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INTERIM

TRIBODYNtm-20

INSTRUCTION MANUAL

January, 1988

DESCRIPTION

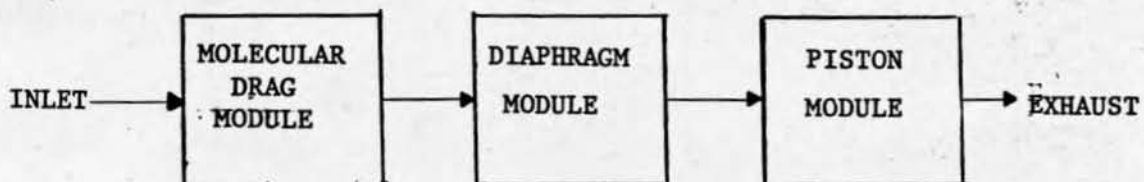
TRIBODYN pumps are oil-free pumps that will evacuate a system from atmospheric pressure to high vacuum. They are multi-stage pumps that operate in series to remove gases without introducing contaminants such as oil as is found in oil-sealed mechanical pumps. Tribodyn pumps are entirely oil-free. The stages are housed within a single container and operate automatically throughout the entire range of pressures as they reduce a chamber from atmosphere to high vacuum.

A series of pumping modules are connected with tubing and although they can be considered separately, each module is required if the total pump is to function.

MODULES

1. Molecular Drag Module
2. Diaphragm Module
3. Piston Module

BLOCK DIAGRAM OF MODULES



OPERATION

When a Tribodyn pump is connected to a chamber, it will go into full operation by turning on the lighted rocker switch mounted on the top of the pump fairing. When the switch is ON, all pump modules are turned on. Each module operates full time, but each is only effective within its own operating envelope of pressure/flow.

As the pumpdown begins, the main pumping burden is carried by the piston module which is capable of pumping relatively large amounts of gas at high pressures. As the pressure falls, the speed of the piston module declines and the main pumping burden is assumed by the diaphragm module. At this point, the piston module assumes a supporting(backing) role for the diaphragm module. As the diaphragm module and piston module bring the pressure down to 10 torr or below, the molecular drag module will be able to reach its full operating rotational speed(27,000rpm) so it will assume the main pumping burden in its turn while the diaphragm and piston modules both assume support roles. At pressures above 10 torr, the molecular drag module will not achieve full rotational speed due to gas pressure resistance. As the molecular drag module achieves full rotational speed, the pumping speed reaches its maximum and maintains full speed down to the pump's ultimate.

INSTALLATION

1. The Tribodyn is ready for operation when it is unpacked from the shipping container. Inspect the pump and shipping container for signs of shipping damage, and if damage is suspected or obvious, contact the carrier for a damage claim. If no damage is suspected, continue with installation. Even if no damage is suspected, it is recommended that the pump be checked out upon receipt since internal damage could conceivably occur during shipment. It is difficult to impossible to claim shipping damage if a claim is filed some time after delivery.

Checkout can be performed by installing a gauge on the pump itself, by installing the pump on the system to be evacuated, or by blanking off the pump inlet and following the pumpdown procedure described below.

2. Connect the pump to the system to be evacuated either directly or through the necessary adapter to match the fitting on the system. In general, best performance will be achieved if the connection to the system is of the largest diameter and the shortest length possible. The pump can be mounted in any orientation without problems including sideways or upside down.

3. The pump only needs to be plugged into any 115v outlet before operation.

OPERATING THE PUMP

1. Turn on the pump with the lighted rocker switch on the top of the pump housing. The switch will light as the pump is turned on.

2. The operation of the pump can be monitored with the Three LEDs on the end of the pump housing. As the pump is turned on, the YELLOW LED is lit indicating that the molecular drag module is ON and is rotating below full rotational speed. As the pressure drops to the 1-10 torr region, the pump will be able to reach full speed and the YELLOW LED will go out and the GREEN LED will come on indicating that the molecular drag module is now at full speed of 27,000 rpm.

The third LED is RED. If the RED LED comes on, the pump has overheated and will require cooldown before it will come on again. 15 minutes is usually more than sufficient time for cooldown.

TROUBLESHOOTING

Troubleshooting or fault correction will probably require the pump housing to be opened.

1. Disconnect the power to the pump by turning off the pump and unplugging it from the 115v receptacle.

2. Remove the black tee handle. A 5/32 in. Allen wrench is required.

3. Remove the three-sided bent fairing by opening the 1/4 turn fasteners with a screwdriver. Lift the fairing away. Unplug the internal Molex connector between the fairing and the pump. This is located on the wires coming from the ON/OFF switch on the fairing.

SYMPTOM

PUMP IS PLUGGED IN AND SWITCH IS ON BUT DOESN'T LIGHT UP.

Check main power fuse inside pump. The fuse is in an inline fuse holder.

SYMPTOM

PUMP IS RUNNING, BUT THERE IS NO LED INDICATION ON THE MOLECULAR DRAG MODULE.

Check the fuses on the molecular drag module circuit board inside the pump. Check to see that the plug on the bottom of the molecular drag module is plugged in fully. Check connections between the molecular drag module circuit board and

the connector strip. If no fault is found, contact factory.

SYMPTOM

PUMP IS RUNNING, BUT THE YELLOW LED STAYS LIT.

The molecular drag module is not coming up to speed.

There are several possibilities.

1. The inlet pressure is too high. There is either a leak in the system or there is a problem with the pump. Blank off the pump inlet and see if the pump will come up to speed by allowing the YELLOW LED to cycle to GREEN. If it does, the system is probably leaking.

2. If the blanked-off pump doesn't come up to speed, there is probably a problem with the pump. Install a gauge on the pump inlet, unplug the plug on the bottom of the molecular drag module, and turn on the pump. The pressure should drop to about *24* torr. If it does, there's probably a problem with the molecular drag module which will require consulting the factory to resolve or will require regreasing the molecular drag module.

If the pressure does not reach about *24* torr, there is probably a leak in the pumping train. Probe the fittings with alcohol or helium to see if there's a leak indication on the gauge.

If no leak is detected, either the diaphragm or piston

module is not operating properly. Adjust the piston module or install a new diaphragm or piston ring from the maintenance kit.

PISTON MODULE ADJUSTMENT PROCEDURE

Refer to cutaway view of the piston module.

1. Remove piston module head, Part 1
2. Loosen locking screws, Part 13
3. Rotate cooling fan blade to bring piston head to position shown in cutaway (top position)
4. Tighten locking screws (part 13) while holding piston head in position.

SYMPTOM

THE PUMP SEEMS TO LABOR WHEN IT'S TURNED ON.

This is not a problem. If the pump is turned off under vacuum and then turned on in a short time the pressure will not have equalized across the diaphragm and piston modules. Allow it to remain ON and the pump will be running in less than a minute.

SYMPTOM

ONE OR ALL OF THE THREE PUMPING MODULES SHUTS DOWN UNDER LOAD.

Each module is provided with a thermal overload

interlock. If the gas load is too high for too long, any or all of the modules will shut down until it cools down. The system is either much too large for the pump or a large leak is present. If the system is too large, valve off the pump when overload shutdown occurs and continue the pumpdown when the pump cools.

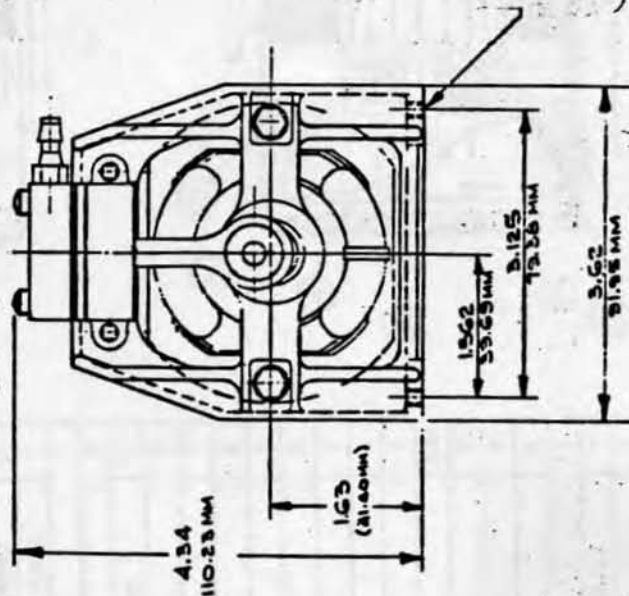
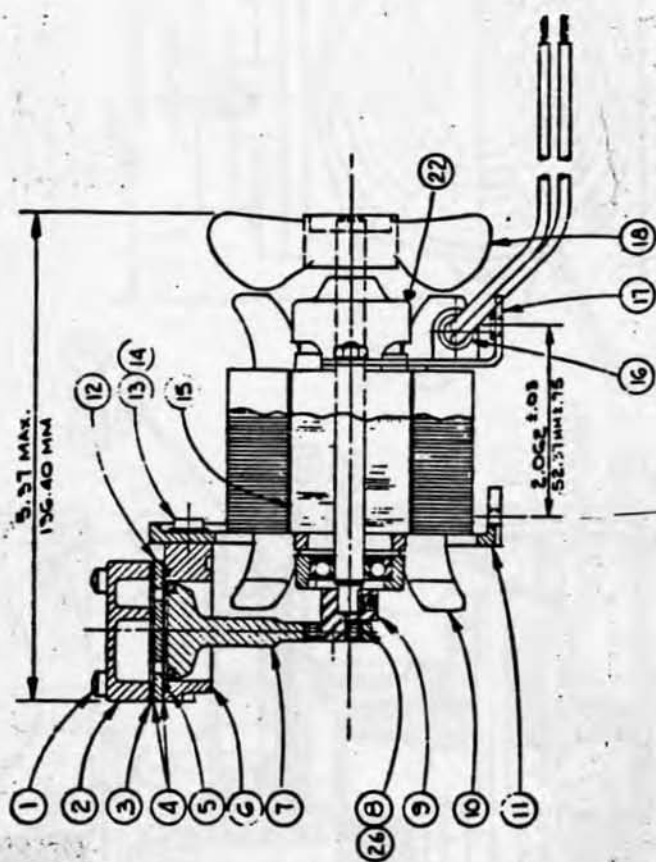
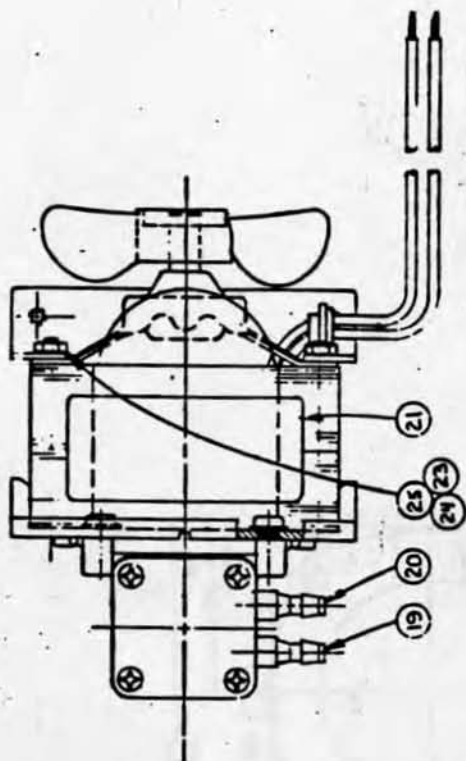
APPLICATIONS

The Tribodyn is designed for general purpose oil-free roughing and backing applications. It's oil-free nature opens a number of design possibilities that are not open to oil-sealed mechanical pumps.

Some care must be taken in the gases that can be pumped. The pump contains aluminum, Brass, Teflon, and Viton. The Tribodyn is somewhat forgiving of particulate bearing gases. Particles up to 100 microns have been pumped successfully.

The Tribodyn is fitted with a barbed hose fitting on the exhaust side of the pump. Gases can be led through a 1/4 in. ID hose from this fitting to a suitable venting system. Tribodyn pumps can be ordered with an optional NW-25 exhaust fitting.

P I S T O N M O D U L E



Key No.	Part No.	Description	Qty.
1	625065	Screw - Head	4
2	600838	Head	1
3	633808	Gasket - Head	1
4	657556	Flapper Valve	2
5	623554	"O" Ring - Cyl. Bk.	1
6	660637	Cylinder Block	1
7	607365	Conn. Rod Ass'y.	1
8	631533	Locite Primer "N"	A/R
9	645874	Ecc., Bearing & Screw Ass'y.	1
10	See Chart	Stator	1
11	See Chart	Support - Motor & Head	1
12	657558	Valve Plate	1
13	625400	Screw	2
14	626330	Lockwasher	2
15	602991	Shaft, Rotor & Bearing Ass'y.	1
16	633808	Snap Bushing	1
17	See Chart	Support - Rear	1
18	See Chart	Fan C.C.W.	1
19	624569	Barbed Fitting - Exhaust (Red)	1
20	624568	Barbed Fitting - Int. (White)	1
21	See Chart	Nameplate	1
22	614349	Bearing Strap	1
23	626402	Screw	2
24	626637	Lockwasher - Int.	2
25	626663	Nut - Mech.	2
26	631532	Locite #609	A/R

DIAPHRAGM MODULE

Item No.	Part No.	Description	Qty.
1	660131	Head	1
2	625109	Head Screw	4
3	633500	Snap Bushing	1
4	633544	Fan - Rear	1
5	825114	Connecting Rod Screw	1
6	631519	Loctite #290	A/R
7	615403	Spacer - Eccentric	1
8	614425	Motor End Cap	1
9	see chart	Stator	1
10	602911	Shaft, Rotor & Brg. Assy.	1
11	see chart	Eccentric & Bearing Assy.	1
12	633439	Valve Plate Gasket	1
13	617045	Valve Keeper Strip	2
14	625160	Screw - Valve Flapper	2
15	621102	Valve Flapper	2
16	654129	Valve Plate	1
17	625141	Valve Plate Screw	8
18	654649	Hold Down Plate	1
19	625208	Stator Screw	2
20	660227	Housing	1
21	608148	Diaphragm	1
22	607139	Connecting Rod	1
23	631510	Loctite #242	A/R
24	614609	Front Cover	2
25	625266	Front Cover Screw	8
26	660584	Filter Assembly	1
27	633545	Fan - Front	1
28	602495	Shaft Rotor Assy. (N.S.)	1
29	646125	Ball Bearing (N.S.)	2
30	625244	Set Screw - Eccentric (N.S.)	1

