

EVEREST

OIL FREE (DRY) ROTARY VANE PUMPS

MODEL DVP-01 'Everest'

INSTRUCTION MANUAL

**INSTALLATION
OPERATION
MAINTENANCE**

WARNING

**DONOT OPERATE WITHOUT
READING MANUAL**

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(ISO 9001:2000 CERTIFIED QUALITY MANAGEMENT SYSTEM)**



**OIL FREE
DRY ROTARY VANE PUMP
MODEL DVP-01 'Everest'**

CAUTION

- **VANE PUMPS ARE MEANT FOR INDOOR INSTALLATION AND SHOULD BE PROTECTED FROM DIRECT SUNLIGHT & RAIN, IF INSTALLED OUTDOOR.**
- **VANE PUMP IS DESIGNED FOR DRY (OIL FREE) OPERATION. DONOT PUT OIL IN THE PUMP.**
- **ENSURE CORRECT DIRECTION OF ROTATION PRIOR TO START UP. SERIOUS VANE DAMAGE MAY OCCUR INCASE PUMP IS ROTATED IN WRONG DIRECTION. DURING INSTALLATION REMOVE BELTS, RUN MOTOR TO VERIFY DIRECTION OF ROTATION AND THEN INSTALL BELTS.**

INTRODUCTION

Everest Dry Vane Pumps have been designed to give you safe, reliable and trouble free service, provided some of the basic maintenance guidelines as set out in this manual are followed. A dry vane pump is a rotating piece of equipment and operators must exercise good judgment and follow proper safety procedures to avoid damage to the equipment or personal injury. Please review and follow all instructions in this manual before attempting to install, start or operate equipment.



Safety

All products offered by Everest have been designed and manufactured for safe operation. However, the responsibility for safe operation rests with those who use and maintain these products. Your safety department should establish a safety program based on OSHA, federal, state & local codes. It is important that due consideration be given to hazards which arise from the presence of electrical power, hot liquids, toxic gases and rotating equipment. Proper installation and care of protective devices is essential to safe pump and system operation. These safety procedures are to be used in conjunction with the instructions contained in this manual.

STORAGE

Keep the pump or system in a cool, dry environment and plug all open ports to keep out dirt and foreign objects.

INSTALLATION

The design of foundation, piping system and plant system design is the responsibility of the purchaser. Everest and its representatives may offer advice but cannot assume responsibility for operation and installation design.

Please consult an authorized dealer or a specialist skilled in the design of plant layout, system piping design and foundation design. The installer should carefully read this manual before installing the equipment. Everest or your local dealer can provide start-up assistance in most instances at a reasonable cost.

Unpacking

Upon receipt of pump or system, immediately inspect for signs of damage. Carefully remove the packing or crating from around the pump or system. Be sure to keep equipment in the upright position. Everest products are shipped F.O.B. factory, which means that any damage is the responsibility of the carrier and should be reported to them.

Lifting

Lift the equipment carefully and with weight evenly distributed. Everest is not responsible for equipment that has been damaged through mishandling or dropping.

Location

Install the unit in a well ventilated and dust free area. The pump or system should be a minimum distance of 3 feet from surrounding walls to allow for checking temperatures, pressures and general servicing. Vane pumps are meant for indoor installation or should be protected from direct rain & sunlight, if installed outdoor.

Mounting

The pump or system should be installed on a level surface in a horizontal position. The foundation must be designed to support the total unit weight, be rigid and substantial enough to absorb any equipment vibration and to permanently support the system base plate at all points. The pump system should be leveled and secured with foundation bolts. Level the base frame using a machinist level. Everest recommends the installation of standard neoprene mounting pads between base and foundation.

Ventilation

Locate the pump or system in an area with sufficient air flow and accessibility. To prevent excessive ambient temperature rise, it is imperative to provide adequate ventilation. Cooling is an important aspect of reliable equipment operation and it is therefore important to install the unit in a reasonably cool area, where temperatures do not exceed 45°C. For higher ambient temperatures, contact the factory.

Electrical Preparation

All system wiring is performed at the factory if a control panel is supplied. Required customer wiring is minimal, but should be done by a qualified electrician in compliance with OSHA, National Electric Code and applicable local electric code concerning isolation switches, fused disconnects, etc. Everest recommends that a main disconnect switch be fitted between the pump or system and the incoming power.

After the electrical wiring connections are completed, check the incoming voltage to make sure that the incoming voltage is the same as the pump or system voltage. Line voltage should be within the voltage tolerance as specified on the motor. **Check the unit for proper motor rotation.** The direction of rotation is marked by an arrow on the pump housing and should be clockwise as viewed from pulley end. Jog the motor by pressing the START button, then the STOP button. If the rotation is incorrect, switch any two of the three main power leads on the contactor inside the control panel. Failure to do so could result in serious equipment damage.

WARNING: Install, ground and maintain equipment in accordance with the National Electric Code and all applicable federal, state and local codes.

Pipe Connections and Sizing

Before installation, remove all protective inserts in the inlet and discharge connections. Piping connected to the unit must be installed without imposing any strain on the unit components. Improperly installed piping can result in misalignment, general operating problems and pump failure. Use flexible connectors wherever necessary. Piping must be cleaned of debris before installation.

The piping system has to be designed to ensure that no liquids such as condensate or liquid carried over from the process can reach the pump. If this possibility exists, a knock-out liquid separator should be installed. Consult the factory for recommendation.

Inlet Piping

All oil-free (dry) pumps are fitted with an inlet filter.

Incase pump is used for suction applications inlet piping should be at least the size of the pump inlet. Install the unit as close as possible to the process to minimize losses due to the length of suction line. If the unit has to be installed further away from the process, be sure that the inlet piping is oversized accordingly to minimize the overall line pressure drop. For more information

consult your dealer or call the factory. **Note: non-lubricated (dry) pumps can operate with closed suction.** If the possibility exists that the inlet gas pumped contains dust or foreign particles, an additional (10 micron or finer) inlet filter should be installed at the inlet port. It is good practice to install this accessory at all times, as it will increase the life of the pump. Contact Factory for recommendations.

Discharge Piping

Discharge piping should be at least the size of pump discharge i.e. 25mm NB. Reducing the pipe diameter will only create additional line losses and increase the overall pressure differential and input power.

Pipe threads / flanges must meet the pump connections accurately & squarely. No attempt should be made to correct misalignment of end connections by springing or cramping the pipe or by forcefully connecting the two. This may result in distorting the pump end plates and thereby causing serious damage to the pump. For similar reasons piping should be supported near the compressor to eliminate dead weight strains on the pump. A flexible bellow is recommended in the discharge pipeline, close to the pump discharge, so as to isolate pump & pipeline vibrations. The discharge inter connecting piece assembly has a provision for mounting of Pressure Relief Valve & Pressure Gauge. Do not operate the pump without these accessories especially the pressure relief valve which is a safety device to prevent overloads due to excessive system back pressures.

Incase using for suction application, do not discharge the exhaust gases from the pump or system into the area where the system is installed. Vapors pulled over from the process could be hazardous. Discharge piping should be at least the size of pump discharge. Everest recommends the installation of a dripleg with tee on the discharge line, to prevent any condensed vapors discharged by the pump from draining back into the pump.

Avoid sharp bends in the suction or discharge line. Use adequate size pipe with large radius bends. This would keep pipeline pressure losses to bare minimum. As a thumb rule the line size should be such that the air velocity is in the range of 20-25 mts/sec. Gate valves, nozzles, etc. should be avoided since they cause turbulence and have not much utility. If at all they must be used, ensure they are sized adequately.

All system piping must be cleaned internally before connecting to the pump.

Multiple Pump Installations

When two or more pumps are connected to a system through a common header, the line sizes should be adequately designed to handle the flow rates. Generous line sizes would result in low line losses and consequently power saving. For pumps and systems operating in parallel on a common discharge, we recommend the installation of a suitable check valve close to the discharge.

THEORY OF OPERATIION

Everest Oil Free (Dry) Rotary Vane Pumps are single-stage air-cooled pumps with no internal lubrication. The construction is heavy-duty and compact, resulting in a small footprint. The high-tech vane material provides extended vane life. Pumps are vee belt driven with foot mounted motor. Rotation of pump rotor traps air/vapor between rotor vane segments. As rotation continues, air/vapor is drawn into suction side & forced out the opposite side against the existing pressures. The differential pressure developed, therefore, depends upon the resistance of the connected system. These pumps being positive displacement type do not develop pressure within the casing but the discharge pressure depends upon the system resistance/back pressures. The air delivered is 100% Oil Free.

The pumping capacity of a dry vane pump, operating at constant speed remains relatively independent of inlet and discharge pressure variations. These pumps are constant volume machines, which deliver a fixed discharge against the system backpressure. It is, therefore, essential to ensure that minimum pipeline restrictions, at the inlet and discharge, are imposed.

Adequate size piping and large radius bends ensure minimum line losses resulting in higher efficiency and low power consumption. Sudden change in pipeline cross section should also be avoided. To change capacity, it is necessary either to change speed (energy saving) or vent some of the air into atmosphere (not energy saving). The air must not be re-circulated from the discharge to suction as it may result in over heating. **No attempt should ever be made to control the capacity of pump by means of throttle valves in the intake or discharge piping.** This increases the power load on the motor and may seriously damage the pump. There is an increase in the discharge air temperature due to heat of compression. As a thumb rule the discharge air temperature increases @10°C for every 0.1 Kg/cm² of ΔP above the inlet temperature.



START-UP PROCEDURES

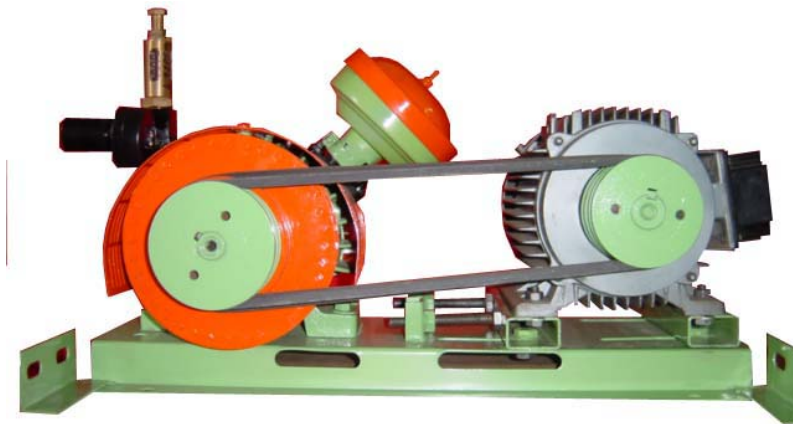
1. Check the unit & all piping for foreign materials & clean if required.
2. Check the flatness of the feet and alignment of the drive. Feet that are bolted down in a bind can cause distortion of the end plates & casing, disturbing the internal clearances.
3. If pumps are V belts driven, check the belt tension and alignment. Over-tensioned belts create heavy bearing loads, which leads to premature failure. Mis-aligned V belts can cause the rotor to rub against the side plates, resulting in overheating and jamming on operation. Misaligned couplings can cause premature bearings/shaft failures.
4. Be sure adequate drive guards are in place to protect the operator from severe personal injury from incidental contact.
5. With motor locked out, turn the drive shaft by hand to ensure free rotation of the pump.
6. "Jog" the unit with the motor a few times to check direction of rotation and to be certain it turns freely and smoothly (press START then STOP). If the direction is backwards, switch any two of the three leads at the power connection.

WARNING: ENSURE CORRECT DIRECTION OF ROTATION PRIOR TO STARTUP. SERIOUS VANE DAMAGE MAY OCCUR INCASE PUMP IS ROTATED INWRONG DIRECTION.

7. Start the unit and operate for 15 minutes at no load.
8. Apply the load and observe the unit for one hour. Check frequently for abnormal noise / over heating / overloading during the first day of operation. If malfunctions occur, do not continue to operate.

SHUT-DOWN PROCEDURE

To stop the pump unit, press the STOP button.



MAINTENANCE

WARNING: Before attempting any maintenance, disconnect all power from the unit by switching off the main breaker or disconnect switch.

External Inlet Filter

Check after first 8 hours of operation. Clean or replace inlet filter element every 1000 hours depending on application or if excessive pressure drop is noticed. Note: in some application it may be required to clean inlet filter more often.

CAUTION: Be careful not to allow accumulated foreign material to fall in the pump suction opening when removing the filter cartridge.

Bearing and Seals

Internal pump components do not require preventative maintenance. Bearing are self lubricating type.

Vanes

Check the vane width every 3000 hours of operation & replace incase required.

MAINTENANCE SCHEDULE

To help ensure trouble-free equipment operation a basic maintenance schedule consisting of the following system checks is recommended.

First 8 hours operation

Check inlet filter element.

Daily

Check inlet filter if necessary, depending on application.

Weekly

Inspect inlet filter and clean if necessary.

500 hours operation

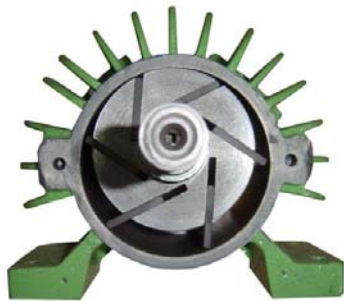
Remove debris from pump body & motor fan guard.

1000 hours operation

Replace inlet filter.

3000 hours operation

Replace vanes.



ACCESSORIES AND PROTECTIVE DEVICES

The following accessories & protective devices are available for **Everest oil free (Dry) Rotary Vane Pump**.

- **Flexible Connectors (optional):** are used in piping systems to eliminate vibration transmission from machinery throughout the piping network. If ordered, Everest uses Stainless Steel flexible connectors on the oil free (dry) rotary vane vacuum pump.
- **Vibration Isolators (optional):** are used to eliminate vibrations, noise and shock transmission from machinery to the floor. Floor-mount type vibration isolators are used for rotary Vane pumps.
- **Inlet Filter (standard on systems):** An inlet filter is installed as standard on the Everest Oil Free (Dry) Rotary Vane Pumps. The inlet air filter should be cleaned every week. Choked filter would result in excessive power and overheating of the pump. Replace filter every three months or earlier.
- **Pressure Relief Valve (essential):** This valve is essential to protect the pump from exceeding the maximum allowable pressure level. Everest systems include this item, but valve must be purchased separately when ordering bare pumps only.
- **Vee Belts:** Everest Dry Vane Pumps are usually supplied with set of Vee Belts for all motor driven units consisting of three number vee belts i.e. two number vee belts for the pump & one number vee belt for the pump cooling fan. For proper matching & performance make sure that the pump drive belts are under normal tension & the fan drive belt may be left little loose incase all three cannot be adjusted to same tension.
- **Non Return Valve (Optional):** Non-return valve may be fitted close to the discharge port to prevent the system fluid from entering he pump or to prevent the pump from running in the reverse direction when switched off under load conditions. In multiple pump installations when two or more units discharge into a common header, use of non-return valves is recommended. One non-return valve should be located in each pump discharge line. Properly installed, they will protect against damage from reverse rotation caused by air back flow through an idle pump.

CAPACITY CONTROL

The capacity of the pump can be varied by changing the pump speed, however, confirmation to the input power and maximum speed must be made prior to doing so. No valves should be put into the suction/discharge line to regulate the air capacity. One may, however, vary the discharge air capacity by venting out some of the air into atmosphere.

TROUBLESHOOTING

The chart on this page is intended as a basic troubleshooting guide. We recommend that you consult your local dealer for service. Each Everest rotary vane pump unit is tested and checked at the factory. Always indicate unit model and serial number when calling.

WARNING: Before attempting any repairs, disconnect all power from the unit by switching off the main breaker or disconnect switch.

Trouble shooting guide

| | PROBLEM | CHECK |
|---|---|---|
| 1 | Unit will not start. | Check reset button on control panel. Overloads may have been triggered. Check power. Make sure that supply voltage matches motor voltage. Check motor overload in control panel. Overload settings may be too low. Set overload setting in motor starter in accordance with the motor nameplate data. Check fuses. Fuses may have blown. Check to see if motor turns. Pump or motor may be seized. Contact the factory. |
| 2 | Unit/motor will not turn. | Pump or motor may be seized. Contact the factory. |
| 3 | Unit is not giving air / drawing vacuum | Check if motor rotation is correct by comparing it to the arrow on the motor or pump housing. If incorrect switch any two of the three main power leads on the contactor inside the control panel. If an inlet filter is installed, check to see if filter element needs to be replaced. |
| 4 | Unit is overheating. | Check line pressure with rated pressure. Make sure that pump is being cooled correctly. Check that pump is located in well-ventilated area. Maximum ambient temperature for the rotary vane vacuum pumps is 45°C. All standard pumps are air-cooled. Clean motor and pump air grills if needed. Check internal inlet filter cartridge, clean or replace. |
| 5 | Unit is running noisy. | Foreign particles may have carried over into pump causing damage to the vanes or other internal parts. Check bearing. If bearing are noisy, contact the factory for replacement instructions. One of the vanes in the rotor may be stuck. Contact the factory for instructions. |

CUSTOMER SERVICE & INFORMATION

Thank you for investing in Everest quality. The Everest reputation for rugged dependability has been earned by over 25 years of service in demanding, industrial operations where downtime cannot be tolerated and efficient blower performance is expected. Your Everest Pump is a precision-engineered machine that has been carefully manufactured and thoroughly tested at the state-of-the-art Everest Blowers factory.

As with other precision machinery, there are several relatively simple installation, operation and maintenance procedures that you must observe to optimum blower performance. There is no guesswork in the manufacture of your highly advanced Everest Blower and there must be none in preparing the Blower to get the job done in the field.

The purpose of this manual is to help you properly install, operate and maintain your Everest Blower. It is essential that you review all sections of this manual in preparation for installing your blower. Follow the instructions carefully and you will be rewarded with trouble free Everest service.....year in and year out.

WHERE TO CALL FOR EVERET BLOWER ASSISTANCE

For prompt professional Everest service always contact your authorized Everest Distributor first. If you do not know your authorized Everest Distributor, contact the numbers below for immediate assistance.

EVEREST CUSTOMER SERVICE / FACTORY SERVICE DEPARTMENT

EVEREST BLOWERS
424, Modern Industrial Estate, Phase-1,
Bahadurgarh-124507, Haryana, India.
Telefax: 91-1276-267582, 268238, 268442
Email: info@everestblowers.com

EVEREST HEADQUARTERS

EVEREST TRANSMISSION
B-44 MAYAPURI IND. AREA, PHASE-I,
NEW DELHI-110064, INDIA.
Telefax: 91-11-28114944, 28114955, 28116307, 28117469
Email: eblowers@vsnl.com

Thanks.....for the privilege of serving you with dependable Everest quality

Dearest Everest Customer,

Thank you for your purchase of Everest Products. To help us improve the products and services we provide you, please complete and return the questionnaire by fax. All completed feedback forms shall receive a free desk top accessory with compliments from Everest.

TELEFAX NO. +91-1276-267582, 268238, 268442
DELHI OFFICE NO. +91-11-28114944, 28114955, 28116307, 28117469

Everest wants to know what you think.

1. How did you first become aware of Everest's products?

- (a) Advertisement (b) Colleague's Recommendation (c) Internet
(d) Trade Show (e) Others _____

2. What industry are you in?

3. What convinced you to purchase Everest products?

- (a) Prior experience using Everest products
(b) Product Quality
(c) Technical Support
(d) Knowledgeable sales people
(e) Service support
(f) Product reliability

4. Please indicate what products / services you use.

- | | | | |
|----|--|-----|----|
| 5. | (a) Did you find it easy to your order with us? | Yes | No |
| | (b) Did you receive your order in time? | Yes | No |
| | (c) Is the shipment complete & free from damage? | Yes | No |
| | (d) Are you satisfied with the workmanship? | Yes | No |
| | (e) Is the documentation complete? | Yes | No |
| | (f) Is it performing up to your expectations? | Yes | No |

6. With respect to the above items, would you please indicate by its corresponding question number, in which areas can Everest most improve? (Question number)

Thanks.....for the priviledge of serving you with dependable Everest quality

7. Inorder for us to maintain accurate records & minimize duplication of this questionnaire, we would appreciate if you will complete the following (or kindly attach your business card).

Name: _____

Title: _____

Company: _____

Address: _____

City: _____

State: _____

Pin Code: _____

Country: _____

Phone (with country & area code): _____

Fax (with country & area code): _____

Mobile: _____

Email: _____

Website: _____

8. Comments: _____

Thank you for your time and input.

Thank you for purchasing your equipment from Everest. In our pursuit of complete customer satisfaction we would appreciate your comments on the usefulness and readability of this manual. Please fax or mail this sheet to Everest Blowers, 424, Modern Industrial Estate, Phase-1, Bahadurgarh, Haryana – 124507, India. Kind Attention: Technical Publications Department. Our Telefax Numbers are 91-1276-267582, 268238, 268442. If we can be of any assistance to you, feel free to contact us at 91-1276-267582, 268238, 268442 Sunday thru Friday, 9:00 AM to 5:30 PM Indian standard time.

Thanking you again,

Manager,
Technical Publications.

Everest Model No. _____ Everest Order No. _____

Revision Date of Manual _____

Please rate the following items:

| | | | |
|--|------|------|------|
| Compared to similar manuals, this manual is..... | Good | Fair | Poor |
| Ease of reading is..... | Good | Fair | Poor |
| Level of information is..... | Good | Fair | Poor |
| Photographs and/or illustrations are..... | Good | Fair | Poor |
| The amount of information was..... | Good | Fair | Poor |

Comments: _____

Please fax to 91-1276-267582, 268238, 268442.

Your cooperation is greatly appreciated.

Thanks.....for the priviledge of serving you with dependable Everest quality