



# TURBOTORR®

Section

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1 parts

3

405

410

**TURBOTORR®**

## Sargent-Welch TurboTorr® Turbomolecular Pumps

### Ultra-high Performance Pumps

Like all other pumps from Sargent-Welch, the turbomolecular line includes advanced design features that set these pumps apart from all others. Principally, the patented Shapiro turbomolecular blade allows TurboTorr pumps to frequently achieve twice the pumping speeds of comparably-sized units.

On top of that, no other turbomolecular pump manufacturer matches the TurboTorr turbomolecular pump line for the following range of features:

- Very high pumping speeds to 3400 liters/second
- Very low vibration to 0.02 micrometers maximum displacement
- Ultimate pressure range down to  $10^{-9}$  Torr
- Efficient pumping of  $H_2$  and He
- Simple eight stage pumping system with pre-balanced components
- Pumps that can be mounted in any orientation
- And on all TurboTorr pumps, flow characteristics do not change over time.

### First in 1968; Finest in 1988

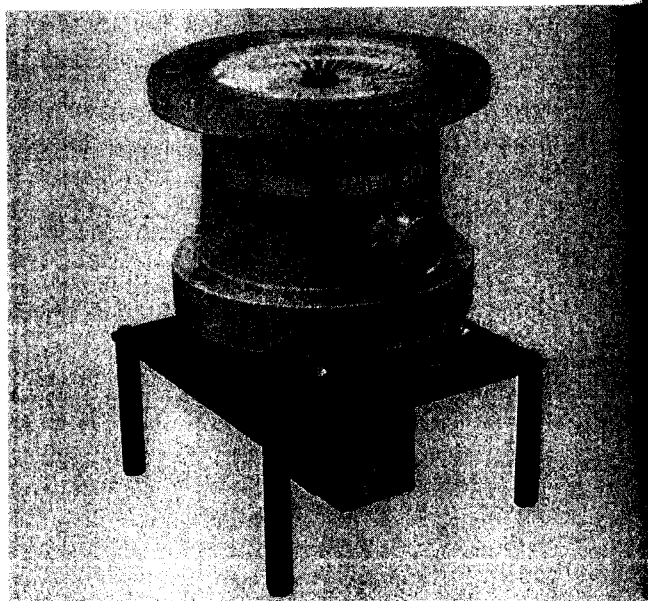
When Sargent-Welch became the first U.S. company to manufacture turbomolecular pumps in the U.S. in 1968, we were building on years of experience as the manufacturer of the popular DuoSeal® pumps. The development of the Shapiro turbomolecular pump blade (based on the design of blades in a jet aircraft turbine engine), and the journal bearing has further established Sargent-Welch as the source for turbomolecular pumps.

Today, these ultra-clean, ultra-high vacuum TurboTorr pumps are available in 6 models that range from 160 to 3400 liters/second.

Each vertical pump contains 8 multibladed disks, the tips of which move at supersonic speeds. At those speeds, blank-off pressures reach  $1 \times 10^{-9}$  Torr. Each horizontal pump uses a double-ended assembly for efficient pumping.

### Pumps and Pump Packages for the most critical laboratory and production work

All of these pumps are ideal for achieving high vacuums in precision instrumentation. And most are available in packages supplied in a rack which includes the power supply control unit and a direct drive forepump fitted with the patented Isolatorr® automatic isolation valve.



For additional accessories such as refrigeration and fan cooling units, see the specific pumps on the pages listed.

### Model 3120

This double-ended horizontal pump has three inlets that can be used simultaneously. The electric motor that drives the pump motor uses a 3-phase power supply and achieves pump speeds of 160 liters/second to the  $10^{-9}$  Torr range. The 3120 is a rugged pump that will perform for years under the worst conditions.

The pump and the complete pumping package (3120D-01) are specified for instrumentation, accelerators, and vacuum deposition. See pages 46 and 47 for more information.

### Model 3134

This latest addition to the turbomolecular line is a vertical pump with a speed of 300 liters/second. Driven by the solid state, high frequency power supply, and utilizing a unique bearing and lubrication system, this pump achieves an ultra-high vacuum—while producing very low vibration.

This pump and its pumping package (the 3134D) are ideal for use with instrumentation that requires a compact unit and extremely clean conditions. See pages 48 and 49.

## Model 3106

The 3106 is a double-ended pump that achieves speeds of 400 liters/second and an ultimate pressure in the  $10^{-9}$  Torr range. Because it's a grease-lubricated pump, it runs only a few degrees above ambient and requires coolant only for heavy gas load applications. This extremely rugged pump is especially suited to production environments.

The 3106 pump and pump package (3106D-01) are used in sputtering systems, beam lines, thin film coating, and semiconductor production. See pages 50 and 51.

## Model 3131

This 6 in. pump achieves speeds of 600 liters/second. With its grease-lubricated bearings, the Model 3131 can be operated in almost any orientation.

Used with instruments such as mass spectrometers and electron microscopes, this pump requires no water coolant unless the gas loads are particularly heavy or the pumps are run in a poorly ventilated space. See pages 52 and 53 for more information.

## Model 3133

This high capacity 6 inch pump is used in vacuum applications that include particle accelerators, and space simulation, as well as vacuum coating, E-beam, and X-ray lithography. The pump and its pumping package (the 3133D) include integral oil pumps that include a flow sensor. Oil can be easily added even while the pumps are operating.

See pages 54 and 55.

## Model 3137

Our largest model features a 3400 liter/second pumping speed in a very compact size for a pump of this type. It uses a dual oil system for adequate lubrication during all phases of operation.

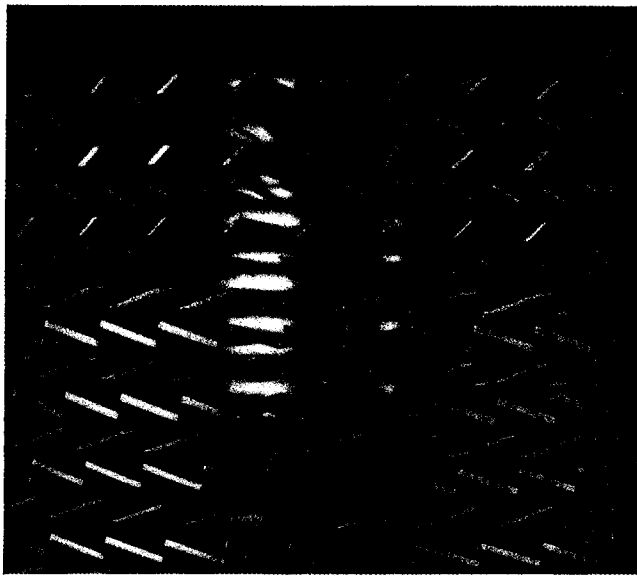
And with a rotatable inlet flange, the 3137 pump can easily be installed into your vacuum system. See pages 56 and 57.

## The Principle of Turbomolecular Pumping

The rotor of the Sargent-Welch turbomolecular pump is comprised of a series of axial flow bladed disks, interleaved with stators and driven at a high speed by an electric motor.

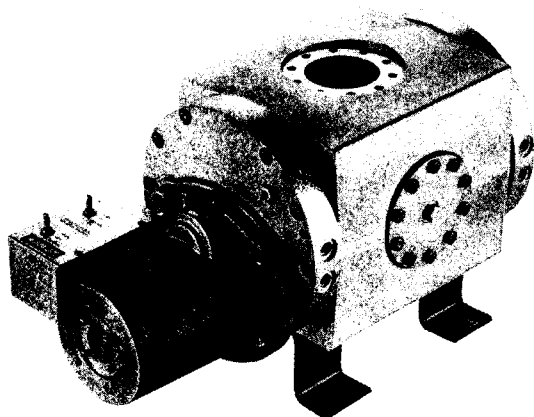
When the pump is operating, molecules of air, water vapor, and other gases are drawn into the pump. Some of these molecules are struck by the first series of rotor disk blades that are spinning at supersonic speeds. These molecules tend to rebound in a favorable axial direction entering the blade passages of the first stator disk toward the outlet. When the molecules rebound again from the stator, they are then impelled by the second rotor disk. As this process is repeated through each level, molecules move toward the outlet and create a pumping action with a very high compression ratio. The very high efficiency of TurboTorr® turbomolecular pump blades makes it possible to achieve excellent ultimate vacuum levels and very high pumping speeds with only eight pumping stages.

The maximum compression ratio and pumping speed are attained when the gas in all stages is in the molecular flow range. Although TurboTorr® pumps begin to pump gas at pressures higher than the molecular flow range, a rotary vane pump is required for roughing and back-up purposes.



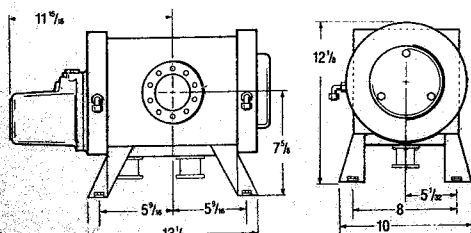
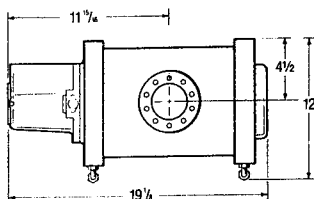
TURBOTOP

# 3120

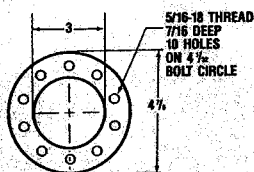


3120S

3120S

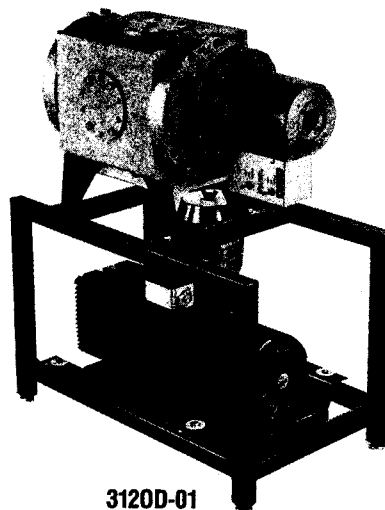


Pump



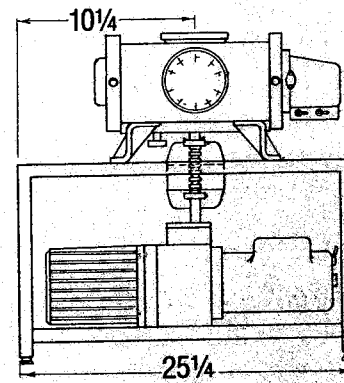
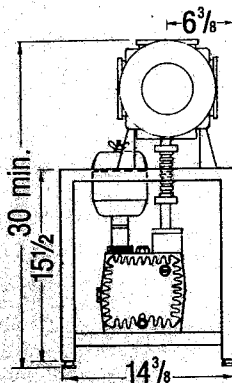
Inlet Flange

- **Pumping Speed**  
160 liters/second
- **Ultimate Pressure**  
 $1 \times 10^{-9}$  Torr
- **Mounting Position**  
Horizontal
- **Lubrication Type**  
Grease



3120D-01

3120D-01



Pumping System

ALL DIMENSIONS IN INCHES

The Model 3120 TurboTorr® Turbomolecular Pump is a horizontally mounted pump with a complete set of rotor and stator blades on either end of a rotating shaft. This double-ended design results in a highly efficient, stable pump system. It incorporates 3 inlets to permit connection to either the top, side or bottom inlets for ease of connecting to the ultra-high vacuum chamber. These inlets can also be used simultaneously. Use of patented (US Patent No. 3,644,051) blade design assures maximum pumping speed.

Incorporated into the pump is a sealless motor which can be connected directly to a 3-phase power line. The motor and gear are sealed entirely within the vacuum system. No additional power control circuitry is required. The pump normally does not require additional cooling unless heavy gas loads are frequently encountered.

The design of this pump assures a long service life. The stability of the rotor is accomplished by securely supporting both ends with greased ball bearings. The bearings are factory lubricated. As required, field regreasing can easily be done without interrupting the operation of the pump. Another design feature contributing to the ruggedness of the pump is the open center section of the

rotor and blade assemblies. This permits small particles and objects to fall harmlessly into the pump.

The major applications for the Model 3120 are in instrumentation, accelerators and in vacuum deposition and thin film work.

#### Recommended Accessories

Roughing Pump Model No. 8821 Vacuum Pump, 210 L/m (7.4 CFM)

Inlet Flange Extension  
Cat. No. 3120F From 3 in. ID AVS to 3 in. ID AVS

Inlet Flange Adapter  
Cat. No. 3120M From 3 in. ID AVS to 4 in. OD ASA-style

Cooling Unit  
Cat. No. 3132P Refrigeration Unit

Other accessories are described at the end of this section and in the general Accessories Section of this catalog.

#### Pumping Speed for N<sub>2</sub>

160 liters/second

#### Ultimate Pressure

$1 \times 10^{-9}$  Torr/ $1.3 \times 10^{-9}$  mbar

Mounting Position Horizontal

Inlet Flange Type AVS 3 in. ID

Outlet Flange Type ISO NW 40

Lubrication Type Grease

Rotational Speed 20,000 rpm

Acceleration Time 5 to 7 minutes

Spin Down Time 10 to 15 minutes

#### Cooling Requirements

Water or Freon Cooling Optional

Maximum Bake Out Temperature

at Flange 75°C

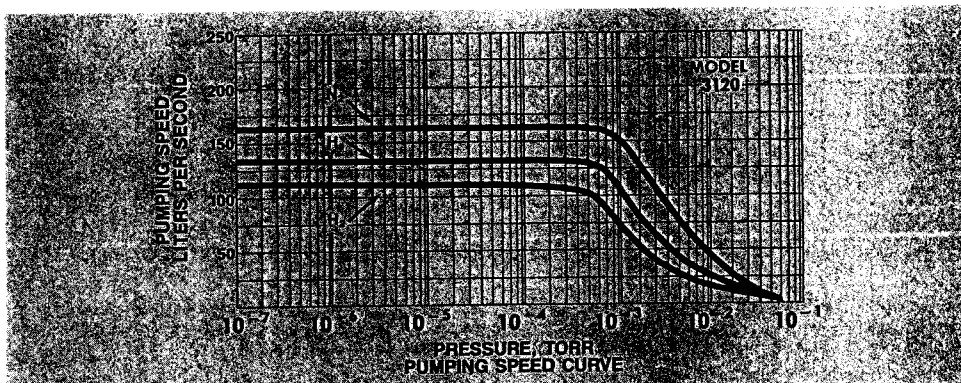
#### Input Power Requirements

208/230 V, 50/60 Hz, 3 phase

#### Pump Dimensions

19-1/8 in. L x 11-1/2 in. W x 12-1/8 in. H,  
(48.6 x 29.2 x 30.8 cm)

Pump Weight 122 lbs (55.4 kg)



#### Pump Shipping Carton Dimensions

34 in. L x 29 in. W x 25 in. H  
(86.4 x 73.7 x 63.5 cm)

#### Pump Shipping Weight

160 lbs (72.6 kg)

#### Pumping System Dimensions

25-1/4 in. L x 14-3/8 in. W x 30 in. H  
(64.1 x 36.5 x 76.2 cm)

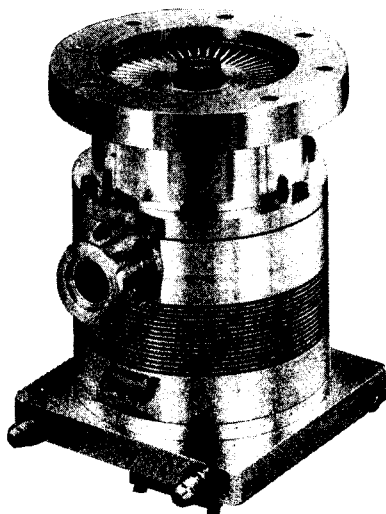
## ORDERING INFORMATION

Pump includes mounting feet, 1 brass shipping cover plate for inlet (which can be machined later as adapter plate), 2 inlet blank-off plates, 3 Buna tetralseals, 2 outlet blank-off plates with centering rings and hinged clamps and 2 grease syringes for regreasing later.

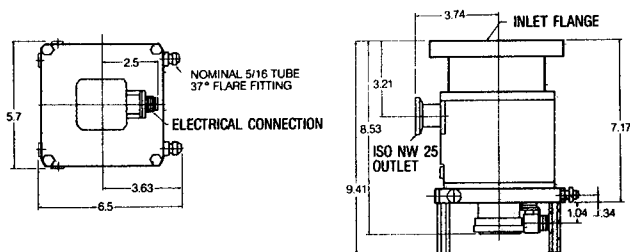
Pumping System includes pump and Model 8821 Vacuum Pump connected to one outlet flange of pump, both mounted on a frame with leveling feet.

Model Number	Inlet Type	Flange Size	Outlet Flange Type and Size	Pump Body	Description
3120S	AVS	3 in. ID	ISO NW 40	Aluminum	Pump Pumping System
3120D-01	AVS	3 in. ID	ISO NW 40	Aluminum	

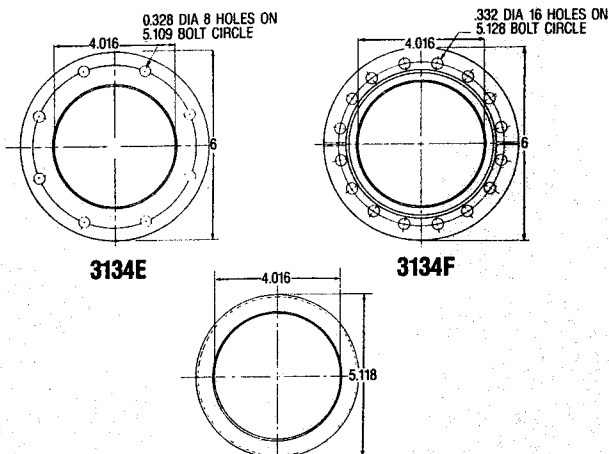
# 3134



**3134E**

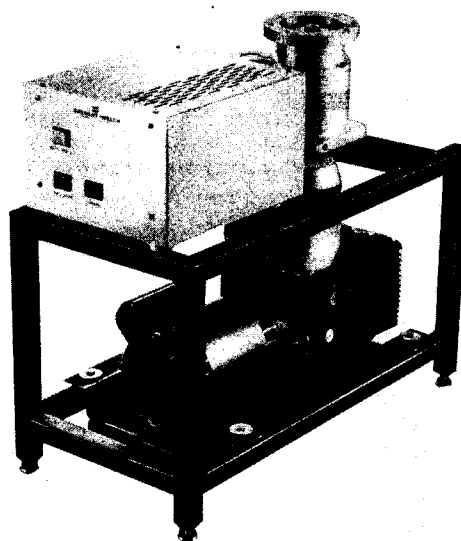


## Pump

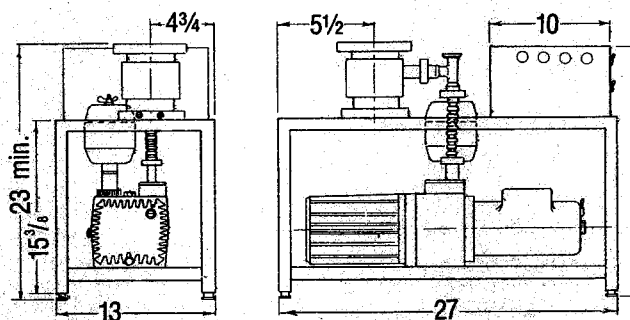


## 3134K Inlet Flanges

- **Pumping Speed**  
300 liters/second
- **Ultimate Pressure**  
 $6 \times 10^{-9}$  Torr
- **Mounting Position**  
Vertical
- **Lubrication**  
Oil



3134ED-1



## Pumping System

**ALL DIMENSIONS IN INCHES**

34

**Model 31:**  
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Pumping Speed  
 liters/second  
 models with  
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 sure  $10^{-9}$  Torr  
 Displacement  
 Pumping Pos-  
 sible Flange T-  
 ype ISO, COM-  
 pat Flange  
 Application T-  
 ype National Sp-  
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 Down Time  
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 (Minimum)  
 Minimum Back-  
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The Model 3134 TurboTorr® Turbomolecular Pump is a vertically-mounted, oil-lubricated pump which uses a patented (US Patent No. 3,644,051) blade design coupled with high rotational speed to provide a pump with much higher pumping speeds than comparable pumps of the same size.

The pump incorporates a patented (US Patent No. 4,674,952) journal upper bearing which makes no metallic contact with the rotating shaft. It develops an oil fluid film as a bearing surface, eliminating the need for a ball bearing at this location. This type of bearing has no inherent life limitation and, because there are no moving parts, the vibration level of this pump is significantly lower than the traditional two ball bearing design. Oil lubrication is supplied by a centrifugal pump.

A power supply has been designed to accelerate the pump to its maximum speed smoothly and quickly. It senses the power requirements of the pump both during acceleration and running and, compensates for any fluctuations due to varying gas load, for example. It will automatically shut down the turbo pump if the acceleration period is too long, or the gas load is too high for safe operation. The power supply is available in either rack is mounted or stand-alone versions.

#### Pumping Speed for N<sub>2</sub>

300 liters/second; 200 liters/second for models with restricted inlet

#### Ultimate Pressure

$6 \times 10^{-9}$  Torr/ $8 \times 10^{-9}$  mbar

Displacement Vibration < 0.03  $\mu$ m

Mounting Position Vertical,  $\pm 1^\circ$

#### Inlet Flange Types

AVS, ISO, CONFLAT®, ASA

Outlet Flange Type ISO NW 25

Lubrication Type Oil

Rotational Speed 90,000 rpm

Acceleration Time 4 minutes

Spin Down Time 15 minutes

Cooling Requirements Forced Air, Freon or Water (5 gal/hr @ 2 PSI minimum)

Maximum Bake Out Temperature at

Flange 100°C for aluminum housing  
150°C for stainless steel housing

To meet the various system configurations encountered in ultra-high vacuum operation, the Model 3134 is available in 8 different inlet flange styles. Convenient Pumping Systems are also available for most of the popular inlet flange types.

#### Recommended Accessories

Roughing Pump Model No. 8821 Vacuum Pump, 210 L/m (7.4 CFM)

#### Power Supplies

Cat. No. 3134PS Rack Mounted Power Supply

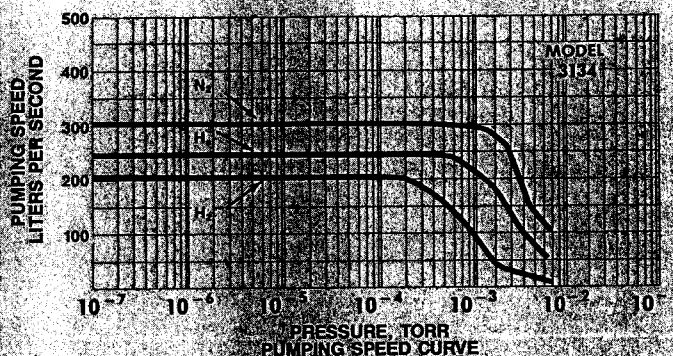
Cat. No. 3134PS1 Free-standing Power Supply

#### Cooling Units

Cat. No. 3132P Refrigeration Unit

Cat. No. 3134AA Air Cooling System

Other accessories are described at the end of this section and in the general Accessories Section of this catalog.



**Power Supply Power Requirements**  
100/115/220/240 V, 50/60 Hz,  
1 phase

**Pump Dimensions** 7-1/2 in. L x  
7-1/2 in. W x 9-7/16 in. H  
(19.1 x 19.1 x 24 cm)

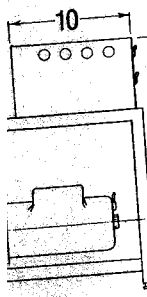
**Pumping System Dimensions**  
27 in. L x 13 in. W x 22-3/4 in. H  
(68.6 x 33 x 57.8 cm)

## ORDERING INFORMATION

Pump includes mounting legs, inlet blank-off plate, outlet blank-off plate with centering ring and hinged clamp, inlet screen, oil filler kit, 2 water cooling hose adapters. Shipped without oil in pump, but with bottle of Cat. No. 3116K Oil for filling.

Pumping system includes pump, power supply and Model 8821 Vacuum Pump connected to the turbomolecular pump outlet flange, all mounted on a frame with leveling feet.

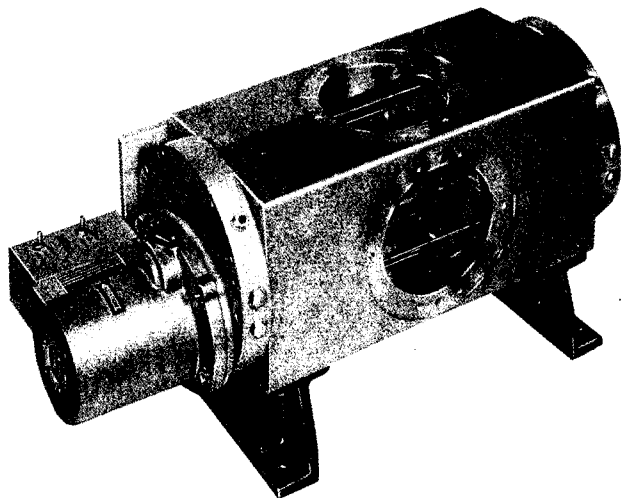
Model No.	Inlet Type	Flange Size	Pumping Speed (L/s)	Pump Body	Description
3134E	AVS	6 in. OD	300	Aluminum	Pump
3134-2E	AVS	4-1/2 in. OD	200	Aluminum	Pump
3134F	CONFLAT®	6 in. OD	300	Stainless Steel	Pump
3134-2F	CONFLAT®	4-1/2 in. OD	200	Stainless Steel	Pump
3134F8	CONFLAT®	8 in. OD	300	Stainless Steel	Pump
3134K	ISO	NW 100	300	Aluminum	Pump
3134-2K	ISO	NW 63	200	Aluminum	Pump
3134L	ASA	9 in. OD	300	Aluminum	Pump
3134ED1	AVS	6 in. OD	300	Aluminum	Pumping System
3134-2ED1	AVS	4-1/2 in. OD	200	Aluminum	Pumping System
3134FD1	CONFLAT®	6 in. OD	300	Stainless Steel	Pumping System
3134-2FD1	CONFLAT®	4-1/2 in. OD	200	Stainless Steel	Pumping System
3134LD1	ASA	9 in. OD	300	Aluminum	Pumping System
3134KD1	ISO	NW 100	300	Aluminum	Pumping System
3134-2KD1	ISO	NW 63	200	Aluminum	Pumping System
3134-F8D1	CONFLAT®	8 in. OD	300	Stainless Steel	Pumping System



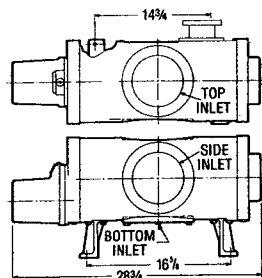
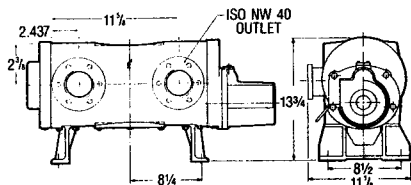


**TURBOTORR®**

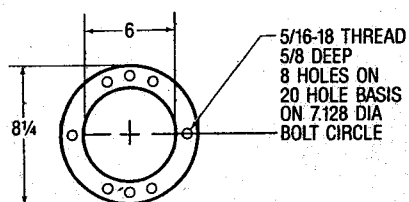
**3106**



**3106S**

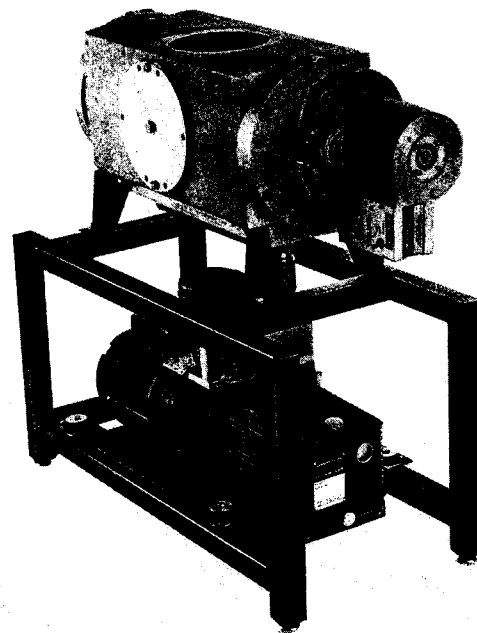


**Pump**

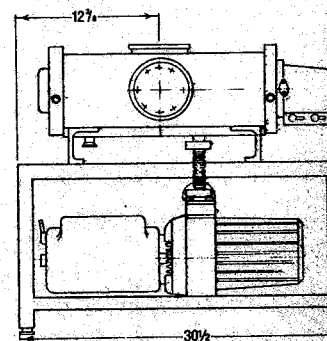
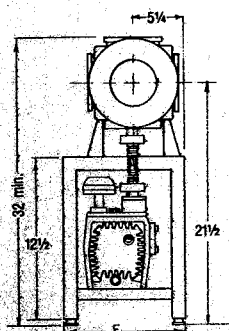


**Inlet Flange**

- **Pumping Speed**  
400 liters/second
- **Ultimate Pressure**  
 $1 \times 10^{-8}$  Torr
- **Mounting Position**  
Horizontal
- **Bearing Lubrication**  
Grease



**3106D-01**



**Pumping System**

ALL DIMENSIONS IN INCHES

**3106**

The Model 3106 is mounted on the end of a rotor, efficient, bottom) flanges can 3,644,051

Incorporates a direct drive motor within the required. heavy gas

The design of the rotor is a ball bearing regreasing pump. Air is the operating small par

**Pumping**  
400 liters  
**Ultimate**  
 $1 \times 10^{-8}$   
**Mounting**  
Inlet Flange  
Outlet Flange  
Lubrication  
Rotation:  
Acceleration  
Spin Down  
Cooling Time  
Freon Charge  
Maximum  
Flange Size  
Input Power  
208/230 V  
Pump Diameter  
28-3/4 in. L  
(73 x 28)

**ORD**

Pump includes shipping container, 2 Viton® O-rings, gaskets, clamps, and regreasing grease.

Pumping system mounted on a metal frame and connected to a vacuum pump.



The Model 3106 TurboTorr® Turbomolecular Pump is a horizontally-mounted pump with a complete set of rotor and stator blades on either end of a rotating shaft. This double-ended design results in a highly efficient, stable pump system. It incorporates 3 inlets (top, side and bottom) for ease of connecting to the ultra-high vacuum chamber. These inlets can also be used simultaneously. Use of patented (US Patent No. 3,644,051) blade design assures maximum pumping speed.

Incorporated into the pump is a sealless motor which can be attached directly to a 3-phase power line. The motor and gear are sealed entirely within the vacuum system. No additional power control circuitry is required. The pump normally does not require additional cooling unless heavy gas loads are frequently encountered.

The design of this pump assures a long service life. The stability of the rotor is accomplished by securely supporting both ends with greased ball bearings. The bearings are factory lubricated. As required, field regreasing can easily be done without interrupting the operation of the pump. Another design feature contributing to the ruggedness of the pump is the open center section of the rotor and blade assemblies. This permits small particles and objects to fall harmlessly into the pump.

#### Pumping Speed for N<sub>2</sub>

400 liters/second

#### Ultimate Pressure

$1 \times 10^{-8}$  Torr/ $1.3 \times 10^{-8}$  mbar

**Mounting Position** Horizontal

**Inlet Flange Types** AVS 6 in. ID

**Outlet Flange Type** ISO NW 40

**Lubrication Type** Grease

**Rotational Speed** 20,000 rpm

**Acceleration Time** 10-12 minutes

**Spin Down Time** 20-25 minutes

**Cooling Requirements** Water or Freon Cooling

**Maximum Bake Out Temperature at Flange** 75°C

#### Input Power Requirements

208/230 V, 50/60 Hz, 3 phase

#### Pump Dimensions

28-3/4 in. L x 11 1/8 in. W x 13-3/4 in. H  
(73 x 28.3 x 34.9 cm)

The major applications for the Model 3106 are in instrumentation, accelerators and in vacuum deposition and thin film work.

#### Recommended Accessories

Roughing Pump Model No. 8821 Vacuum Pump, 210 L/m (7.4 CFM)

#### Inlet Flange Extension

Cat. No. 3105F From Modified 6 in. ID AVS to Standard 6 in. ID AVS. Length, 3 in.

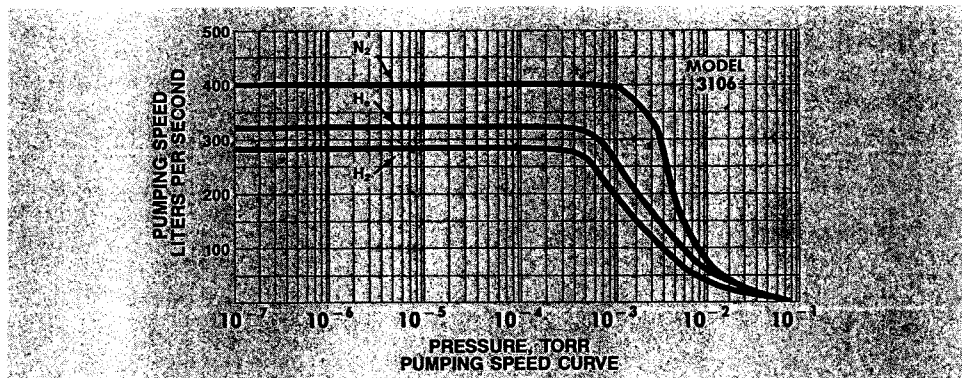
#### Inlet Flange Adapters

Cat. No. 3105G From Modified 6 in. ID AVS to 8 in. OD CONFLAT®

#### Cooling Unit

Cat. No. 3132P Refrigeration Unit

Other accessories are described at the end of this section and in the general Accessories Section of this catalog.



#### Pump Shipping Carton Dimensions

34 in. L x 29 in. W x 25 in. H  
(86.4 x 73.7 x 63.5 cm)

#### Pump Shipping Weight

220 lbs (100 kg)

#### Pumping System Dimensions

30-1/2 in. L x 14 in. W x 32 in. H  
(77.5 x 35.6 x 81.3 cm)

## ORDERING INFORMATION

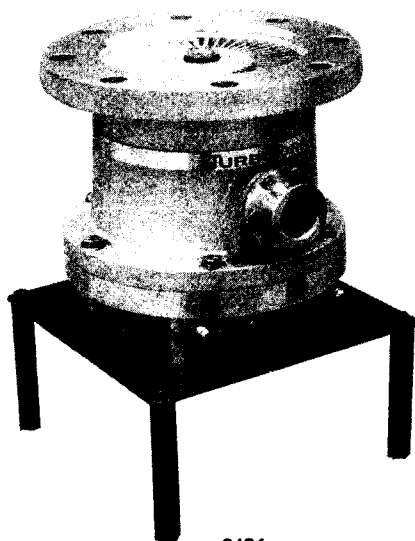
Pump includes mounting feet, 1 inlet shipping cover, 2 inlet blank-off plates, Viton® seals, 2 outlet blank-off plates with centering rings and hinged ramps, and 2 greasing syringes for greasing as required.

Pumping System includes pump mounted on frame with leveling feet and Model 8851 Vacuum Pump connected to one outlet flange of pump.

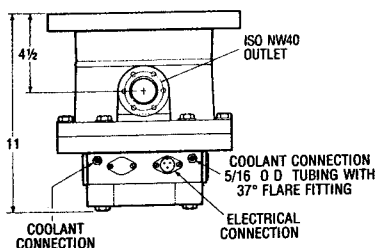
Model Number	Inlet Type	Flange Size	Outlet Flange Type and Size	Pump Body	Description
3106S	AVS	6 in. ID	ISO NW 40	Aluminum	Pump
3106D-01	AVS	6 in. ID	ISO NW 40	Aluminum	Pumping System

**TURBOTORR®**

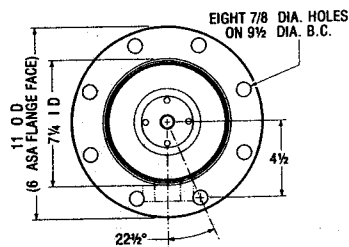
**3131**



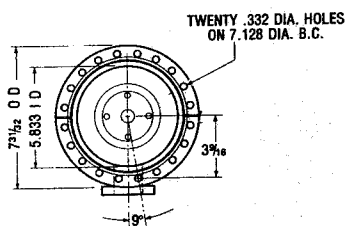
**3131**



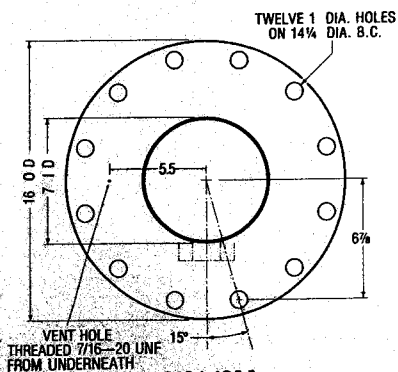
**Pump**



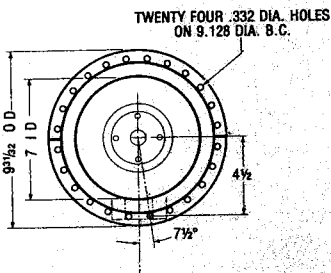
**3131**



**3131-8C**



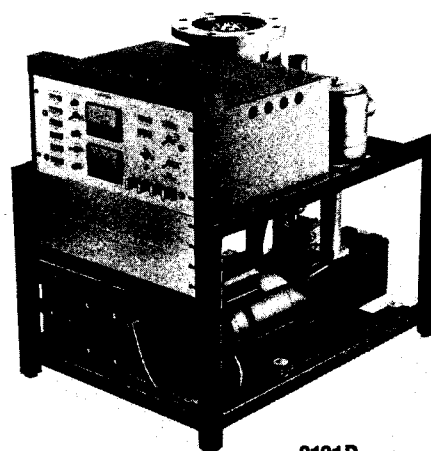
**3131-10AA**



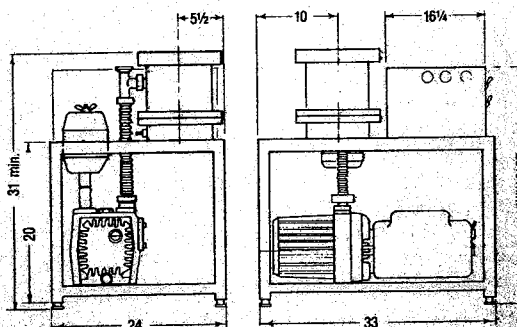
**3131-10C**

**Inlet Flanges**

- **Pumping Speed**  
600 liters/second
- **Ultimate Pressure**  
 $5 \times 10^{-8}$  Torr
- **Mounting Position**  
Any position
- **Bearing Lubrication**  
Grease



**3131D**



**Pumping System**

ALL DIMENSIONS IN INCHES

**3131**

The Model 3131 is a turbomolecular pump that uses a patented design for high rotational speeds and low ultimate pressure.

The Model 3131 uses bearings that can easily be lubricated with grease.

A power supply is quickly connected to the pump bottom for power supply acceleration if the gas Power Supply is the user's choice or standard.

**Pumping Speed**  
600 liters/second for model 3131  
**Ultimate Pressure**  
 $5 \times 10^{-8}$  Torr  
**Displacement**  
Inlet Flange  
Outlet Flange  
Lubrication  
Rotational Speed  
Acceleration  
Spin Down  
Cooling Rate  
Forced Air, or Water  
**Maximum Temperature**  
Flange 100°C for 3131, 150°C for 3131D

**ORDER**

Pump included can be reconnected to the blank-off port of the flange and with CONFIRMED hose and fittings for the pump.

Pump/Power supply includes power supply and power supply.

Pumping Speed power supply connected pump outlet which are included for

# 3131

The Model 3131 TurboTorr® Turbomolecular Vacuum Pump is a grease lubricated turbo which can be mounted in any direction. The Model 3131 uses a patented blade design (US Patent No. 3,644,051) coupled with a high rotational speed to provide a pump with higher pumping speeds than comparable pumps of the same size.

The Model 3131 turbo makes use of a two ball bearing design. The bearings are factory lubricated; however, as required, field regreasing can easily be done without interrupting the operation of the pump.

A power supply has been designed to accelerate the pump smoothly and quickly to its maximum speed. It senses the power requirements of the pump both during acceleration and at operating frequency, and compensates for any fluctuations due to varying gas loads, for example. The power supply will automatically shut down the turbo pump if the acceleration period is too long, frequency too high, excessive current, or if the gas load becomes too high for safe operation. The Model 3131 Power Supply incorporates the use of a high torque switch which will aid the user during the grease break-in procedure and can be rack mounted or stand-alone.

## Pumping Speed for N<sub>2</sub>

600 liters/second; 450 liters/second for models with restricted inlet

## Ultimate Pressure

$5 \times 10^{-8}$  Torr/ $7 \times 10^{-8}$  mbar

Displacement Vibration  $< 0.10 \mu\text{m}$

Mounting Position Any orientation

Inlet Flange Types ASA, CONFLAT®

Outlet Flange Type ISO, CONFLAT®

Lubrication Type Grease

Rotational Speed 25,000 rpm

Acceleration Time 6 minutes

Spin Down Time 30 minutes

Cooling Requirements (Optional)

Forced Air, Freon Refrigeration

or Water

Maximum Bake Out Temperature at

Flange 100°C for aluminum housing

150°C for stainless steel housing

To meet the various system configurations encountered in ultra-high vacuum operations, the Model 3131 is available in 5 different inlet flange styles. Pump/Power Supply combinations and Pumping Systems are available for many of the popular inlet flange types.

## Recommended Accessories

Roughing Pump Model No. 8851 Vacuum Pump, 340 L/m (12 CFM)

Power Supply

Cat. No. 3131PS Power Supply

Cooling Units

Cat. No. 3132P Refrigeration Unit

Cat. No. 3131AA Air Cooling Unit

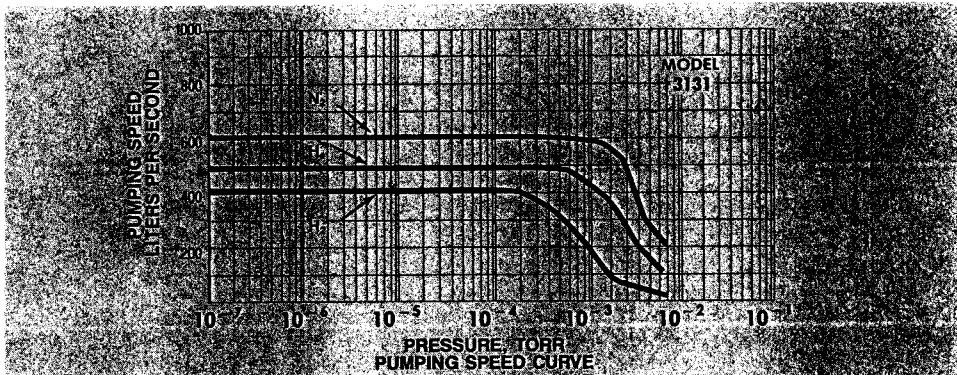
Inlet Screen

Cat. No. 3132S For 11 in. OD ASA Flange

Cat. No. 3132S-10 For 16 in. OD ASA Flange

Cat. No. 3132S-68 For CONFLAT® 8 in. OD Flange

Other accessories are described at the end of this section and in the general Accessories Section of this catalog.



**Power Supply Power Requirements**  
115 V, 60 Hz, 1 phase (unless otherwise indicated)

**Pump Dimensions with Mounting Stand** 15-1/4 in. H (38.7 cm) Length and width dimension depends on flange OD

**Pumping System Dimensions**  
33 in. L x 24 in. W x 31 in. H (83.8 x 61 x 78.7 cm)

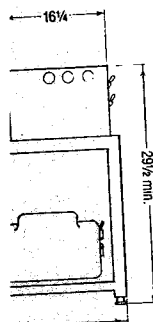
## ORDERING INFORMATION

Pump includes mounting stand which can be removed, if desired, once pump is installed, inlet shipping plate, outlet blank-off plate with centering ring and hinged clamp for models with ISO flange and a shipping plate for models with CONFLAT® flange, 2 water cooling hose adapters, and 2 grease syringes for regreasing later.

Pump/Power Supply Combination includes pump and Cat. No. 3131PS Power Supply with cables.

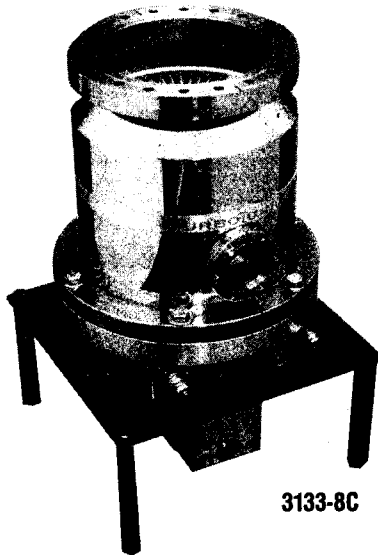
Pumping System includes pump, power supply and Model 8851 connected to the turbomolecular pump outlet flange, all components of which are mounted on a frame with leveling feet.

Model No.	Inlet Flange Type	Inlet Flange Size	Outlet Flange Type	Outlet Flange Size	Pumping Speed (L/s)	Pump Body	Description
3131	ASA	11 in. OD	ISO	NW 40	600	Aluminum	Pump
3131-10AA	ASA	16 in. OD	ISO	NW 40	600	Aluminum	Pump
3131-10AS	ASA	16 in. OD	ISO	NW 40	600	Stainless Steel	Pump
3131-8C	CONFLAT®	8 in. OD	CONFLAT®	1-1/2 in. OD	450	Stainless Steel	Pump
3131-10C	CONFLAT®	10 in. OD	CONFLAT®	1-1/2 in. OD	600	Stainless Steel	Pump
3131C	ASA	11 in. OD	ISO	NW 40	600	Aluminum	Pump/Power Supply
3131C-8C	CONFLAT®	8 in. OD	CONFLAT®	1-1/2 in. OD	450	Stainless Steel	Pump/Power Supply
3131C-10C	CONFLAT®	10 in. OD	CONFLAT®	1-1/2 in. OD	600	Stainless Steel	Pump/Power Supply
3131D	ASA	11 in. OD	ISO	NW 40	600	Aluminum	Pumping System (115/230 V, 50/60 Hz)

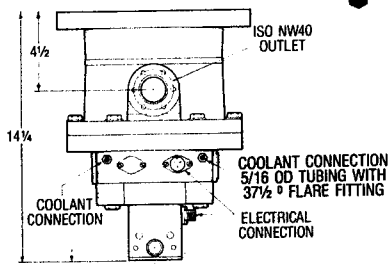


**TURBOTORR®**

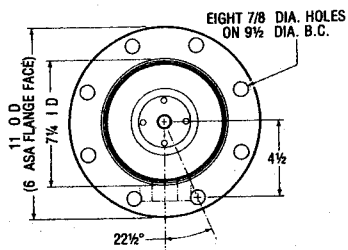
**3133**



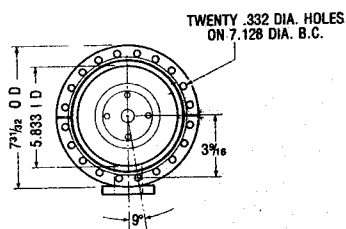
**3133-8C**



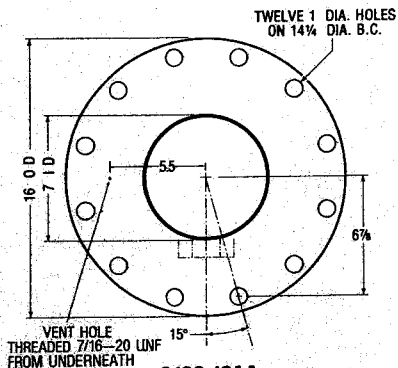
**Pump**



**3133**

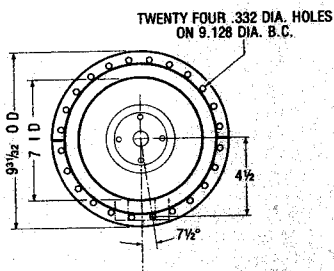


**3133-8C**



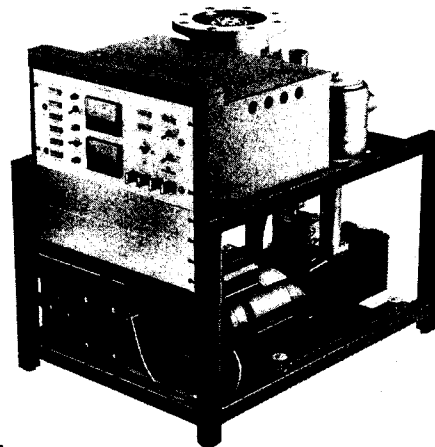
**3133-10AA**

**Inlet Flanges**

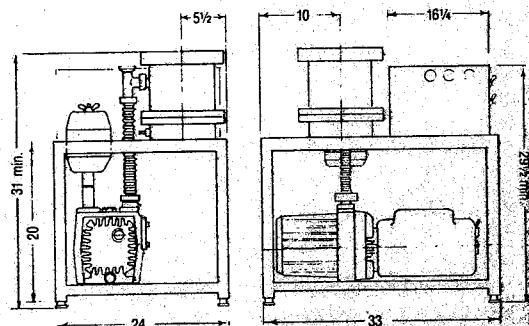


**3133-10C**

- **Pumping Speed**  
1150 liters/second
- **Ultimate Pressure**  
 $1 \times 10^{-9}$  Torr
- **Mounting Position**  
Vertical
- **Bearing Lubrication**  
Oil



**3133D**



**Pumping System**

The Model mounted, ( Patent No. 4,674,952) the rotating as a bearing upper journal location. There are no significant lubrication

A power supply quickly to the pump both states for air supply will period is to load become user to run be rack mo

**Pumping S**  
1150 liters/ for models **Ultimate P**  
 $1 \times 10^{-9}$  Torr  
**Displacement**  
**Mounting I**  
**Inlet Flang**  
ASA, CONF  
**Outlet Flan**  
ISO, CONFL  
**Lubrication**  
**Rotational**  
**Acceleratic**  
**Spin Down**  
**Cooling Re**  
**Refrigeratic**  
2 PSI)  
**Maximum**  
**Flange 10C**  
housing/15  
steel housi

Pump includ on be rem installed, Sink-off pl charged clarr age and a CONFL hose ad in reserv Oil Fille:

Pump/Power includes pu as.

Pumping Sy for suppl mounted

ALL DIMENSIONS IN INCHES

## 3133

The Model 3133 TurboTorr® Turbomolecular Vacuum Pump is a vertically-mounted, oil-lubricated turbo which uses a patented blade design (US Patent No. 3,644,051). It incorporates a patented (US Patent No. 4,674,952) journal upper bearing which makes no metallic contact with the rotating shaft. The lubrication system creates an oil film (which acts as a bearing surface) between the moving rotor shaft and the stationary upper journal bearing, thus eliminating the need for a ball bearing at this location. This journal bearing has no inherent life limitation and, because there are no moving parts, the vibration levels of this pump are significantly lower than those of the traditional two ball bearing design. Oil lubrication is supplied by an external oil pump.

A power supply has been designed to accelerate the pump smoothly and quickly to its maximum speed. It senses the power requirements of the pump both during acceleration and at operating frequency, and compensates for any fluctuations due to varying gas load, for example. The power supply will automatically shut down the turbo pump if the acceleration period is too long, frequency is too high, current is excessive, or if the gas load becomes too high for safe operation. The power supply allows the user to run the turbo at half speed to conserve bearing life. It can either be rack mounted or used stand-alone.

### Pumping Speed for N<sub>2</sub>

1150 liters/second; 750 liters/second for models with restricted inlet

### Ultimate Pressure

$1 \times 10^{-9}$  Torr/ $1.3 \times 10^{-9}$  mbar

Displacement Vibration < 0.03  $\mu$ m

Mounting Position Vertical,  $\pm 5^\circ$

### Inlet Flange Types

ASA, CONFLAT®

### Outlet Flange Types

ISO, CONFLAT®

### Lubrication Type Oil

Rotational Speed 50,000 rpm

Acceleration Time 6 minutes

Spin Down Time 30 minutes

Cooling Requirements Freon

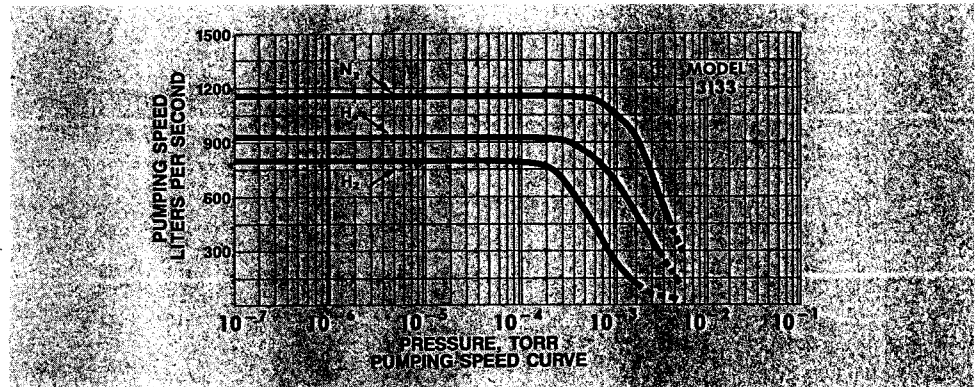
Refrigeration or Water (5 gal/hr @ 2 PSI)

### Maximum Bake Out Temperature at

Flange 100 °C for aluminum

housing/150 °C for stainless

steel housing



### Power Supply Power Requirements

115 V, 60 Hz, 1 phase (unless otherwise indicated)

### Pump Dimensions with Mounting

Stand 15-1/4 in. H (38.7 cm) Length and width dimension depends on flange OD

### Pumping System Dimensions

33 in. L x 23 in. W x 31 in. H (83.8 x 61 x 78.7 cm)

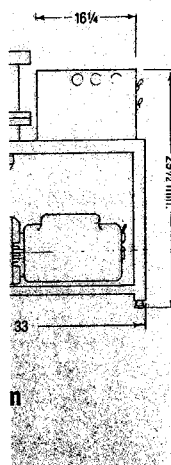
## ORDERING INFORMATION

Pump includes mounting stand which can be removed, if desired, once pump is installed, inlet shipping plate, outlet blank-off plate with centering ring and hinged clamp for models with ISO flange and a shipping plate for models with CONFLAT® flange, 2 water cooling hose adapters. Pump shipped with oil in reservoir, plus Cat. No. 3116K Oil and Oil Filler kit.

Pump/Power Supply Combination includes pump and power supply with cables.

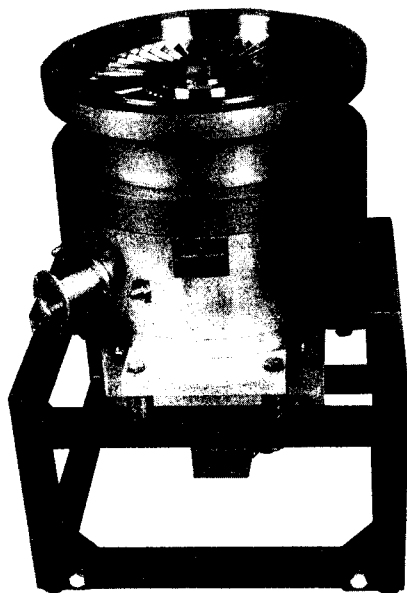
Pumping System includes pump, power supply and Model 8851 Pump all mounted on a frame with leveling feet.

Model No.	Inlet Flange Type	Inlet Flange Size	Outlet Flange Type	Outlet Flange Size	Pumping Speed (L/s)	Pump Body	Description
3133	ASA	11 in. OD	ISO	NW 40	1150	Aluminum	Pump
3133R	ASA	11 in. OD	ISO	NW 40	1150	Aluminum	Pump-Rad. Res.
3133-10AA	ASA	16 in. OD	ISO	NW 40	1150	Aluminum	Pump
3133-10AS	ASA	16 in. OD	ISO	NW 40	1150	Stainless Steel	Pump
3133-8C	CONFLAT®	8 in. OD	CONFLAT®	1-1/2 in. OD	750	Stainless Steel	Pump
3133-10C	CONFLAT®	10 in. OD	CONFLAT®	1-1/2 in. OD	1150	Stainless Steel	Pump
3133C	ASA	11 in. OD	ISO	NW 40	1150	Aluminum	Pump/Power Supply
3133CHZ	ASA	11 in. OD	ISO	NW 40	1150	Aluminum	Pump/Power Supply (230 V, 50 Hz)
3133RC	ASA	11 in. OD	ISO	NW 40	1150	Aluminum	Pump/Power Supply
3133C-10AA	ASA	16 in. OD	ISO	NW 40	1150	Aluminum	Pump/Power Supply
3133C-10AS	ASA	16 in. OD	ISO	NW 40	1150	Stainless Steel	Pump/Power Supply
3133C-8C	CONFLAT®	8 in. OD	CONFLAT®	1-1/2 in. OD	750	Stainless Steel	Pump/Power Supply
3133C-10C	CONFLAT®	10 in. OD	CONFLAT®	1-1/2 in. OD	1150	Stainless Steel	Pump/Power Supply
3133D	ASA	11 in. OD	ISO	NW 40	1150	Aluminum	Pumping System (115/230 V, 50/60 Hz)

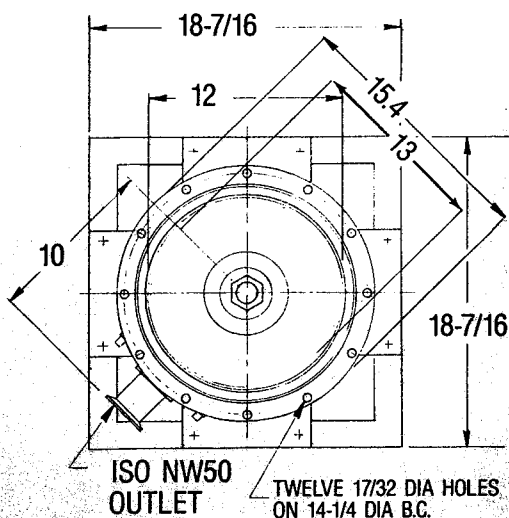


**TURBOTORR®**

**3137**

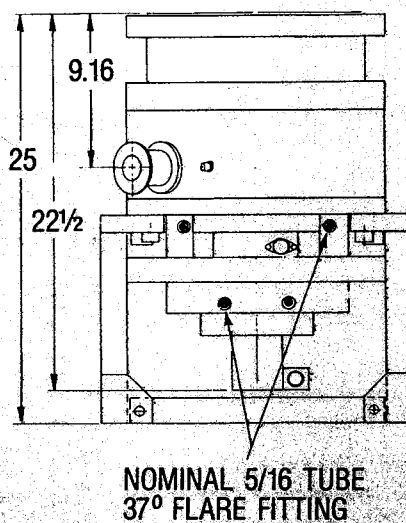


3137E with stand



Inlet Flange

- **Pumping Speed**  
3400 liters/second
- **Ultimate Pressure**  
 $1 \times 10^{-9}$  Torr
- **Mounting Position**  
Vertical
- **Bearing Lubrication**  
Oil



Pump with Stand

ALL DIMENSIONS IN INCHES

**3137**

#### General I

The Mode vertically blade des rotational speeds th

The pump makes no system cr between t bearing, t location. because t pump are bearing d and by a

A power s smoothly requireme

#### Specificat

**Pumping**  
3400 liter:  
**Ultimate I**  
 $1 \times 10^{-9}$  T  
**Displacen**  
**Mounting**  
**Inlet Flan**  
**Outlet Fla**  
**Lubricatio**  
**Rotational**  
**Accelerati**  
**Spin Dow**  
**Cooling R**  
valve set :  
70°F at p  
**Maximum**  
**Flange 10**

#### ORDE

Pump incl  
inlet shipp  
outlet blan  
ring and h  
cooling ad  
with oil in  
3116K Oil

Pumping s  
on stand,  
ables, an  
Pump with  
connect to

### General Information

The Model 3137 TurboTorr® Turbomolecular Vacuum Pump is a vertically mounted, oil-lubricated pump which uses a patented blade design (US Patent No. 3,644,051) coupled with a high rotational speed to provide a pump with much higher pumping speeds than comparable pumps of the same size.

The pump incorporates a unique journal upper bearing which makes no metallic contact with the rotating shaft. The lubrication system creates an oil film (which acts as a bearing surface) between the moving rotor shaft and the stationary upper journal bearing, thus eliminating the need for a ball bearing at this location. This journal bearing has no inherent life limitation, and because there are no moving parts, the vibration levels of this pump are significantly lower than those of the traditional two ball bearing design. Oil lubrication is supplied by an external oil pump, and by a centrifugal pump.

A power supply has been designed to accelerate the pump smoothly and quickly to its maximum speed. It senses the power requirements of the pump both during acceleration and operating

frequency, and compensates for any fluctuations due to varying gas load, for example. The power supply will automatically shut down the pump if the acceleration period is too long, frequency is too high, current is excessive, or if the gas load becomes too high for safe operation.

The power supply can be either rack mounted or stand-alone. The Model 3137 is available with an ASA-type adjustable flange.

### Recommended Accessories

**Roughing Pump** Cat. No. 8871 Vacuum Pump, 1500 L/m (53 CFM)

**Power Supply** Cat. No. 3137PS Power Supply

**Cooling Unit** Cat. No. 3132P Refrigeration Unit

Other accessories are described at the end of this section, and in the general Accessories Section of this catalog.

### Specifications

#### Pumping Speed for N<sub>2</sub>

3400 liters/second

#### Ultimate Pressure

$1 \times 10^{-9}$  Torr/ $1.3 \times 10^{-9}$  mbar

**Displacement Vibration**  $< 0.03 \mu\text{m}$

**Mounting Position** Vertical,  $\pm 1^\circ$

**Inlet Flange Type** ASA similar

**Outlet Flange Type** ISO NW 50

**Lubrication Type** Oil

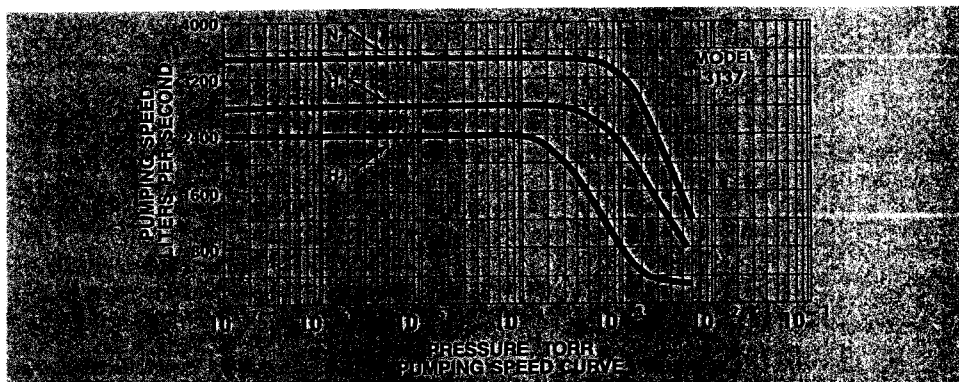
**Rotational Speed** 28,800 rpm

**Acceleration Time** 8 minutes

**Spin Down Time** 60 minutes

**Cooling Requirements** Freon (control valve set at 70 PSI which gives about 70°F at pump)

**Maximum Bake Out Temperature at Flange** 100°C



**Power Supply Power Requirements**  
230 V, 60 Hz, 1 phase

**Pump Dimensions**  
18-1/2 in. L x 18-1/2 in. W x 25 in. H  
(47 x 47 x 63.5 cm)

**Pump Weight** 275 lbs (125 kg)

## ORDERING INFORMATION

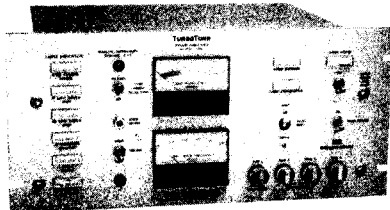
Pump includes mounting stand, inlet shipping plate, inlet screen, outlet blank-off plate with centering ring and hinged clamp, Freon cooling adapters. Pump is shipped with oil in reservoir, plus Cat. No. 3116K Oil and Oil Filler Kit.

Pumping System includes pump on stand, power supply with cables, and Model 8871 Vacuum Pump with tubing and hardware to connect to the pump.

Model Number	Inlet Type	Flange Size	Outlet Flange Type and Size	Pump Body	Description
3137E	ASA type	15.4 in. OD	ISO NW 50	Aluminum	Pump with Stand
3137	ASA type	15.4 in. OD	ISO NW 50	Aluminum	Pumping System



## 3131 POWER SUPPLY



### Specifications

**Maximum Output Power** 25 V, 12 A  
**Frequency Adjust Range** 300 to 420 Hz  
**Power Consumption (Run Mode)** 75 watts  
**Input Power** 115 V, 60 Hz, 1 phase  
**Dimensions** 19 in. L x 16 $\frac{5}{16}$  in. W x 8 $\frac{3}{4}$  in. H

- Meters for Frequency and Current Levels
- Indicator Lights Shows Pump Status
- High Torque Mode when Regreasing Pump

A full feature power supply designed to operate the Model 3131 Turbomolecular Pump. Provides power to smoothly accelerate the pump and maintain full status indication during operation, including overcurrent protection, retarded acceleration, locked rotor and frequency too high (overspeed). Special High Torque Mode permits uninterrupted operation of the pump during regreasing. Power supply has auto restart after power interruption. Cables are attached to power supply.

Cat. No. ....3131PS

## 3133/3137 POWER SUPPLIES



3133PS

### Specifications

**Maximum Output Power** 50 V, 12 A (3133)  
 220 V, 12 A (3137)  
**Frequency Adjust Range** 300 to 840 Hz (3133)  
 300 to 500 Hz (3137)  
**Power Consumption (Run Mode)** 150 watts (3133)  
 625 watts (3137)  
**Input Power** 115 V, 60 Hz, 1 phase (3133)  
 230 V, 60 Hz, 1 phase (3137)  
**Dimensions** 19 in. L x 16 $\frac{5}{16}$  in. W x 8 $\frac{3}{4}$  in. H

- Meters for Frequency and Current Levels
- Indicator Lights Show Pump Status
- Half-Speed for Model 3133
- Auxiliary Battery Backup for Model 3133

**Power Supplies.** Similar in performance characteristics and features of Model 3131 but with Lubrication Failed and Coolant Failed protection and Indicator Lights designed specifically for these oil lubricated pumps. Also, the Model 3133 Power Supply allows operation at half speed to conserve bearing life. Units can be rack mounted, or used stand alone. Cables are attached.

Power Supply for Model 3133 .....Cat. No. 3133PS

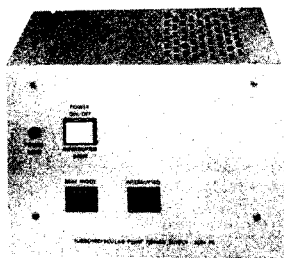
Power Supply for Model 3137 .....Cat. No. 3137PS

**Auxiliary Battery Backup Unit.** For Model 3133 Power Supply only. Provides power to the pump oil pump in the event of power failure, permitting sufficient oil flow during coast down period. Unit is self charging during power on. Easily installed. Provided with cables to operate back up one oil pump, with accessory cables available to backup a second oil pump.

Auxiliary Battery Backup Unit .....Cat. No. 3133PS-70

Accessory Cable for Second Oil Pump .....Cat. No. 3133PS-75

## 3134 POWER SUPPLY



3134PS1

### Specifications

**Maximum Output Power** 100 V, 3 A  
**Maximum Output Frequency** 1500 Hz  
**Power Consumption (Run Mode)** 130 watts  
**Input Power** 110/115/220/230 V, 50/60 Hz, 1 phase  
**Dimensions (Rack Mounted)** 19 in. L x 13 in. W x 8 $\frac{3}{4}$  in. H  
**Dimensions (Stand Alone)** 10 $\frac{1}{8}$  in. L x 13 in. W x 8 $\frac{3}{4}$  in. H

- Fully Protects Turbomolecular Pump
- Indicator Lights Show Pump Status
- Connections for Remote Operation

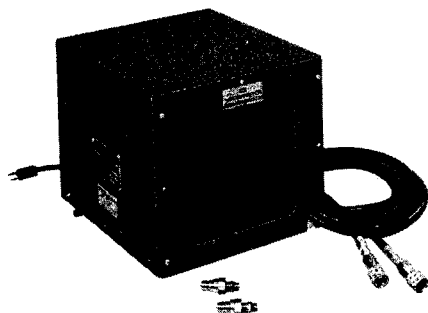
A compact, solid state power supply for the Model 3134 Turbomolecular Pump. Accelerates the pump smoothly and compensates for changes in operating conditions. Provides full protection to pump during operation. Has status indicators for power, full speed and interrupt modes. Incorporates two sets of contacts, with access at the rear chassis, for remote operation and status check. With detachable 10 ft cable.

Rack Mountable Unit .....Cat. No. 3134PS

Stand-Alone Unit .....Cat. No. 3134PS1

Auxiliary Cable, 35 ft .....Cat. No. 3134PK-35

## REFRIGERATION UNIT



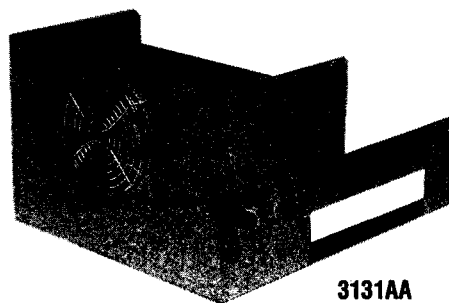
A self-contained refrigeration unit for use with all model turbomolecular pumps. Has a charge of freon gas which is circulated within the turbomolecular pump. The heat exchanger in the refrigeration unit is set to provide the proper temperature. Has quick-disconnect couplings for ease of installation. Standard refrigeration tubing of 10 ft length is attached, with extension hose available. Comes complete with charge of Freon, ready for installation. Operation from 115 V, 60 Hz.

Refrigeration Unit ..... Cat. No. 3132P  
Extension Hose, Single Length, 10 ft. .... Cat. No. 3132H

## AIR COOLING UNITS

A fan in a chassis designed to direct the proper air flow to cool the Model 3131 Turbomolecular Pump for optional cooling when the ambient temperature is high, or high gas loads are frequently encountered. Complete with cable for connecting directly to the pump power supply. Attaches to the outer housing of the pump. Cat. No. .... 3131AA

Similar to the above, but designed specifically for the Model 3134 Turbomolecular Pump. Replaces either the water or Freon cooling system required. Channels ambient air across the heat-exchanging ridges on the outer housing of the pump. With cables for attaching to the power supply. Cat. No. .... 3134AA



## INLET SCREENS

Used to prevent debris and large particles from entering turbomolecular pump. Design of wire mesh minimizes reduction in pumping speed.

Catalog No.	Fits Pump Models
3132S	3131, 3133, 3106(w/3105G)
3132S-10	3131-10AA, 3133-10AA
3132S-68	3131-8C, 3133-8C, 3134F8
3134ES	3134, 3134L, 3120(w/3120M)
3134-2ES	3134-2E
3134FS	3134F
3134F-2FS	3134-2F
3134KS	3134K
3134-2KS	3134-2K
3137ES	3137E

## SEALS

Captured O-ring gasket for the inlet of the Models 3131 and 3133 ASA-style inlet flanges. Bakeable to 150°C. Complete with Buna N O-ring.

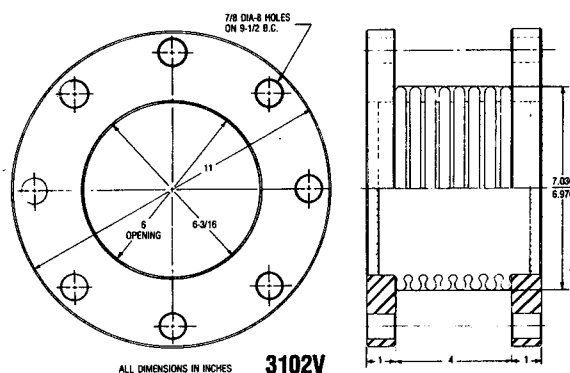
Cat. No. .... 3133S

Viton® O-ring only for Cat. No. 3133S.

Cat. No. .... 3133S-10

For seals for CONFLAT® flanges, see the general Accessories Section in this catalog.

## BELLOWS



Stainless steel bellows adapter designed to eliminate minor vibrations in the turbomolecular pump system. Easy to install. Both flanges 11 in. OD ASA style. Approximately 6 in. in length. Mates to Models 3133 or 3133 inlet flange.

Cat. No. .... 3102V

Similar to 3102V Bellows, but with both flanges of the 6 in. OD CONFLAT® style. Mates to Model 3134F inlet flange.

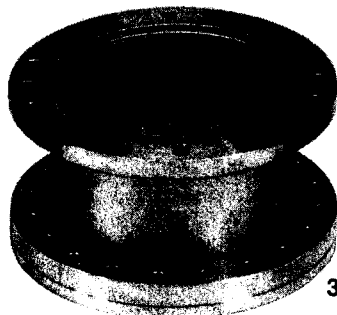
Cat. No. .... 3134FB

Similar to 3102V Bellows, but with both flanges of the ISO NW 100 type. Mates to Model 3134K inlet flange.

Cat. No. .... 3134KB

For Bellows Tubing for foreline connections, see the general Accessories Section in this catalog.

## FLANGE ADAPTERS



**3105J**

An aluminum inlet flange adapter for the Model 3120, to adapt the 3 in. ID AVS to 9 in. OD ASA-style flange. Overall length, 2¾ in.  
Cat. No. .... 3120M

An aluminum inlet extension for the Model 3120, to extend the inlet by 2¼ in.  
Cat. No. .... 3120F

A stainless steel inlet adapter specifically designed for the Model 3106 Turbomolecular pump. Adapts the Model 3106 6 in. ID AVS inlet flange to an 8 in. OD CONFLAT® flange. Overall length, 4 in.  
Cat. No. .... 3105J

An aluminum inlet adapter for the Model 3106, to adapt the 6 in. ID AVS inlet flange to an 11 in. OD ASA-style flange. Overall length, 3⅝ in.  
Cat. No. .... 3105G

An aluminum inlet extension for the Model 3106, to adapt the 6 in. ID AVS modified inlet flange (8 bolt holes) to a standard 6 in. ID AVS flange (20 bolt holes). Overall length, 3 in.  
Cat. No. .... 3105F

For a complete listing of flange adapters, see the general Accessories Section in this catalog.

## TOOL AND SPARE PARTS KITS

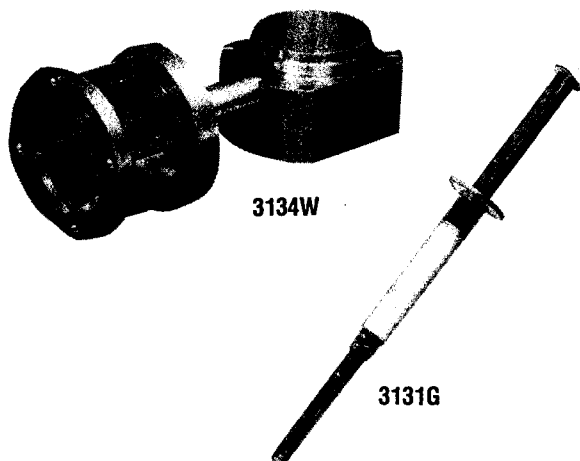
**Tool Kits** to facilitate disassembly of the pump. Consists of a special wrench to loosen top and bottom shaft nuts and a puller tool for removing the upper outer housing away from the blade assembly.

Catalog No.	For Pump Models
3132T	3131, 3133
3134T	3134
3134-2T	3134-2 (2 in. flanges)
3137T	3137

**Spare Parts Kit** for the Model 3133 Pump and 3133PS Power Supply. Includes replacement upper journal and lower bearings and seals for pump, lamps, fuses, meters and power transistors for power supply.  
Cat. No. .... 3133SP

Consult the factory for individual parts availability. Reference pump model and serial number whenever ordering parts.

## LUBRICATION SUPPLIES



**3134W**

**3131G**

**Lubrication Oil** for the Models 3133, 3134 and 3137 Turbomolecular Pumps. Recommended for its low vapor pressure and superior lubrication of high speed bearings. Supplied in 1 qt (0.9 liter) bottle. For use with Oil Filler Kit supplied with the pump.  
Cat. No. .... 3116K

**Greased filled syringe** for regreasing Models 3120, 3106 and 3131 Turbomolecular Pumps. Specifically formulated for high speed operation and low vapor pressure. Syringe contains approximately 3 cc of grease.  
Cat. No. .... 3131G

**Large Oil Reservoir** specifically designed for the Model 3134 Turbomolecular Pump. Replaces the oil reservoir normally supplied with the pump. Provides an expanded supply of oil for applications where more frequent oil refilling is not practical. Easy to install. Made of aluminum with a highly visible oil sight window.  
Cat. No. .... 3134W

**Turbomolecular Pump Flushing Fluid.** Recommended for flushing pump of hydrocarbons and matter associated with repair or accidental contamination of pump housing or blades. Consists of trichloromono fluoromethane fluid in a 1 qt can.  
Cat. No. .... 3101F