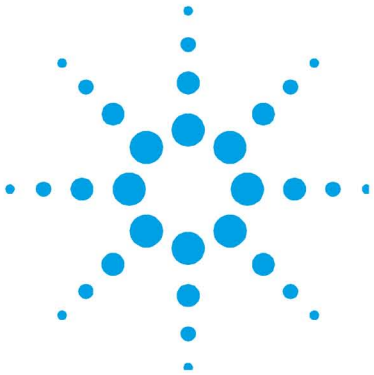

Turbo-V 81-T

Models: 969-8905, 969-8906, 969-8907, 969-8908

Manual de Instrucciones (Spanish - pages 7-18)

User Manual (English - pages 19-58)

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CAUTION

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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.

Turbo-V 81-T

4
Manual de istrucciones

Traducción de las instrucciones originales

Indicaciones de Seguridad para Bombas Turbomoleculares

Las bombas Turbomoleculares descritas en el siguiente manual de instrucciones tienen una elevada cantidad de energía cinética debido a la alta velocidad de rotación en combinación a la masa específica de sus rotores.

En el caso de un daño del sistema, por ejemplo por un contacto entre el rotor y el estator o por una rotura del rotor, la energía de rotación podría ser liberada.

¡ADVERTENCIA!

Para evitar daños a los equipos y prevenir lesiones a los operadores, es necesario seguir atentamente las instrucciones de instalación descritas en el presente manual!

Información general

Este equipo es para uso profesional. El usuario ha de leer atentamente el presente manual de instrucciones y cualquier otra información suplementaria facilitada por Agilent antes de usar el aparato. Agilent se considera libre de posibles responsabilidades debidas al incumplimiento total o parcial de las instrucciones, al uso impropio por parte de personal no preparado, a operaciones no autorizadas o a un uso contrario a las normas nacionales específicas.

Las bombas de la serie Turbo V 81-T son bombas turbomoleculares para aplicaciones de alto y ultra alto vacío capaces de bombear cualquier tipo de gas o compuesto gaseoso no corrosivo. No son adecuadas para bombear líquidos ni partículas sólidas.

El efecto de bombeo se obtiene mediante una turbina rotativa de alta velocidad (80000 r.p.m. máx.) movida por un motor eléctrico trifásico de alto rendimiento. El Turbo-V 81-T no posee ningún agente contaminante y por lo tanto es adecuado para aplicaciones que requieren un vacío' "limpio".

A continuación se facilita toda la información necesaria para garantizar la seguridad del operador al usar el aparato. En el anexo "Technical Information" se facilita información más detallada.

Este manual utiliza las convenciones siguientes:

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

¡ADVERTENCIA!

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

NOTA Las notas contienen información importante extraída del texto.

Almacenamiento

Para garantizar el nivel máximo de funcionalidad y fiabilidad de las bombas turbomoleculares Agilent, deberán aplicarse las siguientes instrucciones:

- durante el transporte, desplazamiento y almacenamiento de las bombas no deberán superarse las siguientes condiciones ambientales:
  - temperatura: entre –20 °C y 70 °C;
  - humedad relativa: entre 0 y 95 % (no condensante);
- el cliente deberá activar siempre las bombas turbomoleculares en modalidad Soft-Start al recibirlas y ponerlas en funcionamiento por primera vez;
- el período máximo de almacenamiento de una bomba turbomolecular es de diez meses a contar de la fecha de envío al cliente.

¡ATENCIÓN! En caso de superarse por cualquier motivo el período máximo permitido de almacenamiento, será necesario devolver la bomba al fabricante. Para mayores informaciones al respecto, se ruega contactar con el representante local de Agilent.

Preparación para la instalación

El Turbo-V 81-T se suministra en un embalaje especial de protección; si se observan daños, que podrían haberse producido durante el transporte, ponerse en contacto con la oficina local de ventas.

Durante la operación de desembalaje, tener cuidado de que no se caiga la bomba y de no someterla a golpes o vibraciones. No abandonar el embalaje en el medio ambiente. El material es completamente reciclable y cumple con la directiva CEE 85/399 para la preservación del medio ambiente.

¡ATENCIÓN! Para evitar problemas de desgasificación, no tocar con las manos desnudas los componentes destinados a exponerse al vacío. Utilizar siempre guantes u otra protección adecuada.

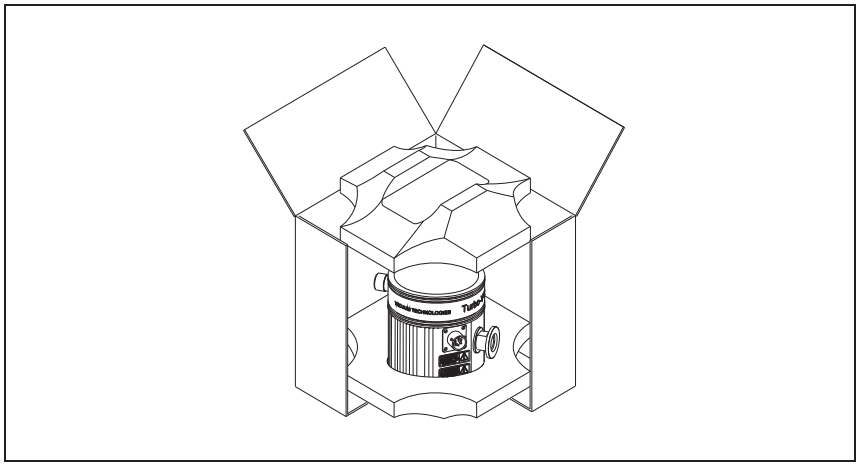

Figura 1

NOTA El Turbo-V 81-T no puede dañarse permaneciendo simplemente expuesto a la atmósfera. De todas formas, se aconseja mantener cerrada la bomba hasta que se instale en el sistema para evitar su posible contaminación por polvo.

Instalación

¡ATENCIÓN! Despegar el adhesivo y quitar el tapón de protección sólo al conectar la bomba al sistema.

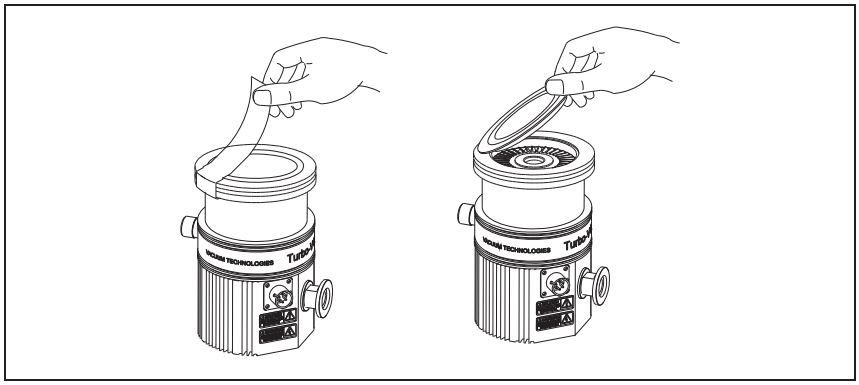

Figura 2

No instalar ni/o utilizar la bomba en lugares expuestos a agentes atmosféricos (lluvia, hielo y nieve), polvo y gases agresivos, en lugares explosivos o con alto riesgo de incendio. Durante el funcionamiento es necesario que se respeten las condiciones ambientales siguientes:

- presión máxima: 2 bares por encima de la presión atmosférica
- temperatura: de +5 °C a +35 °C (véase gráfico en el anexo “Technical Information”)
- humedad relativa: 0 – 95 % (no condensadora).

Cuando existan campos electromagnéticos, la bomba ha de protegerse mediante pantallas oportunas. Véase el anexo “Technical Information” para más detalles. Las bombas turbomoleculares de la serie Turbo-V 81-T deben usarse exclusivamente con uno de los controladores Agilent y deben conectarse a una bomba primaria (véase esquema en “Technical Information”).

Los controladores disponibles son los siguientes:

- Rack controller 81-AG: 969-8988
- Rack controller 81-AG RS232/485: 969-8989
- Rack controller 81-AG Profibus: 969-8990
- PCB 24 V: 969-9538
- Navigator Controller 81AG 24 Vdc: 969-8995
- Navigator Controller 81AG 100-240 Vac: 969-8996

El Turbo-V 81-T puede instalarse en cualquier posición. Fijar el Turbo-V 81-T en posición estable conectando la brida de entrada de la turbobomba a una contrabrida fija que puede resistir a un par de 250 Nm alrededor de su eje. Por ejemplo la brida ISO 63 puede ser fijada con mordazas en acero de alta resistencia (tipo modelo tipo Agilent IC 63250 DCMZ).

La tabla siguiente describe el número de mordazas necesarios y con cual par de apriete apretarlos.

Tab. 1

BRIDA	TIPO DE MORDAZA	N.	PAR DE APRIETE
ISO 63	Mordaza doble con rosca M10	4	22 Nm

La turbobomba con brida de entrada ConFlat ha de fijarse a la cámara de vacío mediante los accesorios mecánicos específicos Agilent. Para más detalles véase el anexo “Technical Information”.

NOTA El Turbo-V 81-T no puede fijarse utilizando su base.

¡ATENCIÓN! El Turbo-V 81-T pertenece a la segunda categoría de instalación (o sobretensión) prevista por la normativa EN 61010-1. Por lo tanto este dispositivo debe ser conectado a una línea de alimentación adecuada para dicha categoría.

Para instalar los accesorios opcionales, véase “Technical Information”.

Uso

En el manual de la unidad de control se encuentran todas las instrucciones para el correcto funcionamiento de la turbo-bomba. Leer atentamente este manual antes de su uso. Para obtener mejores presiones de máxima es posible calentar el sistema.

Durante el calentamiento de la cámara de vacío la temperatura en la brida de entrada no debe superar los 120 °C con acoplamiento ConFlat y los 80 °C con acoplamiento ISO.

Usar siempre refrigeración por agua durante las operaciones de calentamiento.

¡ADVERTENCIA!

No hacer funcionar nunca la bomba si la brida de entrada no está conectada al sistema o no está cerrada con la brida de cierre. No tocar la turbo-bomba y sus posibles accesorios durante las operaciones de calentamiento. La alta temperatura puede provocar lesiones a las personas.

¡ATENCIÓN!

Evítense golpes, oscilaciones o bruscos desplazamientos de la turbobomba durante su funcionamiento. Los cojinetes podrían dañarse. 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 deberá ser inferior a 2 bar (por encima de la presión atmosférica). 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 Helio) para proteger los rodamientos (véase el anexo “Technical Information”).

¡ADVERTENCIA!

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-V 81-T no requieren mantenimiento. Cualquier operación deberá ser realizada por personal autorizado.

¡ADVERTENCIA!

Antes de realizar cualquier operación en el sistema desconectarlo de la corriente, enviar aire de la bomba abriendo la válvula oportuna, esperar hasta que el rotor se pare completamente y esperar a que la temperatura superficial de la bomba sea inferior a 50 °C.

En caso de avería se podrá utilizar el servicio de reparación Agilent o el “Agilent advanced exchange service”, que permite obtener un sistema regenerado para sustituir el averiado.

NOTA

Antes de enviar al fabricante una bomba para su reparación o “advanced exchange service”, es imprescindible cumplimentar y remitir a la oficina local de ventas la ficha de “Seguridad y Salud” adjunta al presente manual de instrucciones. Una copia de la misma se deberá introducir en el embalaje del sistema antes de enviarlo.

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

Eliminación

Significado del logotipo "WEEE" presente en las etiquetas. El símbolo que se indica a continuación, es aplicado en observancia de la directiva CE denominada "WEEE". Este símbolo (**válido sólo para los países miembros de la Comunidad Europea**) indica que el producto sobre el cual ha sido aplicado, NO debe ser eliminado junto con los residuos comunes sean éstos domésticos o industriales, y que, por el contrario, deberá ser sometido a un procedimiento de recogida diferenciada. Por lo tanto, se invita al usuario final, a ponerse en contacto con el proveedor del dispositivo, tanto si éste es la casa fabricante o un distribuidor, para poder proveer a la recogida y eliminación del producto, después de haber efectuado una verificación de los términos y condiciones contractuales de venta.

16
Instructions for Use

Original Instructions

Agilent Technologies

Safety Guideline for Turbomolecular Pumps

Turbomolecular pumps as described in the following operating manual contain a large amount of kinetic energy due to the high rotational speed in combination with the specific mass of their rotors.

In case of a malfunction of the system for example rotor/stator contact or even a rotor crash the rotational energy may be released.

WARNING!

To avoid damage to equipment and to prevent injuries to operating personnel the installation instructions as given in this manual should be strictly followed!

General Information

This equipment is destined for use by professionals. The user should read this instruction manual and any other additional information supplied by Agilent before operating the equipment. Agilent will not be held responsible for any events occurring due to non-compliance, even partial, with these instructions, improper use by untrained persons, non-authorized interference with the equipment or any action contrary to that provided for by specific national standards.

The Turbo-V 81-T is a turbo-molecular pump for high and ultra-high vacuum applications which can pump any type of non-corrosive gas or gas compound. It is not suitable for pumping liquids or solid particles.

The pumping action is obtained through a high speed turbine (max. 80000 rpm) driven by a high-performance 3-phase electric motor. The Turbo-V 81-T is free of contaminating agents and, therefore, is 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:

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

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.**

NOTE The notes contain important information taken from the text.

Storage

In order to guarantee the maximum level of performance and reliability of Agilent Turbomolecular pumps, the following guidelines must be followed:

- when shipping, moving and storing pumps, the following environmental specifications should not be exceeded:
  - temperature range: -20 °C to 70 °C
  - relative humidity range: 0 to 95 % (non condensing)
- the turbomolecular pumps must be always soft-started when received and operated for the first time by the customer
- the shelf life of a turbomolecular pump is 10 months from the shipping date.

CAUTION! If for any reason the shelf life time is exceeded, the pump has to be returned to the factory. Please contact the local Agilent Vacuum Sales and Service representative for informations.

Preparation for Installation

The Turbo-V 81-T is supplied in a special protective pack-ing. 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.

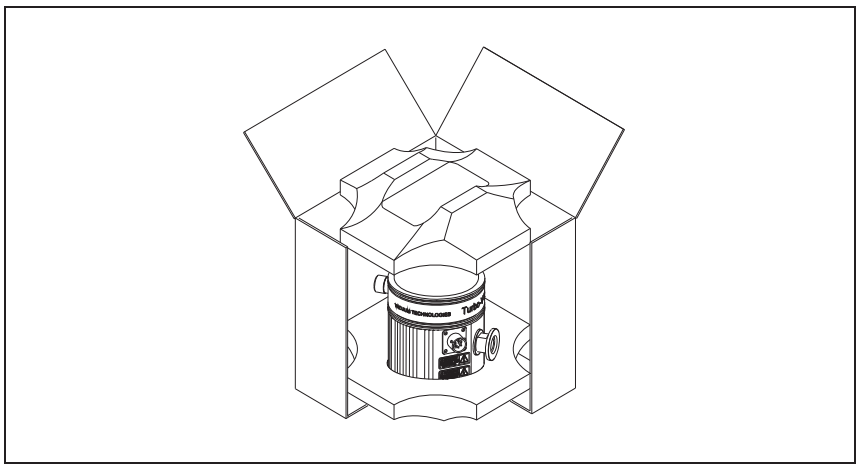

Figure 1

NOTE Normal exposure to the environment cannot damage the Turbo-V 81-T. Nevertheless, it is advisable to keep it closed until it is installed in the system, thus preventing any form of pollution by dust.

Installation

CAUTION! Do not remove the adhesive and protective cap before connecting the turbopump to the system.

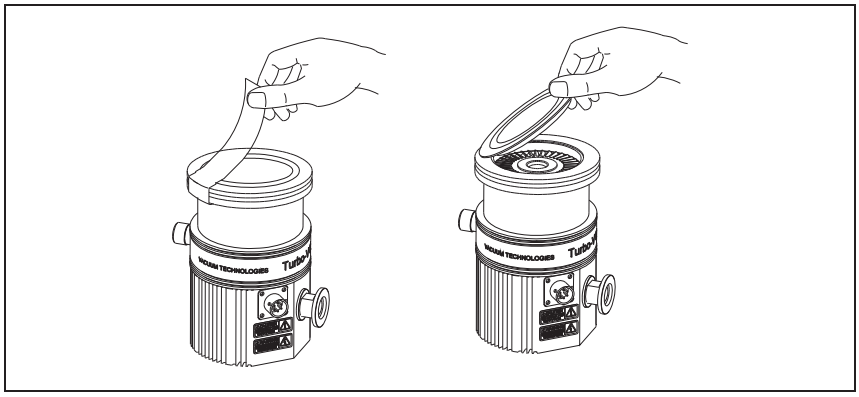

Figure 2

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 (see the diagram pres-sure-temperature in the appendix “Technical Information”)
- 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 information. The Turbo-V 81-T pumps must be used in conjunction with one of the suitable Agilent controller and they must be connected to a primary pump (see "Technical Information").

The available controllers are the following:

- Rack controller 81-AG: 969-8988
- Rack controller 81-AG RS232/485: 969-8989
- Rack controller 81-AG Profibus: 969-8990
- PCB 24 V: 969-9538
- Navigator Controller 81AG 24 Vdc: 969-8995
- Navigator Controller 81AG 100-240 Vac: 969-8996

The Turbo-V 81-T can be installed in any position. Fix the Turbo-V 81-T in a stable position connecting the inlet flange of the turbopump to a fixed counter-flange capable of withstanding a torque of 250 Nm around its axis.

For example the ISO 63 flange can be fixed using high strength steel clamps (as Agilent model IC 63250 DCMZ).

The following table shows the necessary number of clamps and the relevant fixing torque.

Tab. 1

FLANGE	FIXING DEVICE	N.	FIXING TORQUE
ISO 63	M10 clamps	4	22 Nm

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

NOTE The Turbo-V 81-T cannot be fixed by means of its base.

CAUTION! The Turbo-V 81-T belongs to the second installation (or overvoltage) category as per directive EN 61010-1. Connect the device to a mains line that satisfy the above category.

For installation of optional accessories, see "Technical Information".

Use

All the instructions to correctly use the turbopump are contained in the controller manual. Read carefully this manual before use the pump. To obtain better limit pressures it is possible to heat the pump.

While heating the vacuum chamber, the temperature of the inlet flange must not exceed 120 °C for a ConFlat flange and 80 °C for a ISO flange.

While heating always use the water cooling.

WARNING!

Never use the turbopump when the inlet flange is not connected to the vacuum chamber. Do not touch the turbopump or any of its accessories during the heating process. The high temperatures may cause burns.

CAUTION!

Avoid impacts, oscillations or harsh movements of the pump when in operation. The bearings may become damaged. 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). For pumping aggressive gases, these pumps are fitted with a special port to allow a steady flow of inert gas (like Nitrogen or Helium) for pump bearing protection (see the appendix "Technical Information").

WARNING!

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 81-T series pumps does not require any maintenance. Any work performed on the system must be carried out by authorized personnel.

WARNING!

Before carrying out any work on the system, disconnect it from the mains, 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 Agilent service center who can supply a reconditioned system to replace that broken down.

NOTE Before returning the pump to the constructor for repairs, or advanced exchange service, 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 system package before shipping.

If a system 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.

17
Technical Information

Original Instructions

Description of the Turbo-V 81-T

The Turbo-V 81-T pump is available in four versions. The difference among the four versions lies purely in the high vacuum connection.

The four versions are:

- Model 969-8905 with ISO 63 high vacuum flange;
- Model 969-8906 with KF 40 NW high vacuum flange;
- Model 969-8907 with ConFlat 4.5" external diameter high vacuum flange;
- Model 969-8908 with ConFlat 2.75” external diameter high vacuum flange.

Pump Description

The pump consists of a high frequency motor driving a turbine fitted with 9 bladed stages. The turbine rotates in an anticlockwise direction when viewed from the high vacuum flange end.

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

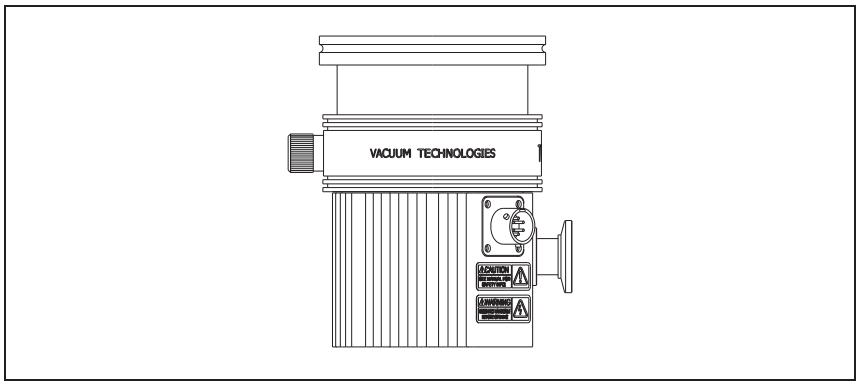

Figure 3 Model 969-8905

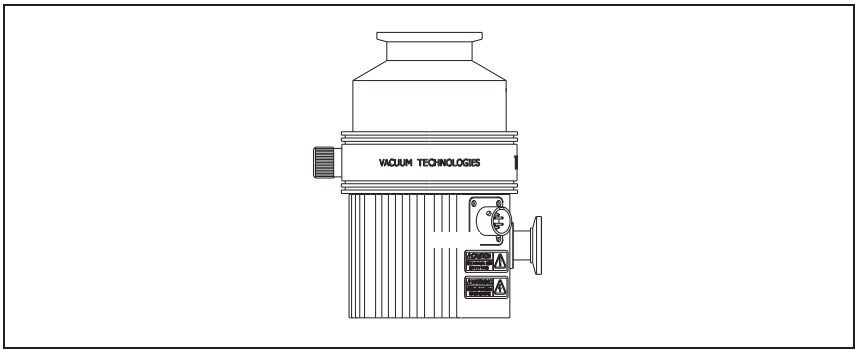

Figure 4 Model 969-8906

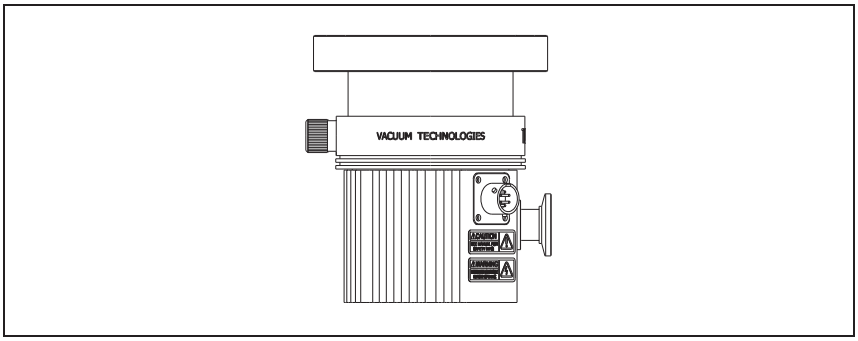

Figure 5 Model 969-8907

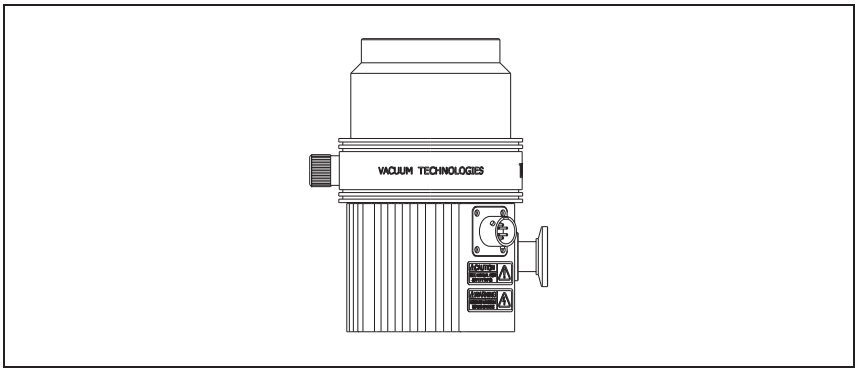

Figure 6 Model 969-8908

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

- 1st stage with a blade angle of 40°,
- 2nd stage with a blade angle of 30°,
- 3rd stage with a blade angle of 24°,
- 4th and 5th stages with a blade angle of 18°,
- 6th stage with a blade angle of 14°;
- 7th, 8th and 9th stages with a blade angle of 12°.

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.

During normal operation, the motor is fed with a voltage of 54 Vac three-phase at 1350 Hz (max). To reduce losses during start-up to a minimum, the frequency increases according to a ramp with a higher initial voltage/frequency ratio.

The pump can be water cooled or air cooled: in the first case the customer can use a dedicated external plate made of nickel-plated brass, in the second case an external optional fan is available.

A thermistor sensor is mounted near the upper bearing to prevent the pump from overheating.

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. The connection of the forevacuum on the side of the pump is a KF 16 NW flange.

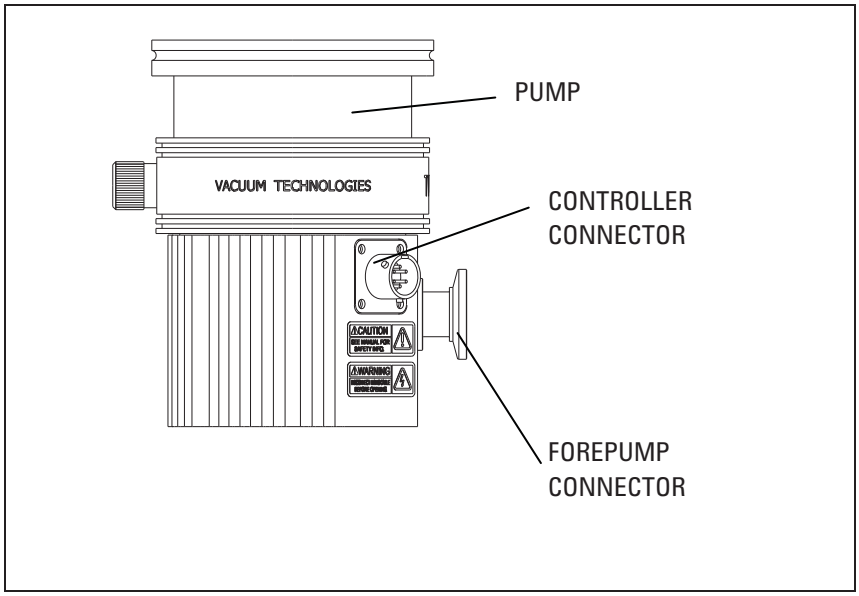
PUMP
VACUUM TECHNOLOGIES
CONTROLLER
CONNECTOR
FOREPUMP
CONNECTOR

Figure 7

Technical Specification

Tab. 2 Technical Specification

Pumping speed	With ISO 63 or CFF 4.5" N_2: 77 l/s He: 65 l/s H_2: 50 l/s	With KF 40 NW or CFF 2.75" N_2: 50 l/s He: 56 l/s H_2: 46 l/s
Compression ratio	N_2: >7 x 10^6 He: 5 x 10^3 H2: 3 x 10^2	
Base pressure * (with recommended forepump)	mechanical: 5 x 10^{-9} mbar (3.8 x 10^{-9} Torr) diaphragm: 5 x 10^{-8} mbar (3.8 x 10^{-8} Torr)	
Inlet flange	ISO 63 CFF 4.5" O.D.	KF 40 NW CFF 2.75" O.D.
Foreline flange	KF16 NW	
Rotational speed	1350 Hz (max)	
Start-up time	< 60 seconds	
Cooling requirements	Natural air convection Forced air or water optional	
Recommended forepump	mechanical: Agilent DS 42 – DS 102 dry pump: Agilent SH 100	
Operating position	any	
Coolant water	flow: 10 l/h (0.05 GPM) temperature: + 15 °C to + 35 °C pressure: 2 to 4 bar (30 to 60 Psi)	
Operating ambient temperature with natural air convection	+5 °C to +25 °C	
Operating ambient temperature with forced air cooling or water	+5 °C to +35 °C	
Bakeout temperature	120 °C at inlet flange max. (CF flange) 80 °C at inlet flange max. (ISO flange)	
Vibration level (displacement)	< 0.01 µm at inlet flange	
Noise level	≤ 45 dB (A) at 1 meter	

Compliance with:	UNI EN 292-1 UNI EN 292-2 EN-CENELEC 55011 IEC 1000-4-2 (ex 801-2) IEC 1000-4-3 (ex 801-3) IEC 1000-4-4 (ex 801-4) EN 61010-1 (IEC 1010-1) EN 1012-2
Storage temperature	-20 °C to +70 °C
Input	60 Vac, three phase, 1350 Hz (max) 50 W max
Lubricant	permanent lubrication
Installation category	II
Pollution degree	2
Storage temperature	- 20 °C to + 70 °C
Weight kg (lbs):	ISO 63: 1.83 (4.03) KF 40: 1.80 (3.97) CFF 4.5": 2.62 (5.78) CFF 2.75": 2.59 (5.71)

* (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)

NOTE When the Turbo-V 81-T has been stored at a temperature less than 5 °C, wait until the system has reached the above mentioned temperature.

Turbo-V 81-T Outline

The following figure shows the Turbo-V 81-T outlines (dimensions are in inches [mm]).

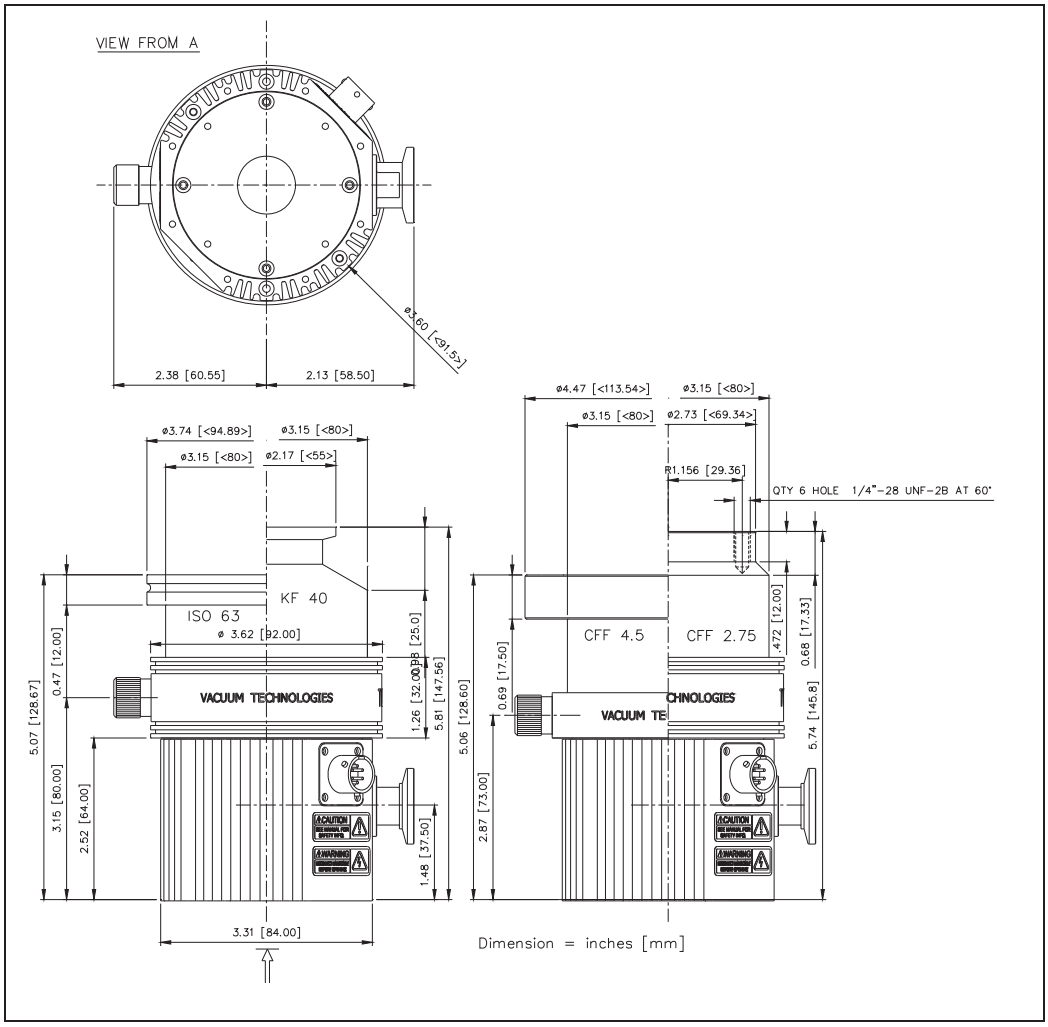

Figure 8 Turbo-V 81-T outline

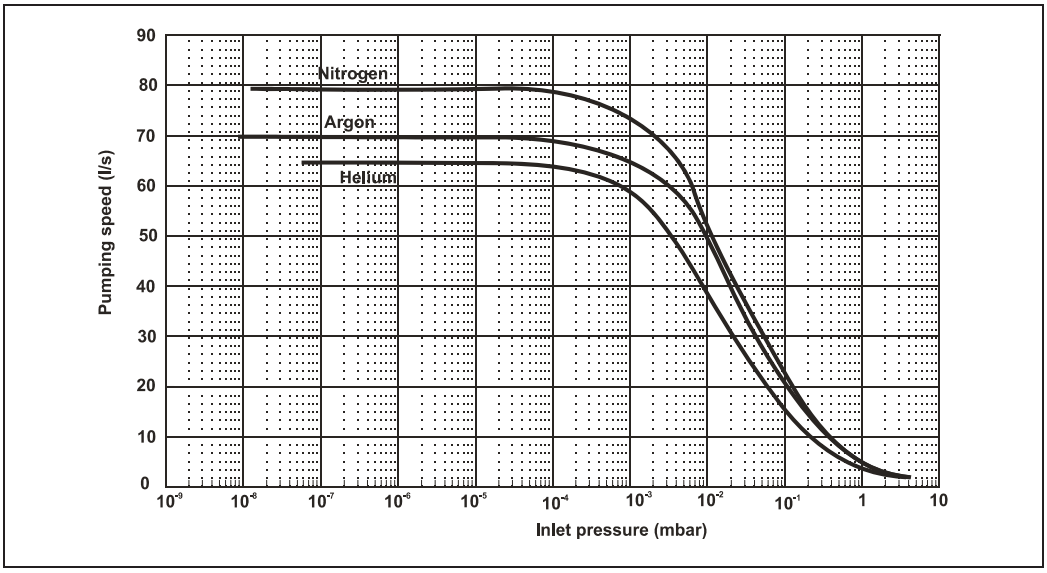

Figure 9 Graph of pumping speed vs inlet pressure with a 8 m^3/h mechanical pump

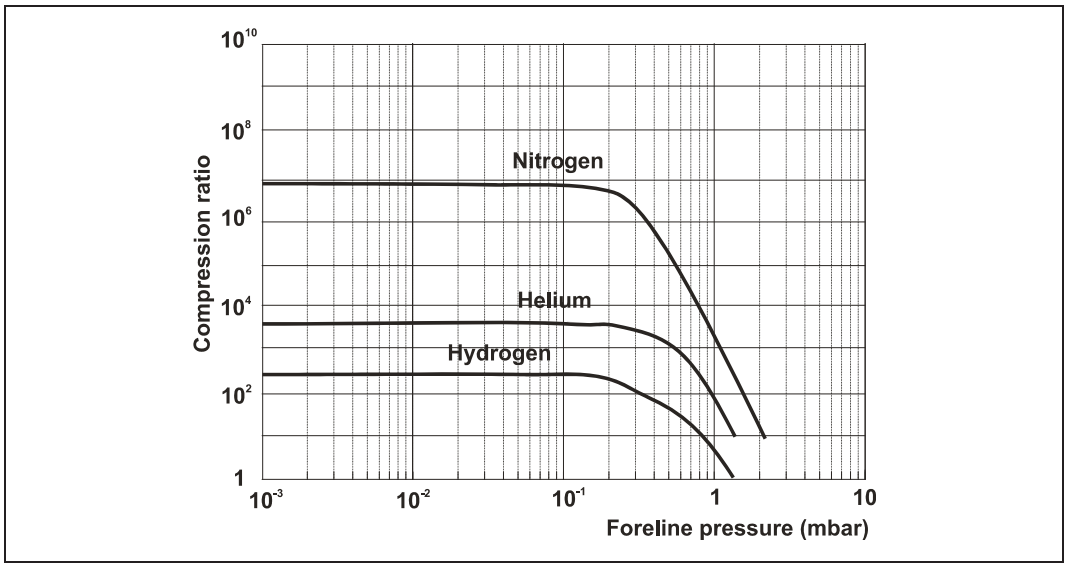

Figure 10 Graph of compression ratio vs foreline pressure

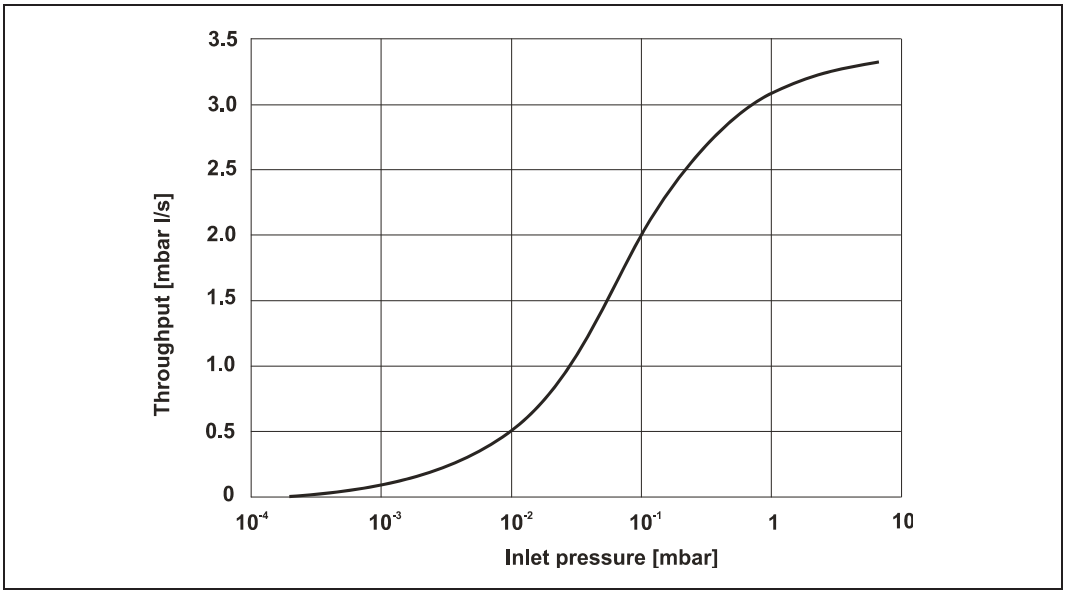

Figure 11 Graph of Nitrogen throughput against inlet pressure using a DS102 as forevacuum pump

Inlet Screen Installation

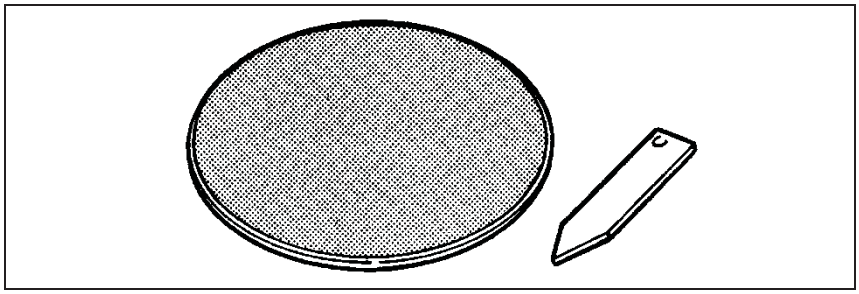

Figure 12

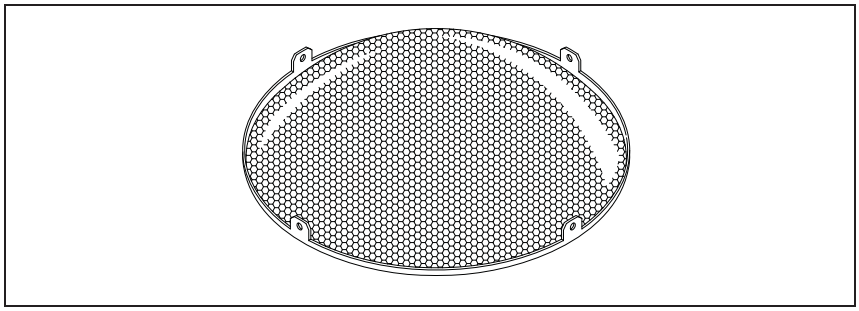

Figure 13

The inlet screens mod. 969-9300 and 969-9309 prevent the blades of the pump from being damaged by debris greater than 0.7 mm diameter.

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

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

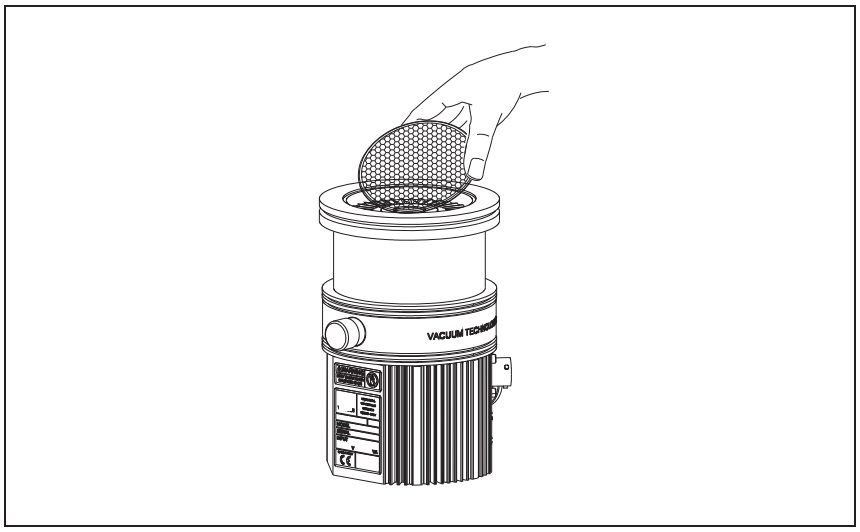

Figure 14

The screen can be mounted on each pump. The screen can be removed as shown in the following figure.

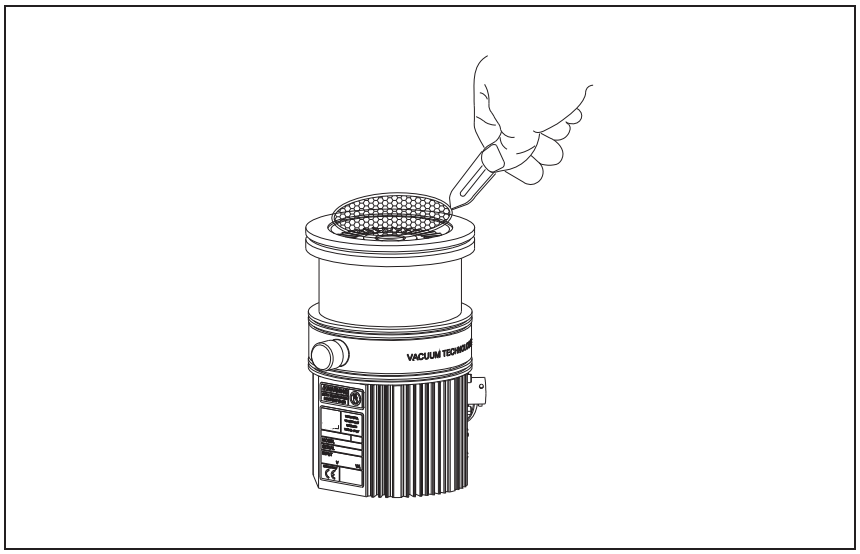

Figure 15

The following figure shows the overall flange dimensions with the protection screen fitted on pump with ISO flange and pump with CFF flange (dimensions are in inches [mm]).

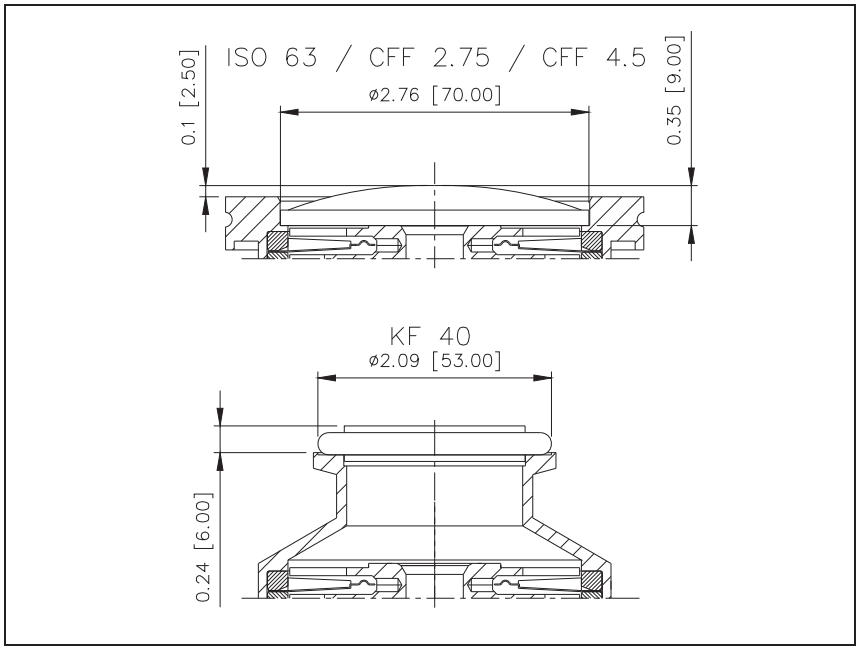

Figure 16

Heater Band Installation

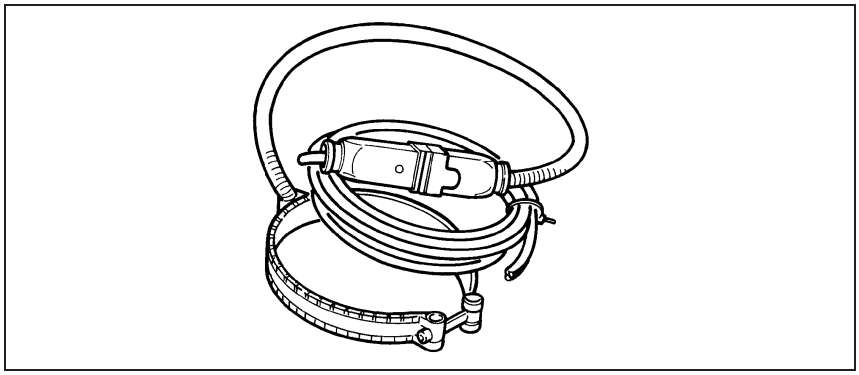

Figure 17

The heater band model 969-9801 and 969-9802 can be used to heat the pump casing when a bakeout is needed. The heater band is applied to the upper part of the pump casing, as shown in the figure, and heats it to a temperature of about 80 °C. The heater band must be mounted such that there is perfect thermal contact with the pump wall to obtain fast and efficient heating.

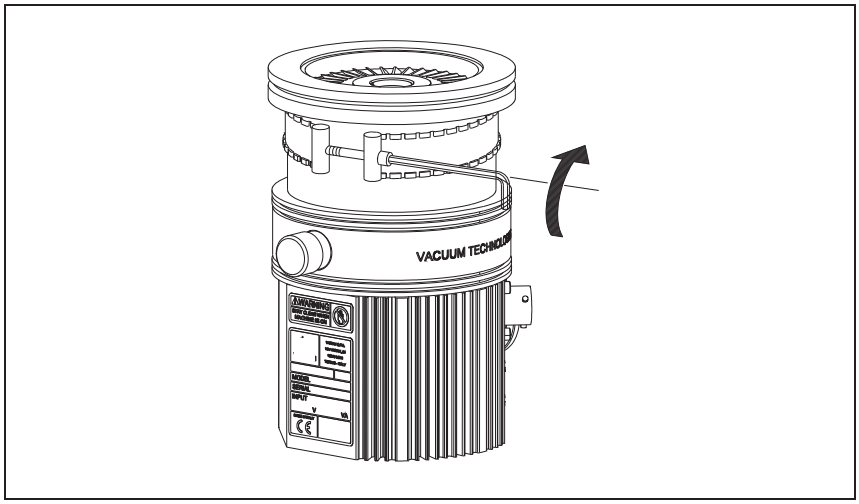

Figure 18

Switch on the heater while the turbopump is in operation. In the event of turbopump overheat, the pump will be automatically cut out by the thermistor sensor.

NOTE The turbopump must be "baked" only when operat-ing with an inlet pressure less than 10^{-4} mbar and with water cooling.

CAUTION! If the chamber of the system is "baked" at a high temperature, a shield should be installed to pre-vent thermal radiation heating the high vacuum flange on the pump. The maximum temperature allowed for the inlet flange is 120 °C.

Air Cooling Kit Installation

An air cooling kit (mod. 969-9290) is available for cooling the pump during heavy operational conditions and whenever the natural air convection is not sufficient.

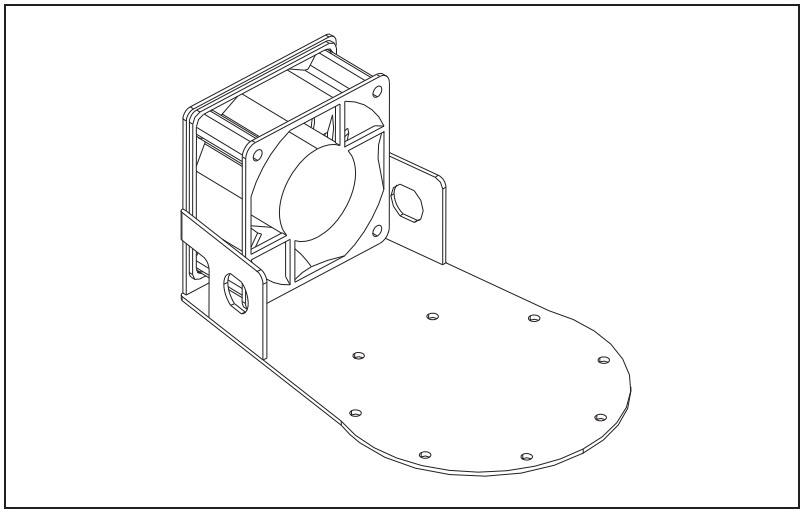

Figure 19

Fan specifications:

- air flow: 12.8 l/s (27.1 CFM)
- input voltage: 24 Vdc
- dimensions: 60 x 60 x 25 mm
- power: 2.60 W

The fan bracket is shaped so that it can be mounted close to the pump and in different positions. To fix the fan to the Turbo-V 81-T case execute the following procedure (see the following figure):

1. Fix the fan to the suitable bracket by means of the furnished screws;
2. Fix the bracket to the pump body;
3. Connect the fan supply to the P4 connector of the controller.

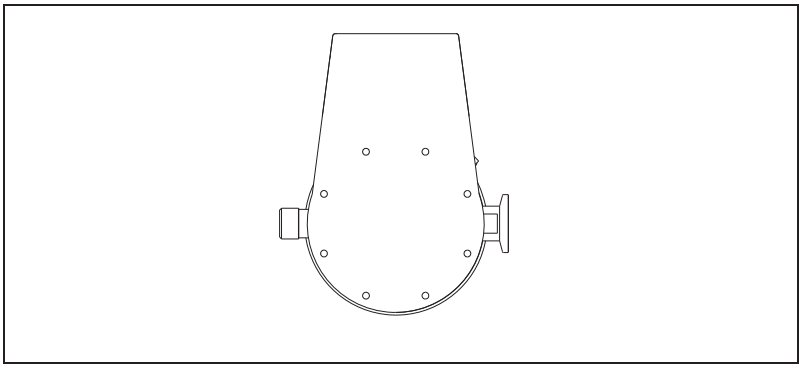

Figure 20

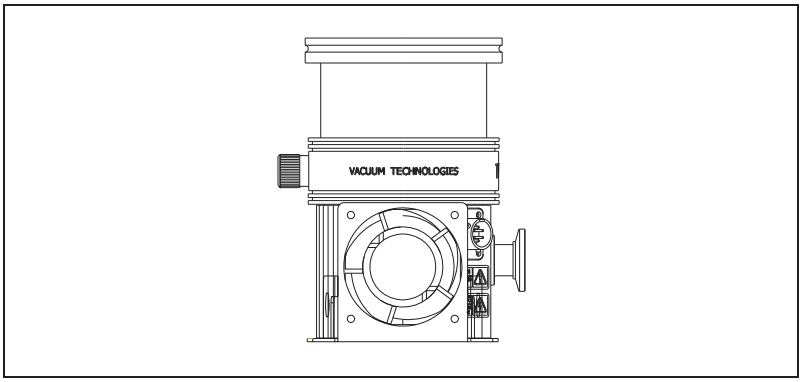

Figure 21

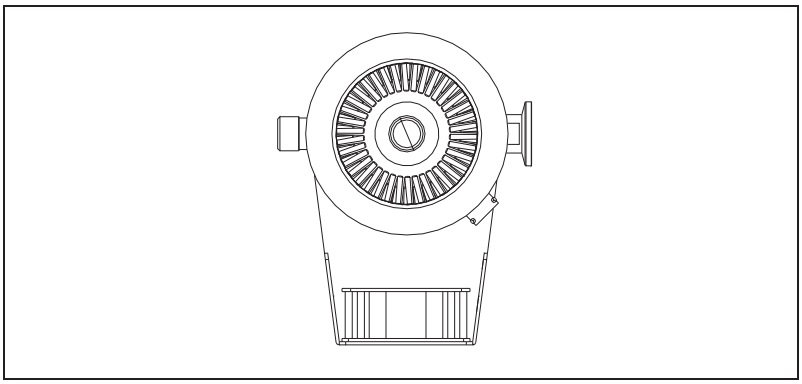

Figure 22

Water Cooling Kit 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: 969-9823 (metallic model), and 969-9824 (plastic model).

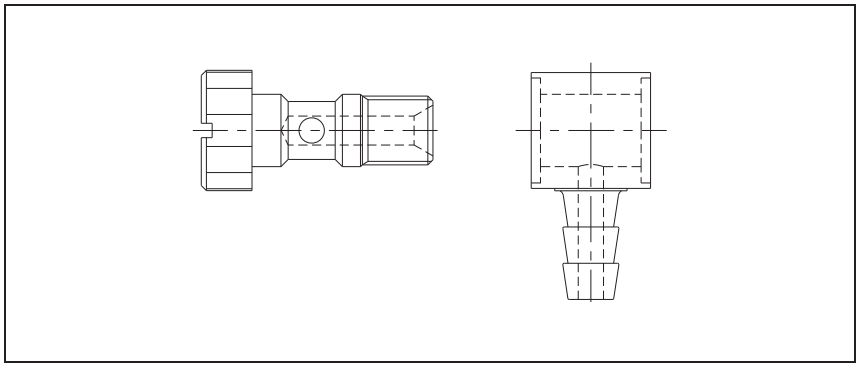

Figure 23

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

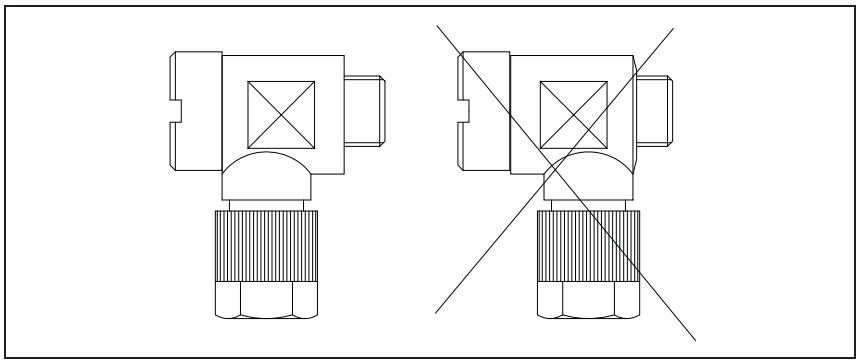

Figure 24

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

The water kit is assembled as shown in the figure.

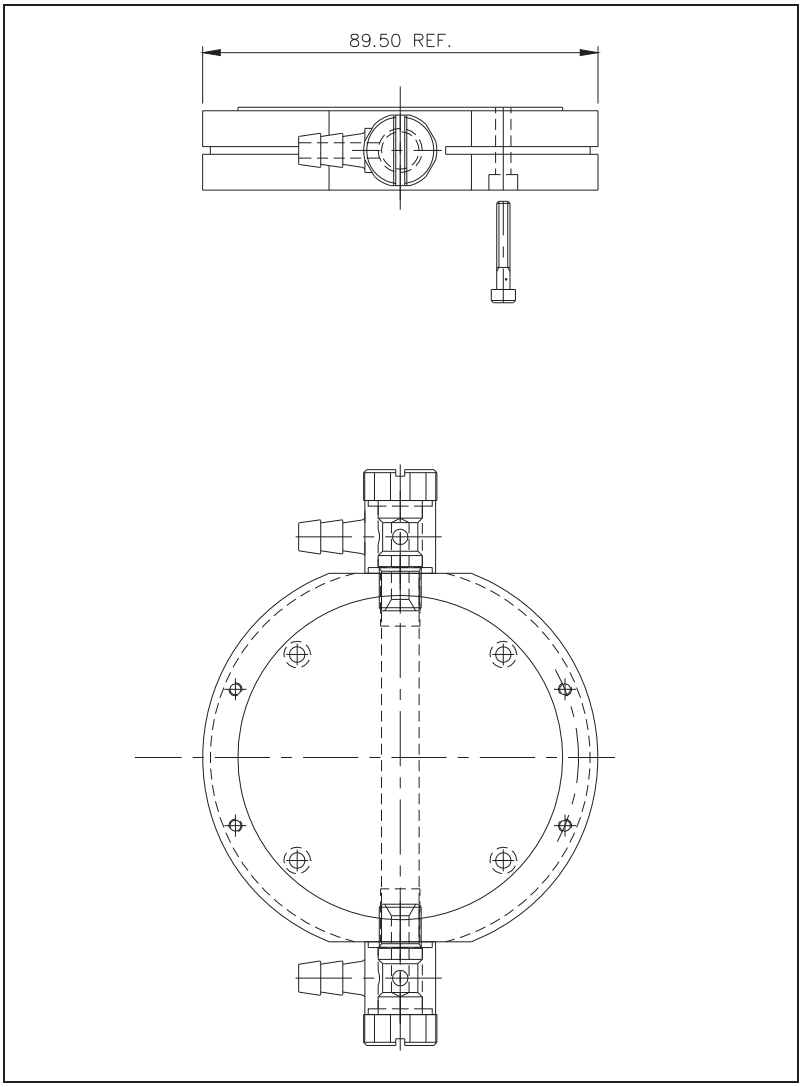

Figure 25

1 Connect the plate to the pump bottom with four screws M3x20

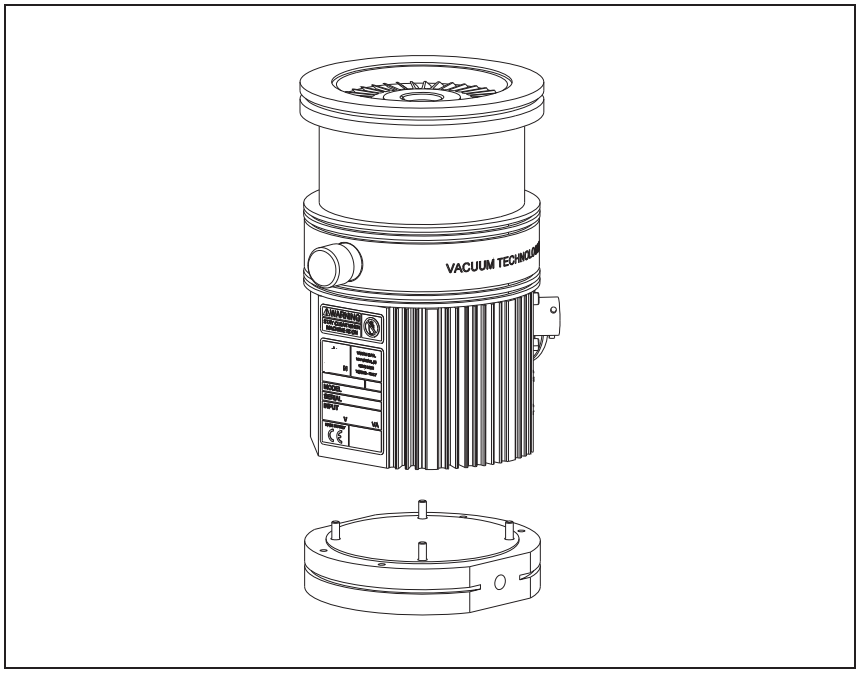

Figure 26

2 Assemble the metal or the plastic kit as shown.

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 +15 °C and +35 °C, with an inlet pressure between 2 and 4 bar.

NOTE The water electrical conductance must be ≤ 500 µs/cm. When the conductance is higher, in closed water circuit, the use of up to 20 % of Ethyl-Glycole is suggested.

Vent Accessories

The vent valve allow to avoid undesired venting of the pump during temporary power failure and enables an automatic vent operation.

There are several vent valves available and each vent valve has to be driven by its own control unit.

NOTE Refer to the Vent Valve Model Selection table to choose the valve and the related control unit.

NOTE Refer to the control unit manual for the pump-valve-controller interconnections. Refer to the vent valve manual and follow the in-structions to properly vent the turbomolecular pump.

To install the vent valve, unscrew the threaded plug (see figure below).

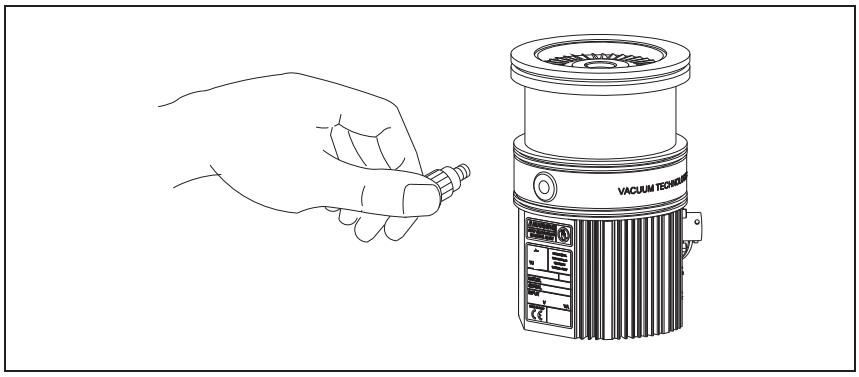

Figure 27

Then screw the vent valve into the pump and tighten it using a 16 mm hexagonal spanner with a torque of 2.5 Nm.

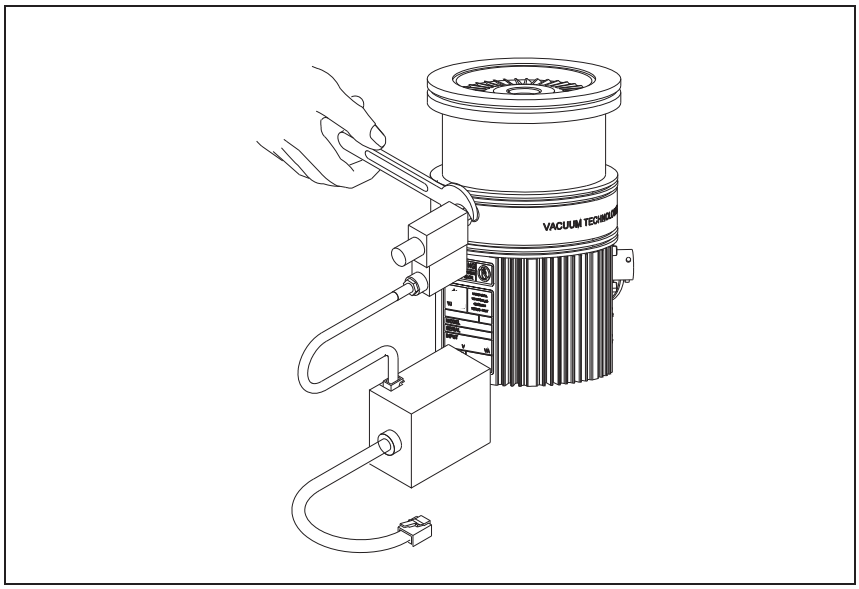

Figure 28

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

Then connect the cable from the valve to the suitable connector on the controller.

Vibration Isolator Installation

Two vibration isolators for ISO and CFF inlet flange version pumps are available as accesso-ries.

The two model part numbers are the following:

- model 969-9375 for ISO 63 flange;
- model 969-9376 for CFF 4.5” flange.

They typically reduce the vibration transmitted from the Turbo-V 81-T to the system by a factor of 20.

Please refer to the relevant instruction manual.

Typical Layout Diagram

With Navigator Controller

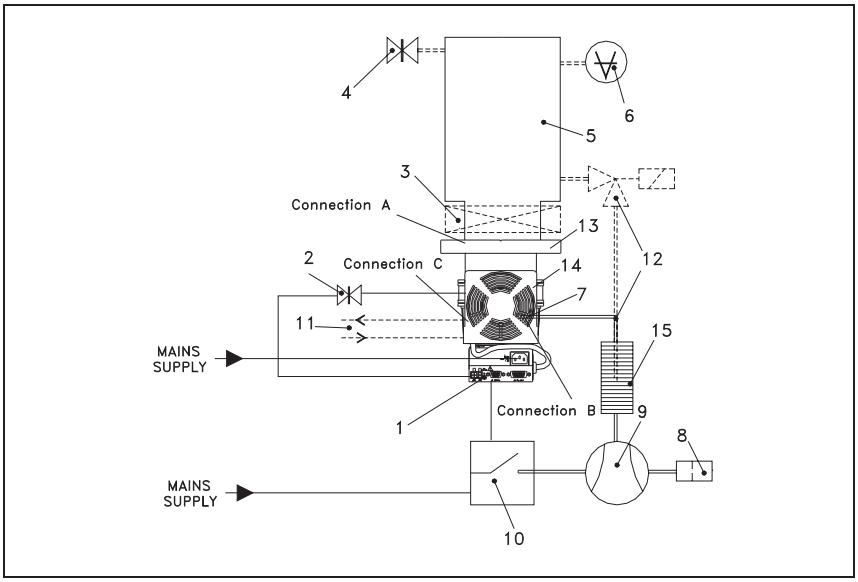

Figure 29

1 Turbo-V Navigator controller
2 Vent valve
3 Vacuum pump shut-off valve (optional)
4 System vent valve (optional)
5 Vacuum chamber
6 Ionization 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 Fan
15 Flexible connection

With Standard Rack Controller

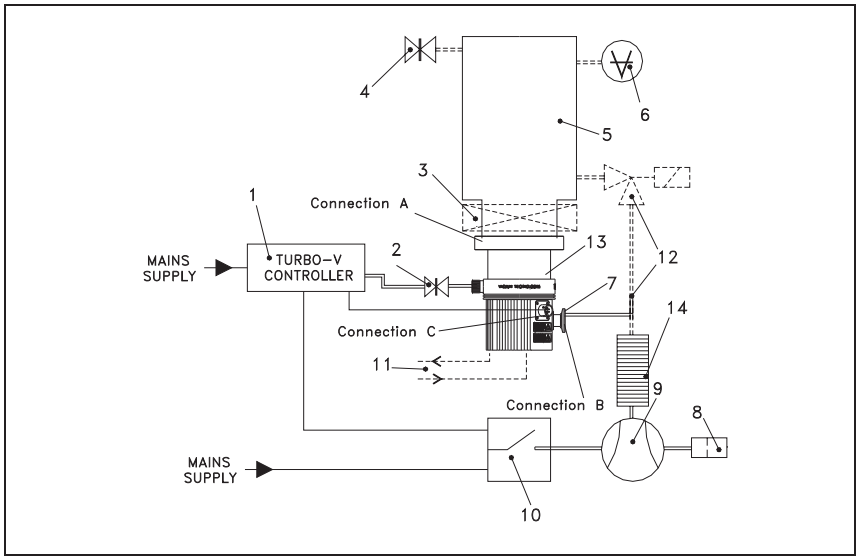

Figure 30

1 Turbo-V standard rack controller
2 Vent valve
3 Vacuum pump shut-off valve (optional)
4 System vent valve (optional)
5 Vacuum chamber
6 Ionization 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-V 81-T pump to the ISO inlet flange, remove the outer ring and position the centering ring as shown in the figure.

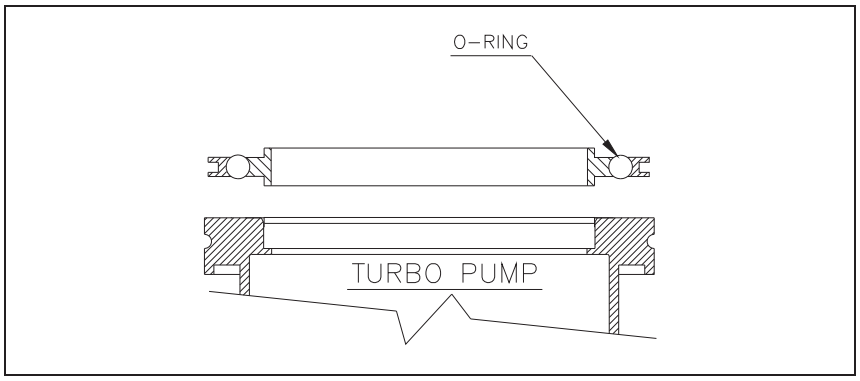

Figure 31

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

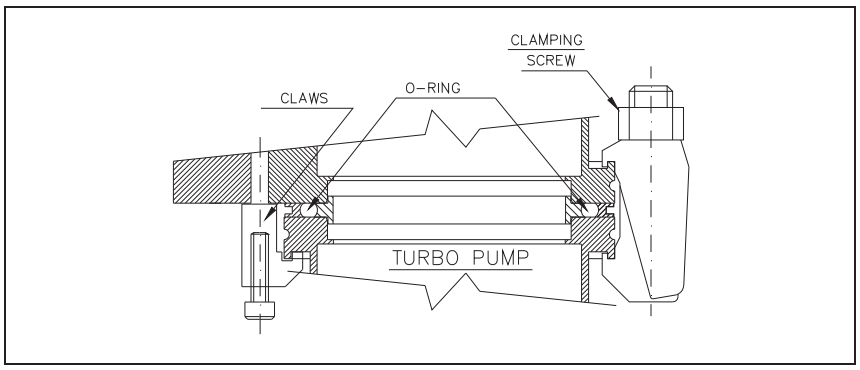

Figure 32

For ConFlat flange connections we recommend using Agilent 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.

Connection Configurations

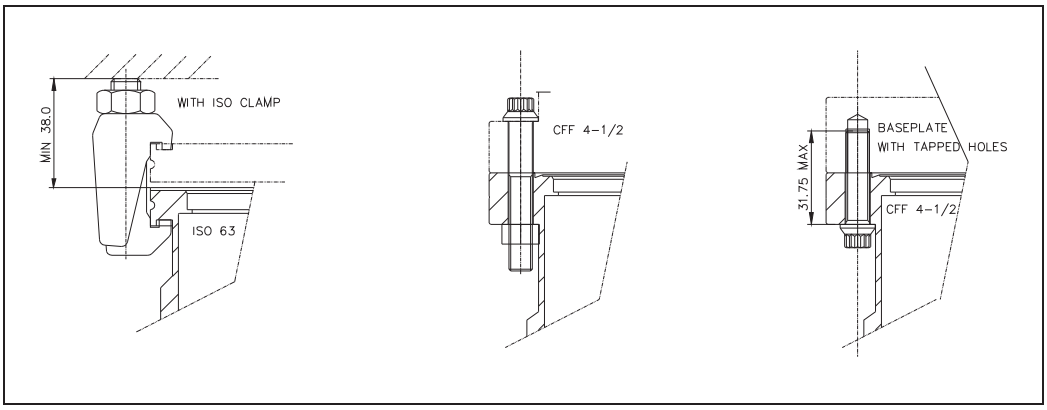

Figure 33

Connection B - Fore-Vacuum Pump

A flange KF 16 NW is available to connect the Turbo-V 81-T pump 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-V 81-T pump is characterized by its high compression ratio also for oil vapors. 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 backstreaming.

Connection C - Electrical

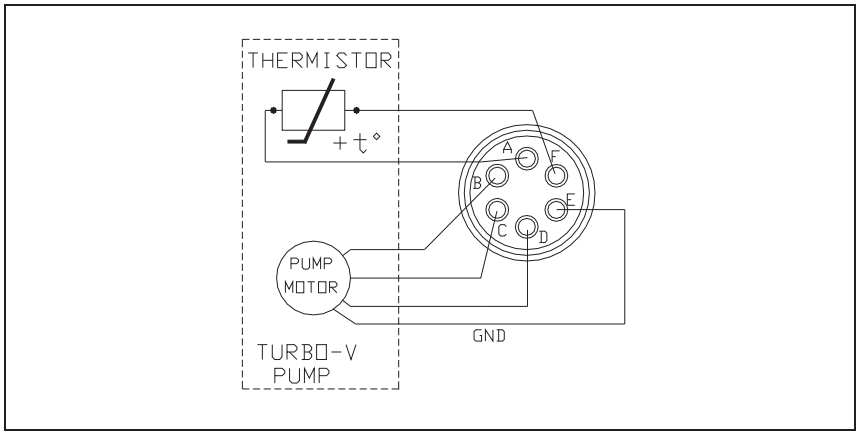

Figure 34

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 KΩ resistance at 25 °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 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 opera-tion, no particular problem should be expected.

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

Accessories and Spare Parts

Tab. 3 Accessories and Spare Parts

DESCRIPTION	PART NUMBER
Inlet screen, DN 40	969-9309
Inlet screen, DN 63	969-9300
Heater band 220 V	969-9801
Heater band 120 V	969-9802
Metallic water cooling kit	969-9823
Plastic water cooling kit	969-9824
Air cooling kit (0.5 m cable)	969-9290
Air cooling kit extension cable (5 m)	969-9940
Pump extension cable	969-9942
Vibration damper DN 63	969-9375
Vibration damper CFF 4.5"	969-9376
Mechanical pump DS 102	949-9315
Mechanical pump DS 42	949-9309
Dry scroll SH 100	SH01001 UNIV
Dry scroll SH 110	SH01101 UNIV
Rack controller 81-AG base	969-8988
Rack controller 81-AG RS232/485	969-8989
Rack controller 81-AG Profibus	969-8990
PCB 24 V	969-9538
Turbo-V 81-AG Navigator Controller 24 Vdc	969-8995
Turbo-V 81-AG Navigator Controller 100-240 Vac	969-8996

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

Vent Valve Model Selection Table

Tab. 4 Vent valve model selection table

CONTROL UNIT MODEL	VENT VALVE PART NUMBER
Turbo-V 81-AG Navigator Controller (cable 0.7 m) (any version)	N.O. 969-9844
Turbo-V 81-AG Rack Controller (cable 0.7 m) (any version)	N.O. 969-9844
Controller TV70 Navigator (P/N 969-8970, 969-8971)	969-9834
Turbo-V 70 Rack controller (P/N 969-9405, 969-9505)	969-9843

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.

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 Leini (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.)

Agilent Technologies

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

Agilent Technologies

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:**

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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