# IMPORTANT

## FISCHER PUMPS ARE NOT TO BE USED ON AMMONIA OR LITHIUM BROMIDE

*(salt water)* **SYSTEMS.** *Pump maintenance is the responsibility of the owner.*

Hydroflouric and hydrochloric acids and moisture collect in the oil. Left sitting in a pump, they act as an abrasive on internal surfaces, rusting and corroding them.


*Figure 1*

*Figure 2*

## CLEANING AND TESTING YOUR VACUUM PUMP

One of the easiest ways to spot if your pump is in need of a good cleaning is to look at the sight glass. If the oil looks milky, rusty, or full of debris, then the inside of the pump is in worse shape *(Figure 1)*.

To clean, start the vacuum pump and allow it to run for about 15 minutes to warm up the oil. Make sure that you have allowed enough working room to safely drain and capture the oil. After the oil has stopped dripping, tilt the pump forward to remove any remaining excess oil *(Figure 2)*. Let sit for a few minutes and return the pump to its normal running position. Repeat tilting forward. Close drain valve. Dispose of contaminated oil properly.

*Figure 3*

Once the oil has been completely removed, stand the pump on the nose of the cover *(Figure 3)* and remove either the two rubber feet from the bottom of the pump or remove pump base (depends on the age of the pump which option is available).

Next, turn the pump on to the motor end *(Figure 4)* and remove the 6 socket head cover screws holding the cover in place *(Figure 5)*. Remove the cover from the pump and wipe the inside surface with a dry, clean rag. The sight glass is more difficult to clean. Try pouring in some solvent and using a pipe cleaner.

*Figure 4*



Next, remove the oil deflector which is held in place with a socket head screw *(Figure 6)*. Wipe with a clean, dry rag. If needed, a wire brush can be used to clean any discoloration to metal parts (this will not affect the pump's performance once the cleaning is complete). Remove the cover seal and clean cover seal *(Figure 7)*. Wipe the outside of the cartridge's surfaces with a clean, dry rag. A wire brush can be used on all surfaces including the exhaust valve and the intake relief valve. If they are discolored, they will still perform fine.

*Figure 5*

## DO NOT

**DISTURB THE FOUR CARTRIDGE BOLTS OR THE TWO SMALLER HEX HEAD SCREWS** *(Figure 8)*.

*These are the setting screws.*

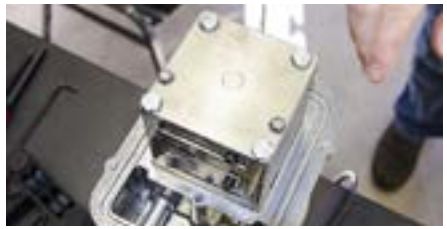


*Figure 8*

*Figure 6*

*Figure 7*

If the intake relief valve set or the exhaust valve set is damaged and needs replacing, these items can be ordered under Part Number PR-18. It is best to replace after completing the cleaning of the cartridge. Pay attention to the order in which they are assembled for correct reinstallation.

Reassemble the oil deflector *(Figure 6)*. Clean out the channel for the cover seal with a clean, dry rag and smear some grease into the channel. This will help hold the cover seal in place for reinstallation of the cover. If the cover seal seems a little tight, stretch the seal a little and try again. All seals in our pumps are designed to be reused. Reset the cover in place and replace the cover screws. Tighten in a crisscross pattern. Reattach feet or base.

Next, return the pump to its normal running position and place where you drained the oil. Open the drain valve, the 3/8" port on the intake, and the isolation valve. Have 1/3 cup of clean oil ready. Start the pump and pour the clean oil into the intake port. Let the pump run for 5 to 6 seconds and then shut the pump off. Drain the oil, tipping the pump forward *(Figure 2)* to completely drain. Close the drain valve and dispose of spent oil properly after the flushing is complete.

## DIGITAL MICRON GAUGES

There are three main complaints that are stated on the returns that JB receives from the DV-22N and DV-24N. First, “inaccurate readings”. Second, “erratic readings”. Third, “will not hold a vacuum”. Each of these complaints involves both the understanding of the gauge functions and the principles of vacuum.

### INACCURATE READINGS:

Please note, for the DV-22N and DV-24N we have a stated accuracy that references AVERAGE accuracy. Thus, between 250 and 6000 microns the unit is +/-10% AVERAGE accuracy and between 50 to 250 microns it is +/-15% AVERAGE accuracy. This does not mean our gauge has a large accuracy discrepancy.

The term AVERAGE is an important part of this accuracy description. The number of increments displayed on the JB digital micron gauge between 50 and 250 microns are 97. Between 250 microns and 6000 microns, there are 232 increments. If you take a comparison reading between the DV-22N and the MKS Baratron master gauge at each of the increments displayed on the digital micron gauge the average accuracy would be +/-10% in one range and +/-15% the average in the other range. Also, the number of increments decrease from the lower micron readings to the higher micron readings.

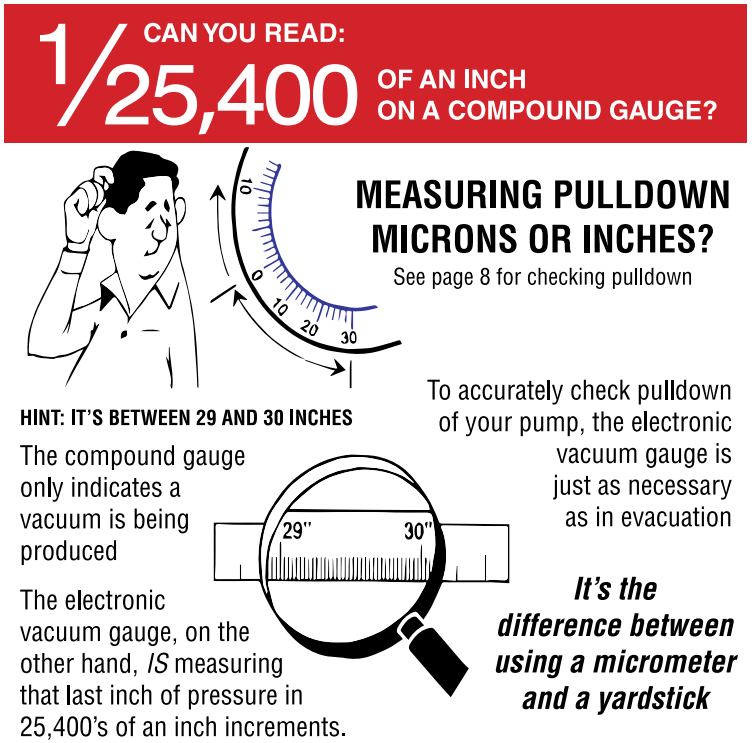
For example, from 250 to 300 microns there are 16 increments, from 650-700 microns there are only 7 increments, between 1000 and 1050 there are 4 increments, and between 4000 and 4500 there are 4 increments. So at 650 to 700 microns the gauge has the ability to show 650-658-667-675-680-685-690-695. But at the micron range of 4000 to 4500, the gauge only displays 4125-4250-4375. This is important because when the system has an actual micron level of 4260, the digital micron gauge will show a reading of 4375 because the threshold for the lower value that the gauge displays, 4250, has not been reached. Once that threshold has been reached, the gauge will display that lower value of 4250. Because the readings in these higher micron ranges only need to show the movement through them , the difference between 4375 and 4250 is of no concern in reaching the ultimate vacuum desired. This is why the JB DV-22N is designed with the most increments in range that are going to be the most critical in determining if the system is ready for charging.

If you understand the size of a micron, then small differences in ranges is nothing to be concerned about. For instance:

| MICRON RANGE: | MICRON DIFFERENCE: |
|---|---|
| 60-100 | 10-20 |
| 200-350 | 30-40 |
| 500-700 | 50-60 |
| 900-1500 | 80-100 |
| 2500-4000 | 200-300 |



## DIGITAL MICRON GAUGES (CONTINUED)




When a DV-22N comes in for repair, it is compared to a secured system set up with a N.I.S.T. Certified analog gauge (DV-6 Hastings). Usually starting around (1)60-100 microns, then (2)200-350 microns, then (3)500-700 microns, then (4)900-1000 microns. These ranges of vacuum are the most common that people work with to determine deep vacuum. We have been comparing the DV-22N to the N.I.S.T certified gauge on a secured system for a number years and has proven to be highly accurate in all four ranges of vacuum. The average accuracy as stated earlier in this section has proven to be consistent against this measure.

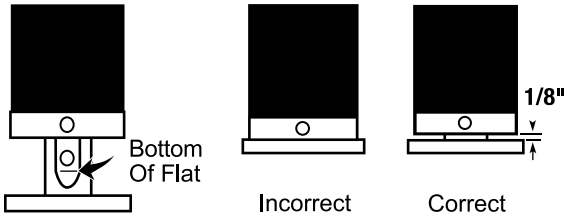
### ERRATIC READINGS:

There are three issues involved in the discussion of erratic readings. One is the understanding of the gauge’s displayed micron increments that was just discussed. The second involves the re-sampling period. The third is the environment inside the system being evacuated. When the DV-22N is turned on, the display will show “JB” and the sensor will start to calculate the ambient temperature.

Once the gauge has finished calculating the ambient temperature, it will display the number “1” if it is not introduced to a vacuum level of 9000 microns or less.

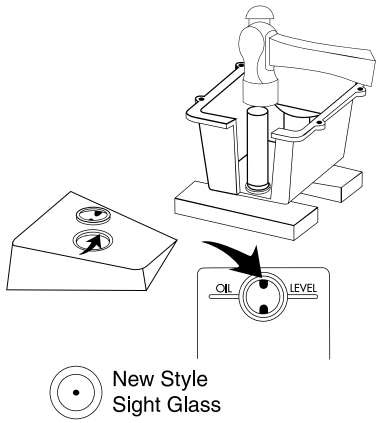
## REPLACING COUPLER (MOTOR REMOVED)

Coat setscrew threads with removable thread sealant. Align coupler setscrew with flat surface of cartridge shaft. Tighten screw so coupler slides on to shaft but stops at the bottom of the flat. Tighten until screw head is flush with coupler surface (approx. 40 in. lbs.).

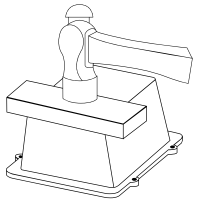



## SIGHT GLASS REPAIR

**STEP 1:**
With cover off of the pump, lay on two blocks of wood. Pop out the sight glass using a broom handle or other objects as a punch. For DV-85 series, DV-142 series, or DV-200 series use a 1" diameter punch.




**STEP 2:**
Clean the surface with acetone or nail polish remover. Put loctite on the inside surface of the hole.



**STEP 3:**
Install the new sight glass from the outside. The hole position does not matter with the new style sight glass.

**STEP 4:**
With the wood block covering the sight glass, tap the sight glass into place. Replace the cover on the pump.

## TROUBLESHOOTING: POOR PULL DOWN

**Possible cause:** Check oil level **Possible cause:** Missing or damages seals or o-rings

In order for your pump to pull to a near perfect vacuum, oil must be clean and moisture-free throughout evacuation.
**STEP 1:** With isolation valve closed, start pump. Oil level should be to the top of the oil level line embossed on the front of the pump's cover. Just a teaspoon low can affect the ultimate vacuum.
**STEP 2:** Flush pump and refill with fresh oil. See "Cleaning and Testing Pump" on page 2 for review.
**STEP 3:** Check all connections to pump and system for damaged or missing o-rings. If brass adapters are being used, make sure copper gaskets are in place.

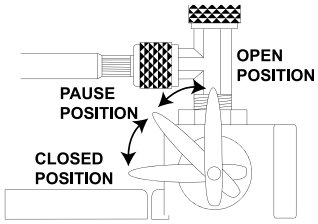


## TROUBLESHOOTING: PUMP HARD TO START

**Possible cause:** Pump has not been shut down properly.

**STEP 1:** Remove 1/4" cap
**STEP 2:** Move blank-off valve to OPEN position
**STEP 3:** Turn pump on
**STEP 4:** Run 2 to 3 seconds and close blank-off valve

***READ THE INSTRUCTION MANUAL FOR PROPER START UP AND SHUT DOWN PROCEDURES.***
**STEP 1:** Close blank-off valve
**STEP 2:** Open gas ballast valve
**STEP 3:** Run 2 to 3 seconds
**STEP 4:** Shut pump off
**STEP 5:** Close gas ballast valve
*NOTE: See previously discussed topic "Breaking Vacuum"*




## TROUBLESHOOTING: MOTOR JUST HUMS

**Possible Cause:** If pump has been dropped, the armature in motor may be out of alignment with the motor's bell housing.

**STEP 1:** Set pump on bench with motor standing up (Figure 3 of this booklet)
**STEP 2:** Loosen the four motor bolts
**STEP 3:** Shake motor and re-tighten motor bolts
**STEP 4:** Start pump

*If this doesn't work, the pump most likely will need to be sent in for repair.*

## TROUBLESHOOTING: MOTOR RUNS BUT NO SUCTION

**Possible Cause:** Flexible coupler is either broken or loose.

**STEP 1:** Set pump on bench with motor standing up *(Figure 3)*
**STEP 2:** Look between motor and pump housing from the bottom to see if the flexible part of the coupler is split or broken. If it is broken, see "Flexible Coupler" section of this booklet. If the coupler is not broken, the coupler may be spinning on either the shaft to motor or cartridge.
**STEP 3:** Go to www.jbind.com and on the tool bar go to Technical. Select instruction sheets from the drop down menu and go to cartridge replacement instructions. These instructions are good for replacing: flexible couplers, motors, shaft seals, and cartridges.

## CROSS REFERENCE OF VACUUM MEASUREMENTS
## BOILING TEMPERATURES OF WATER AT CONVERTED PRESSURES

| TEMP. F° | MICRONS | INCHES OF HG VACUUM | PRESSURE POUNDS SQ. IN. |
|---|---|---|---|
| 212 | 759,968 | 0.00 | 14.696 |
| 205 | 535,000 | 4.92 | 12.279 |
| 194 | 525,526 | 9.23 | 10.162 |
| 176 | 355,092 | 15.94 | 6.866 |
| 158 | 233,680 | 20.72 | 4.519 |
| 140 | 149,352 | 24.04 | 2.888 |
| 122 | 92,456 | 26.28 | 1.788 |
| 104 | 55,118 | 27.75 | 1.066 |
| 86 | 31,750 | 28.67 | 0.614 |
| 80 | 25,400 | 28.92 | 0.491 |
| 76 | 22,860 | 29.02 | 0.442 |
| 72 | 20,320 | 29.12 | 0.393 |
| 69 | 17,780 | 29.22 | 0.344 |
| 64 | 15,240 | 29.32 | 0.295 |
| 59 | 12,700 | 29.42 | 0.246 |
| 53 | 10,160 | 29.52 | 0.196 |
| 45 | 7,620 | 29.62 | 0.147 |
| 32 | 4,572 | 29.74 | 0.088 |
| 21 | 2,540 | 29.82 | 0.049 |
| 6 | 1,270 | 29.87 | 0.0245 |
| -24 | 254 | 29.91 | 0.0049 |
| -35 | 127 | 29.915 | 0.00245 |
| -60 | 25.4 | 29.919 | 0.00049 |
| -70 | 12.7 | 29.9195 | 0.00024 |
| -90 | 2.5 | 29.9199 | 0.00005 |
| --- | 0.00 | 29.92 | 0.00000 |