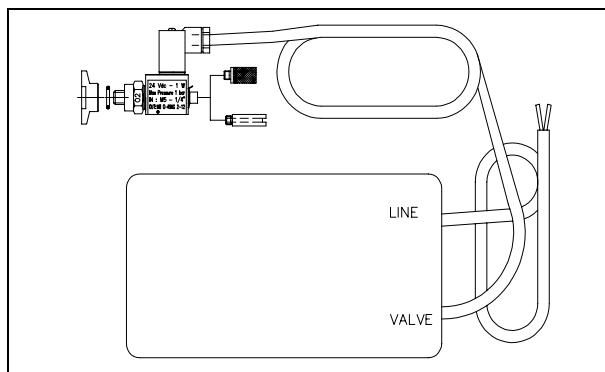


CAUTION

Do not overtighten the valve as this may damage the thread on the pump.

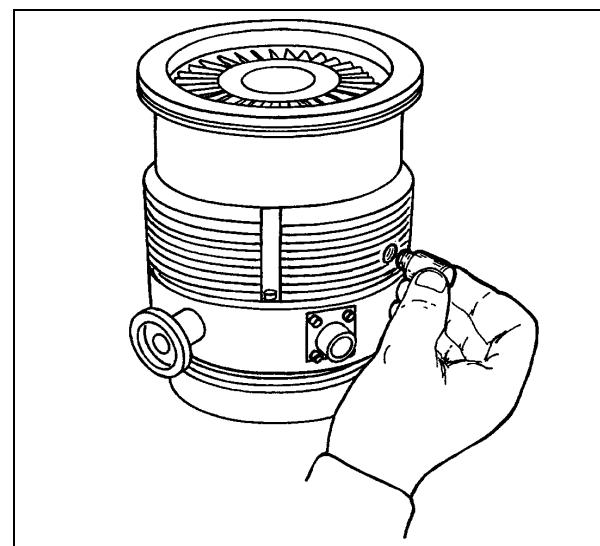


VENT DEVICE INSTALLATION



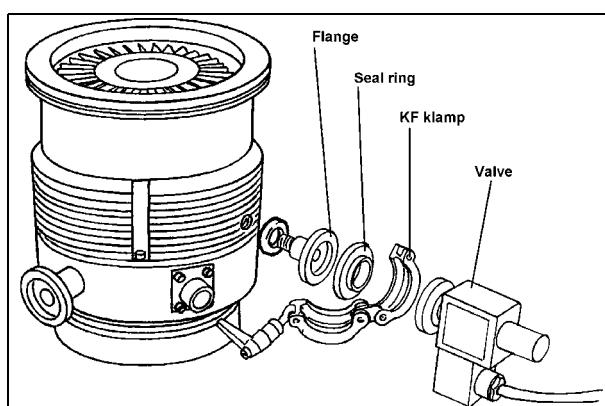
The vent device mod. 969-9831 allows to avoid undesired venting of the pump during a temporary power failure (adjustable time up to 36 min.), and enables an automatic vent operation.

Unscrew and remove the threaded plug (see figure below).



Screw the flange mod. 969-9108 on the pump, taking care of the o-ring right position.

Assemble the seal ring and lock the vent device in position using the KF klamp.



VIBRATION ISOLATOR INSTALLATION

Two vibration isolators for ISO and CFF inlet flange version pumps are available as accessories.

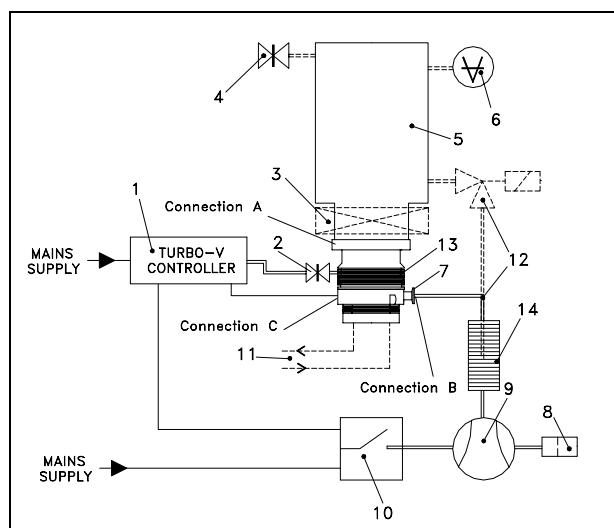
The two model part numbers are the following:

- model 969-9332 for CFF 6" flange;
- model 969-9342 for ISO 100 flange.

They typically reduce the vibration transmitted from the Turbo-V 150HT pump to the system by a factor of 20.

Please refer to the relevant instruction manual.

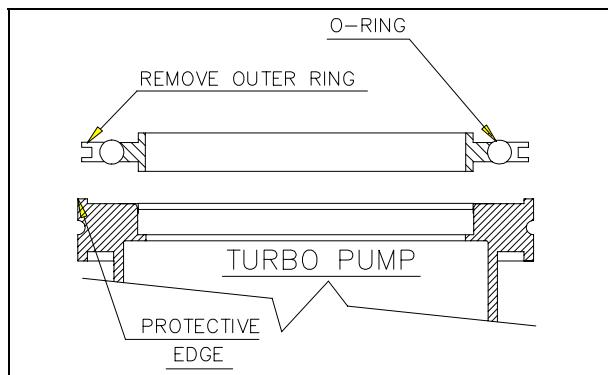
TYPICAL LAYOUT DIAGRAM



1. Turbo-V controller
2. Vent valve
3. Vacuum pump shut-off valve (optional)
4. System vent valve (optional)
5. Vacuum chamber
6. Ionisation gauge
7. Fore-vacuum pump connecting flange
8. Oil mist eliminator
9. Fore-vacuum pump with internal one-way valve
10. Fore-vacuum pump control relay
11. Connection for water cooling
12. Roughing line with valve (optional)
13. Turbopump
14. Flexible connection

Connection A - HIGH VACUUM FLANGE

To connect the Turbo pump to the ISO inlet flange, remove the outer ring and position the centering ring as shown in the figure.



For ConFlat flange connections we recommend using Varian hardware.

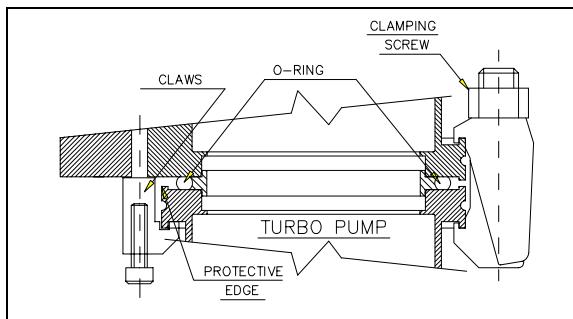
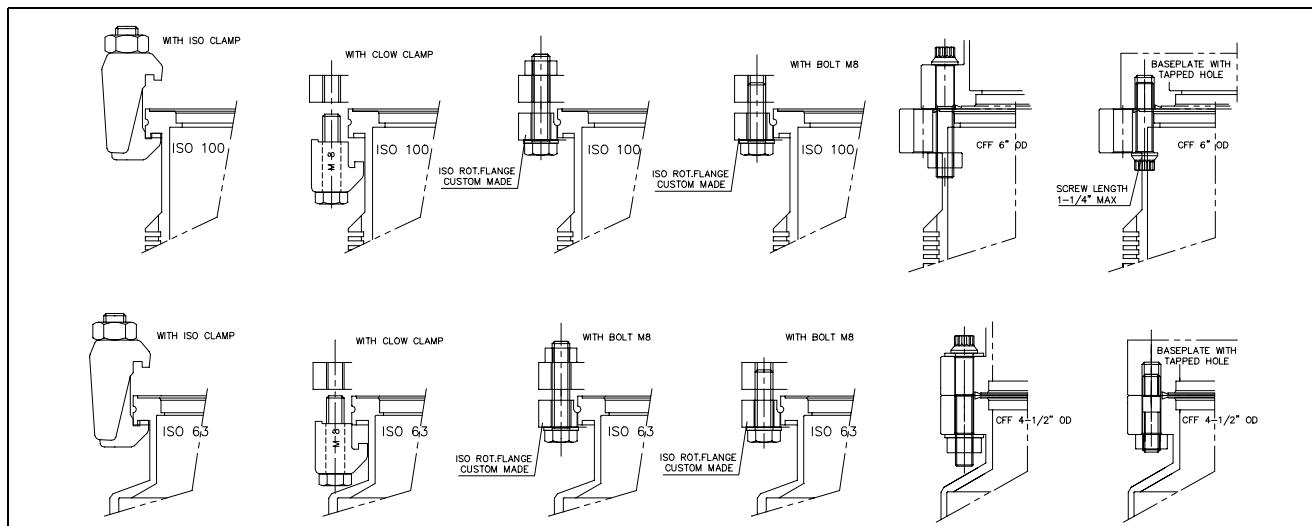
To facilitate assembly and dismantling, apply Felpro C-100 high temperature lubricant to the screw threads protruding from the flange and between the nuts and flange.

Attach the units and tighten each one in turn. Repeat the sequential tightening until the flange faces meet.

 CAUTION

Exercise care when tightening nuts and bolts to avoid creating dents in the envelope as this may cause the pump rotor to lock.

Then fix the two flanges with the clamps or claws as shown in the figure.

**Connection configurations**

Connection B - FORE-VACUUM PUMP

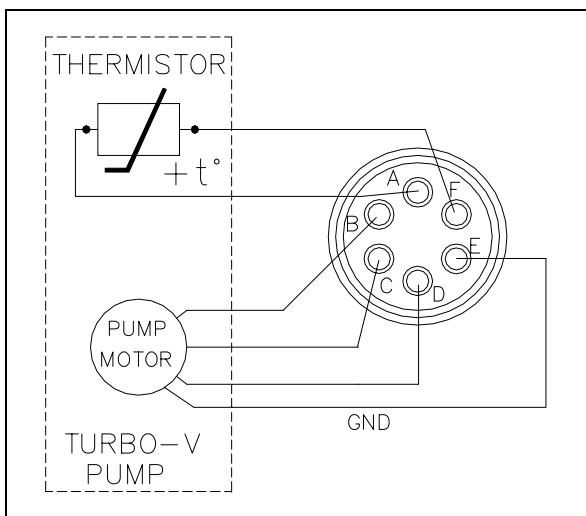
A flange KF 10 NW is available to connect the Turbopump to the fore-vacuum pump. A hose or vacuum approved pipe can be used. If a rigid pipe is used, any vibration generated by the mechanical pump must be eliminated through the use of bellows.

NOTE

The Turbo pump is characterised by its high compression ratio also for oil vapours. When using a mechanical oil-sealed pump, it is advisable to install a suitable trap between the turbopump and the fore-vacuum pump in order to prevent oil back-streaming.

Connection C - ELECTRICAL

The turbopump is connected to the controller through an 6-pin connector. Pins B, C and D are the 3-phase supply to the motor, pins A and F are connected to the temperature sensor (NTC type, 30 K Ω resistance at 20° C) and pin E is connected to the pump ground.



If the temperature sensor is disconnected, the pump will not start. To prevent damage to the pump when the temperature exceeds 60° C, the sensor automatically cuts out the power supply.

PUMP USED WITH CORROSIVE GASES

To prevent damage to the bearings, an inert gas must flow into the pump body around the upper bearing towards the forevacuum line. To supply the inert purge gas (e. g. nitrogen) to the pump through the purge port, connect a gas purge valve between the pressure regulator and the pump (see the following figure). Adjust the pressure regulator in order to obtain the necessary gas purge flow rate according to the application.

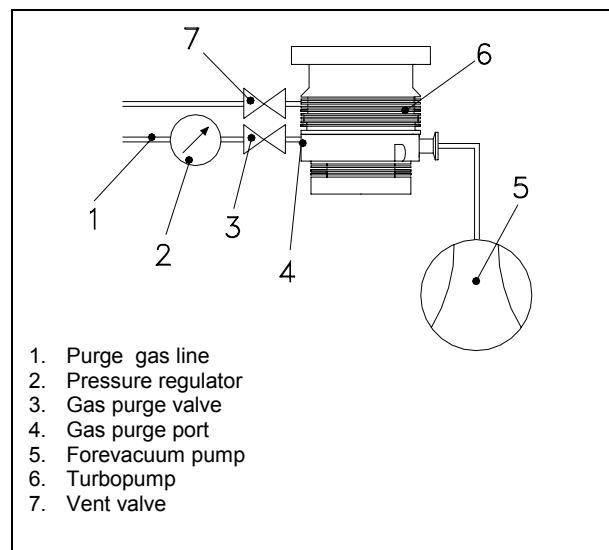
CAUTION

To prevent bearing damage, Varian suggests the following purge gas flow rates: 10 sccm (0.17 mbar l/s) for a mild purge process, or 15 psig (1 bar l/s) for an heavy process. Please contact Varian for specific applications.

The purge gas throughput with the recommended forepump of 2 m³ /h (1.4 CFM) allows to achieve a high vacuum pressure in the 10⁻⁸ mbar range. The recommended gas flow maintains a pressure into the pump body higher than the forevacuum pressure.

The recommended procedure to vent the system and the pump avoiding the contact between the pump bearings and the corrosive gas is described in the following points:

1. Close the corrosive gas flow into the system.
 2. Leaving the Turbo-V pump and the backing pump running and the purge gas flowing, wait for enough time to evacuate the corrosive gas from the system.
 3. Open the Turbo-V vent port slowly until to reach atmospheric pressure in the system.
 4. Turn off the Turbopump.
 5. When the Turbo-V pump and the backing pump are stopped and the system is at atmospheric pressure, for a better bearing protection it is advisable to leave the purge gas flowing into the Turbo-V pump, with the chamber or the Turbo-V vent valve opened, to avoid system overpressures.
- If the vent valve can't be kept opened, the backing pump should be left operating.



1. Purge gas line
2. Pressure regulator
3. Gas purge valve
4. Gas purge port
5. Forevacuum pump
6. Turbopump
7. Vent valve

PUMP USED IN PRESENCE OF MAGNETIC FIELDS

Magnetic fields induce eddy currents in the rotor of a turbomolecular pump that tend to oppose to its rotation.

The result is increased electrical power consumption by the motor, most of which is dissipated in the rotor.

Since the rotor is not in contact with the stator the above power can leave the rotor mainly by radiation and hence the rotor may be overheated while static parts of the pump remain cool.

This effect is strongly dependant from the intensity, time function and distribution of the magnetic field.

In general, therefore, an increase in pump current can be expected.

If this increase is lower than 50% of the current value drawn by the motor in high vacuum operation, no particular problem should be expected.

However if the effect is grater, than the case should be carefully reviewed by Varian's specialist. As a matter of fact, in case of high magnetic fields, also important forces might be generated and applied to the rotor.

ACCESSORIES

DESCRIPTION	PART NUMBER
Inlet screen, ISO 100	969-9302
Inlet screen, ISO 63	969-9300
Water cooling kit	969-9337
Plastic water cooling kit	969-9347
Air cooling kit	969-9314
Vent flange NW 10 KF (M8)	969-9108
Vent valve with fixed delay time	969-9833
Vent device with adjustable delay time	969-9831
Forepump SD 40 with 1 ph. universal motor	P1111-307
Diaphragm pump	MD12
Vibration damper ISO 100	969-9344
Vibration damper CFF 6"	969-9334
Vibration damper ISO 63	969-9340
Purge valves (10 SCCM)	969-9239 969-9240

For a complete overview of Varian's extensive product lines, please refer to the Varian catalog.



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.#:
<u>Europe only:</u> VAT reg. Number:	<u>USA only:</u>	<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 #:



Request for Return



FAILURE REPORT

TURBO PUMPS and TURBOCONTROLLERS

<input type="checkbox"/> Does not start	<input type="checkbox"/> Noise	POSITION	PARAMETERS
<input type="checkbox"/> Does not spin freely	<input type="checkbox"/> Vibrations	<input type="checkbox"/> Vertical	Power: Rotational Speed:
<input type="checkbox"/> Does not reach full speed	<input type="checkbox"/> Leak	<input type="checkbox"/> Horizontal	Current: Inlet Pressure:
<input type="checkbox"/> Mechanical Contact	<input type="checkbox"/> Overtemperature	<input type="checkbox"/> Upside-down	Temp 1: Foreline Pressure:
<input type="checkbox"/> Cooling defective		<input type="checkbox"/> Other:	Temp 2: Purge flow:
		OPERATION TIME:

TURBOCONTROLLER ERROR MESSAGE:

ION PUMPS/CONTROLLERS

<input type="checkbox"/> Bad feedthrough	<input type="checkbox"/> Poor vacuum
<input type="checkbox"/> Vacuum leak	<input type="checkbox"/> High voltage problem
<input type="checkbox"/> Error code on display	<input type="checkbox"/> Other
Customer application:	

VALVES/COMPONENTS

<input type="checkbox"/> Main seal leak	<input type="checkbox"/> Bellows leak
<input type="checkbox"/> Solenoid failure	<input type="checkbox"/> Damaged flange
<input type="checkbox"/> Damaged sealing area	<input type="checkbox"/> Other
Customer application:	

LEAK DETECTORS

<input type="checkbox"/> Cannot calibrate	<input type="checkbox"/> No zero/high background
<input type="checkbox"/> Vacuum system unstable	<input type="checkbox"/> Cannot reach test mode
<input type="checkbox"/> Failed to start	<input type="checkbox"/> Other
Customer application:	

INSTRUMENTS

<input type="checkbox"/> Gauge tube not working	<input type="checkbox"/> Display problem
<input type="checkbox"/> Communication failure	<input type="checkbox"/> Degas not working
<input type="checkbox"/> Error code on display	<input type="checkbox"/> Other
Customer application:	

PRIMARY PUMPS

<input type="checkbox"/> Pump doesn't start	<input type="checkbox"/> Noisy pump (describe)
<input type="checkbox"/> Doesn't reach vacuum	<input type="checkbox"/> Over temperature
<input type="checkbox"/> Pump seized	<input type="checkbox"/> Other
Customer application:	

DIFFUSION PUMPS

<input type="checkbox"/> Heater failure	<input type="checkbox"/> Electrical problem
<input type="checkbox"/> Doesn't reach vacuum	<input type="checkbox"/> Cooling coil damage
<input type="checkbox"/> Vacuum leak	<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 Anfrage ist diese Unterlage auch auf Deutsch, Italienisch und Französisch erhältlich.

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