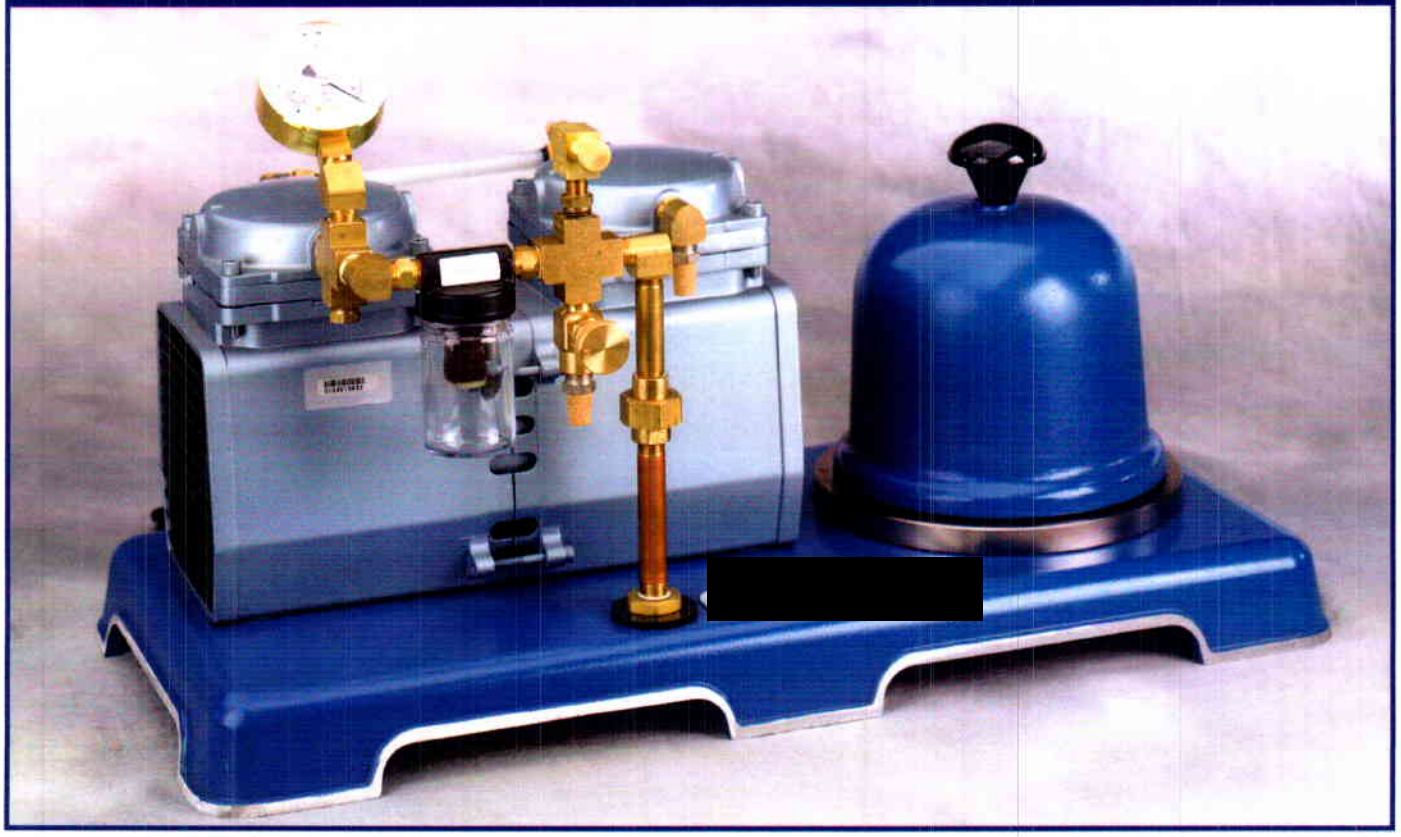





Operating Manual



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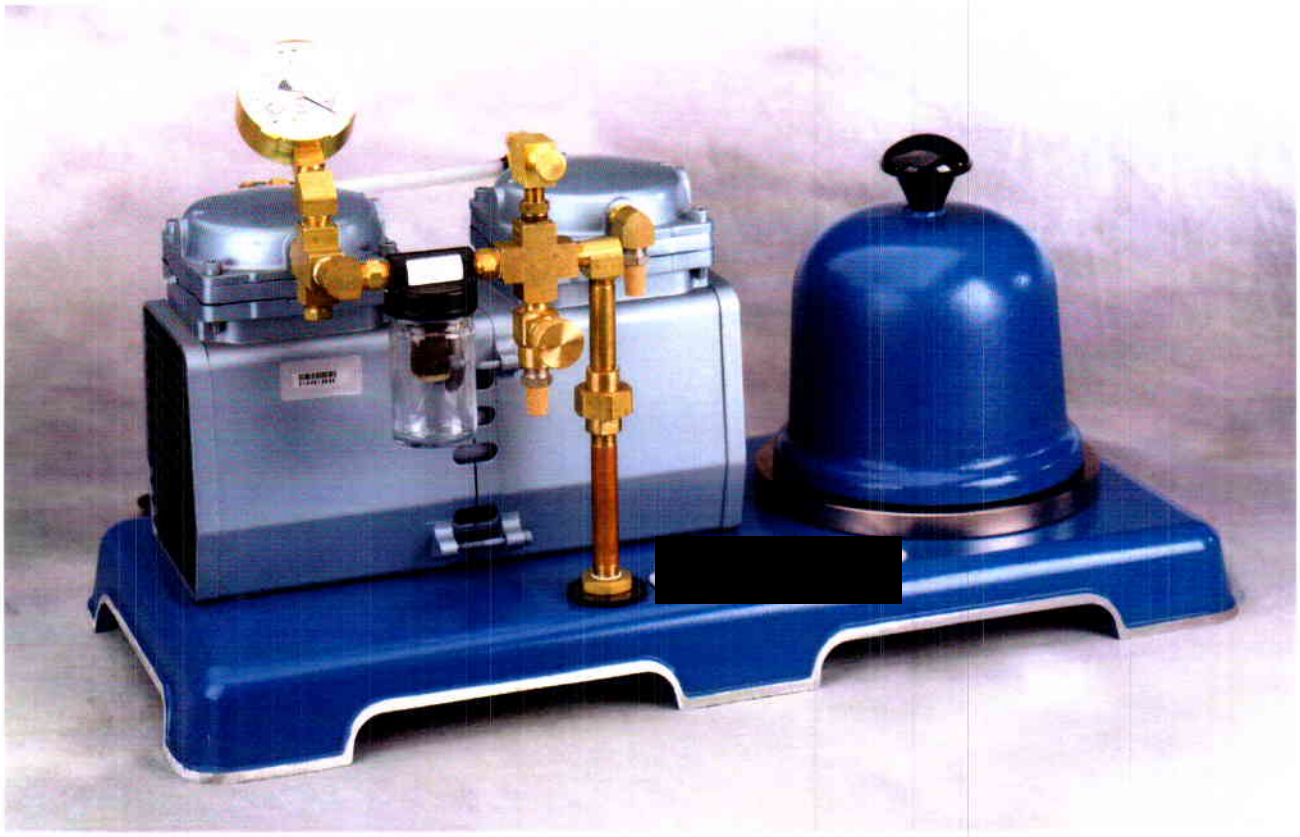
Introduction



Hydrogen gas is a major problem in aluminum foundries. With system you get a highly accurate method of monitoring the gas levels in molten aluminum on a continuous basis. The has proven to be a valuable tool for today's quality-conscious aluminum foundry.

features:

- Virtually indestructible vacuum chamber
- Light-weight aluminum base
- Precision-machines, nickle-plated vacuum chamber base
- Twin diaphragm vacuum pump
- Can quickly obtain 28.5 inch of Hg.
- Quick vacuum release
- Adjustable gauge with calibration port for manometer hook-up (Gauge pre-calibrated at factory and checked at 26 & 28 inches of Hg)

Operating Instructions

To insure safe, accurate and trouble-free operation of the read all of the following instructions carefully before starting unit. Visually inspect unit for missing or broken parts.

1. Read the vacuum gauge calibration instruction information. Check gauge calibration. Re-calibrate if necessary.
2. Heat metal crucible to approximately 400 F. When the crucible has reached 400 F, coat all surfaces with an insulating mold coating (vermiculite/sodium silicate). Follow immediately with a release type mold coating (graphite/sodium silicate), coating all surfaces.
3. Locate equipment adjacent to metal being sampled. Preferably within 4 to 6 feet of furnace.
4. With crucible held in tongs, skim surface of molten metal 2 to 3 times to remove oxides and to preheat crucible prior to taking sample. Take sample by dipping crucible into molten metal and filling it.

CAUTION: *Make sure crucible is completely dry before skimming or dipping in molten metal.*

NOTE: *The sample should be taken from the exact area of production ladling, because the gas level in the dip-out well varies. However, for operator's safety, the sample should be taken from and area of the dip-out well that is not being disturbed by the addition of a gas or tablet (i.e. nitrogen, Nucleant 2, Napak, etc.).*

5. Place crucible with sample on refractory disc in vacuum chamber base place and cover with vacuum chamber.
6. Turn switch on to start vacuum pump, and hold under reduced pressure for approximately seven (7) minutes.

NOTE: *When testing aluminum for permanent mold castings, set vacuum at 26 inches of Hg. For sand castings set at 28 inches of Hg.*

7. After approximately seven (7) minutes have elapsed, turn vacuum pump off and release vacuum pressure by depressing vacuum release button. Lift vacuum chamber and remove crucible with sample.

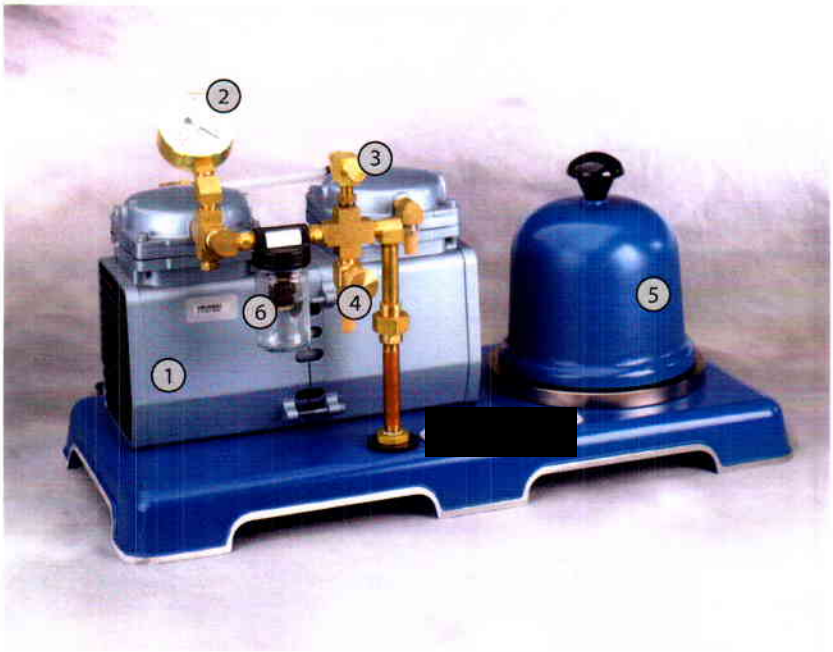
NOTE: *The vacuum chamber should always be placed on the base plate after usage, to protect the O-ring from damage.*

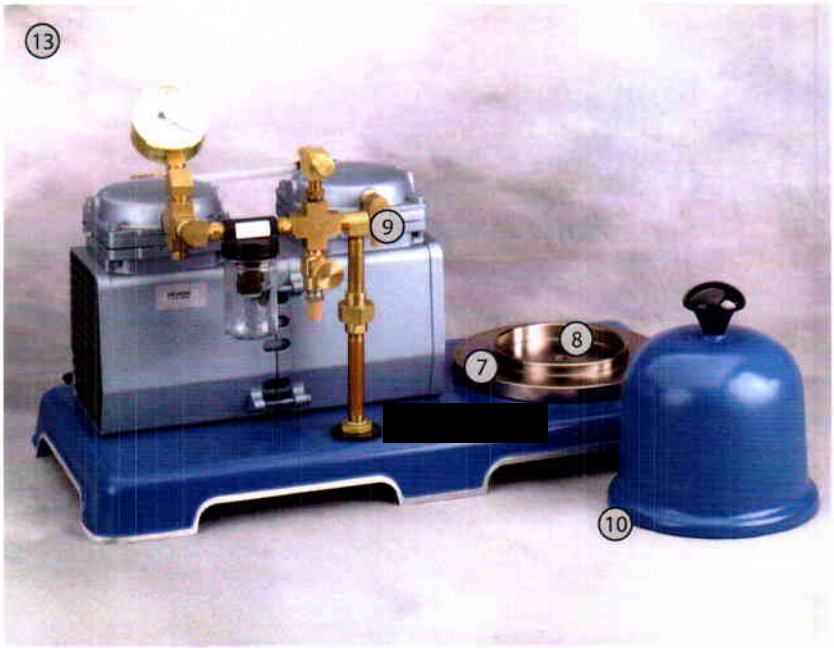
8. Remove sample from crucible, and place under water to cool.
9. Saw sample in half, and buff one half with 120 grit abrasive on either a belt or disc sander.
10. Sand blast buffed surface, and compare hole sizes in sample with a previously determined standard.

CAUTION: *DO NOT attempt to restart the vacuum pump under the presence of vacuum, because damage to the pump may result. Always depress the vacuum release button prior to restarting pump.*

The vacuum pump supplied with this unit is manufactured to be oil-less. DO NOT attempt to use oil in the air filter.

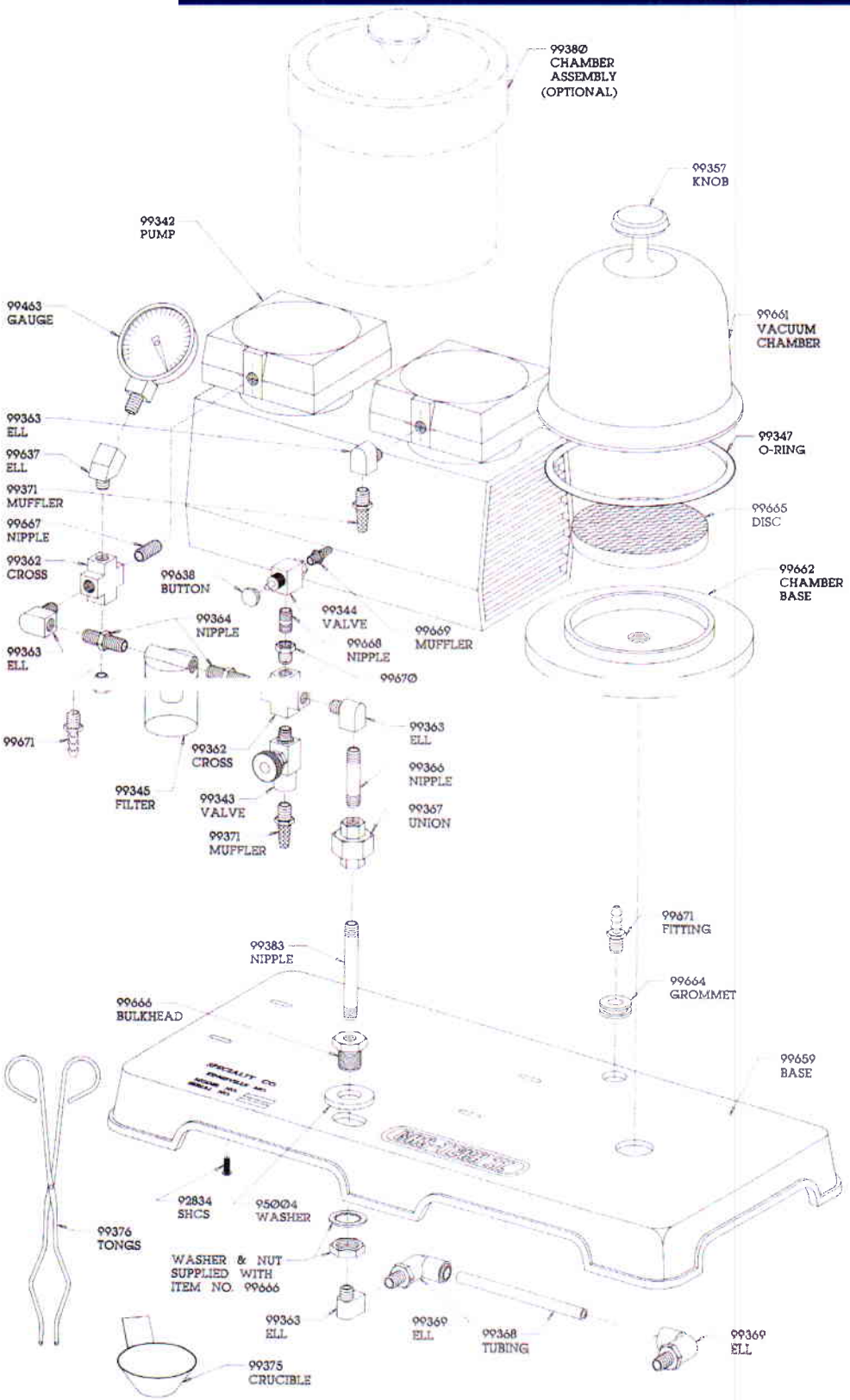
Parts Diagram





1. Vacuum Pump
2. Vacuum Gauge
3. Vacuum Release Button
4. Vacuum Adjustment Knob
5. Vacuum Chamber
6. Gas Filter & Jar
7. Vacuum Chamber Base Plate
8. Refractory Disk
9. Exhaust Muffler
10. O-Ring (*not shown*)
11. Crucible (*not shown*)
12. Tongs (*not shown*)
13. Gas-Tech II Instrument

Instrument Diagram



Vacuum Gauge Calibration Instructions

The vacuum gauge was calibrated at assembly with a mercury manometer. However, due to variations in altitude between place of assembly and place of use, the gauge should be re-calibrated prior to use. Also, due to changes in weather patterns and barometric pressure at the place of use, the calibration should be rechecked periodically. The following instructions must be followed carefully and completely to insure standard gas samples and to protect the unit.

1. Remove hex plug from calibration port. Remove barbed fitting from storage location on base, and carefully apply sealant to threads. Insert fitting into port and tighten with wrench to form vacuum tight seal.
2. Set mercury manometer in absolutely vertical position. Adjust mercury level to zero (0).
3. Attach one end of the rubber tube to barbed fitting at calibration port and the other end to barbed fitting on Mercury Manometer.
4. Turn on. When pump has achieved complete vacuum, compare gauge reading with manometer reading.

NOTE: *If gauge adjustment is required:*

A. Remove lens from gauge.

B. Insert screwdriver in slot of pointer retaining disc.

C. Hold disc stationary, and move pointer to same reading as manometer. CAUTION: DO NOT turn pointer retaining disc. Disc is fastened directly to pointer drive linkage. Turning disc may damage linkage, rendering gauge useless.

D. Replace lens.

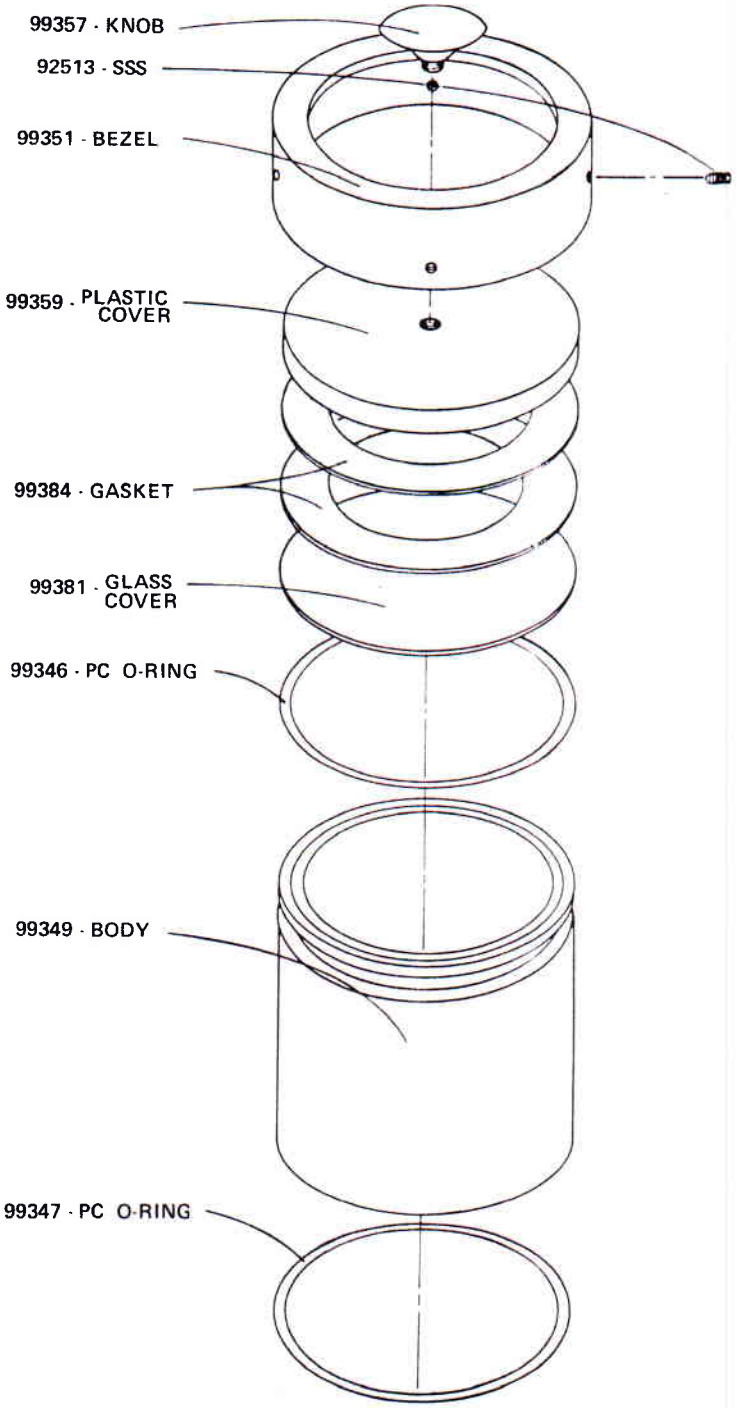
5. Turn off and release vacuum.
6. Disconnect rubber tube. Remove barbed fitting from calibration port and return to storage location. Apply pipe sealant to hex plug and tighten with wrench in calibration port.
7. is ready for operation.

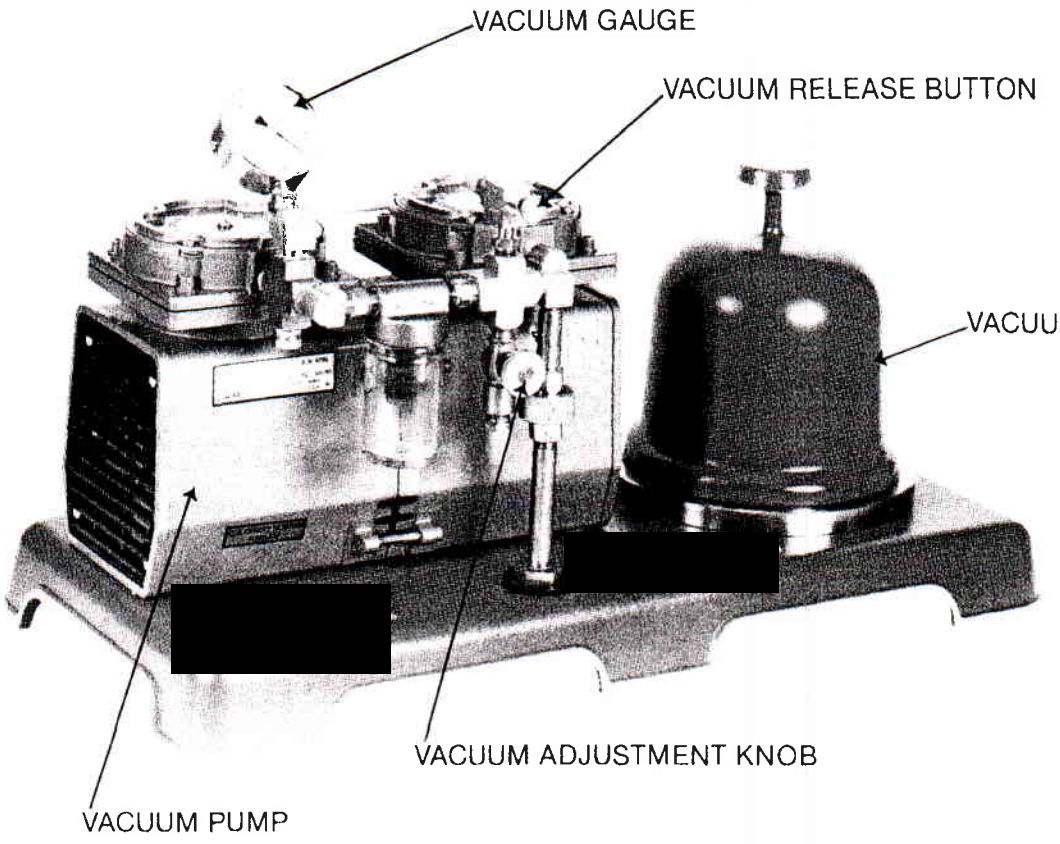
Optional Vacuum Chamber Assembly Instructions

This vacuum chamber consists of several parts that must fit together correctly to obtain a vacuum tight assembly. The final step of assembly must be done with the chamber placed on vacuum chamber base plate and the vacuum pump running.

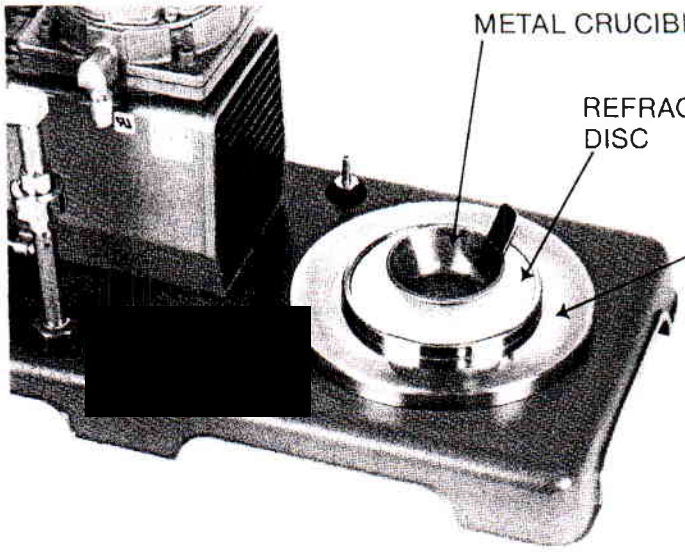
1. Clean dirt and oil out of the O-ring grooves at both ends of the vacuum chamber body.
2. Place several spots of super glue or equivalent in large O-ring groove in bottom of body and install the large O-ring in groove.
3. Place thread sealant on threads of knob and install knob on plastic cover.
4. Install four (4) set screws in bezel. Turn screws in until they are flush with the inside surface of bezel.
5. Place body with O-ring on base plate.
6. Place parts on top of body in order shown on drawing. **DO NOT** tighten set screws.
7. Turn on and pull vacuum to a minimum of 26 inches Hg. This will help locate and seal the parts.
8. Tighten four (4) set screws in bezel evenly.
9. Turn off and release vacuum. Vacuum chamber is ready for operation.

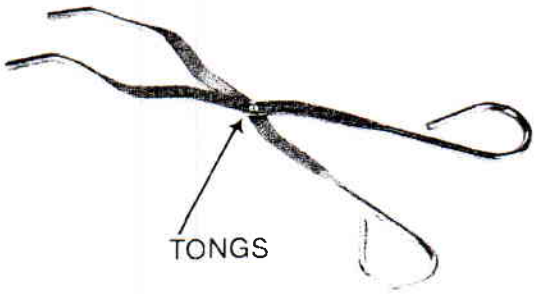
Vacuum Chamber Diagram





Optional vacuum chamber cover features heavy duty aluminum construction with removable bezel ring. Clear Lexan/Pyrex top provides viewing of the sample during solidification.





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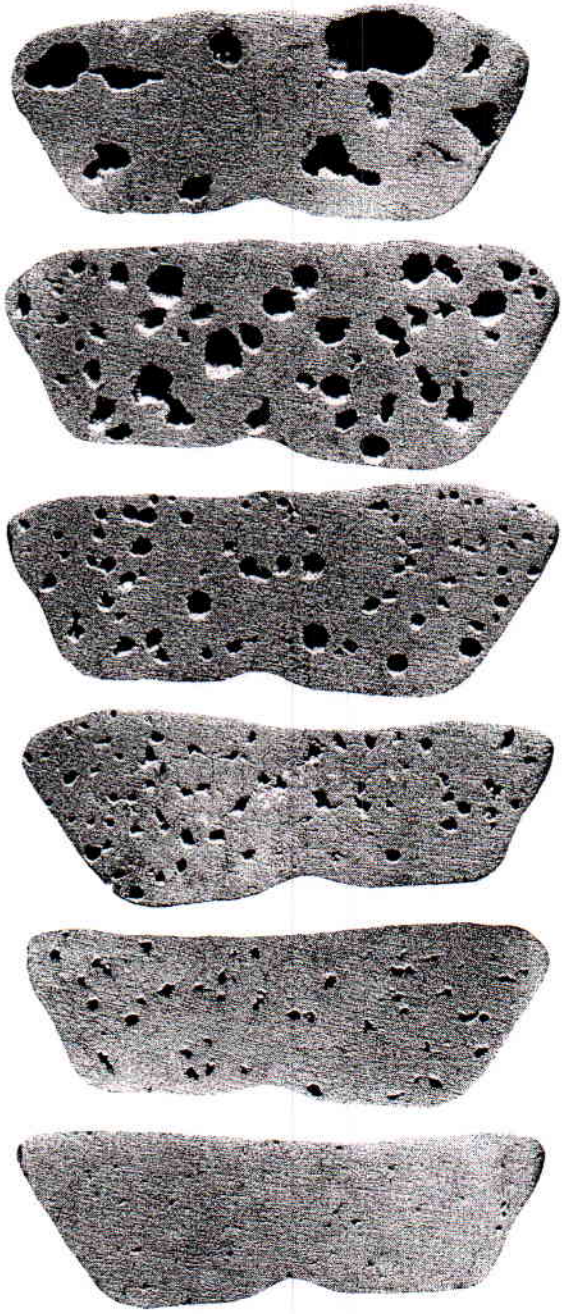
SAMPLE INSTRUCTIONS

- Warm up the gas sample cup buy dipping it into the melt 3 times. Fill the cup up and then dump it out 3 times slowly.
- Place the cup onto the and place the lid over the top.
- Timer should be set for 7 min.
- Check to make sure the vacuum is set at -26.
- After the 7 minutes, there are 2 different options. You can weigh the sample with a buoyancy test or cut the sample in half, buff and then bead blast the sample and then use a sample chart to check gas level.

Effect of different reduced pressure readings with same level of hydrogen gas.

Samples show the importance of maintaining either 26 or 28 inches (± 0.5 inches) of vacuum for consistency of measurement.

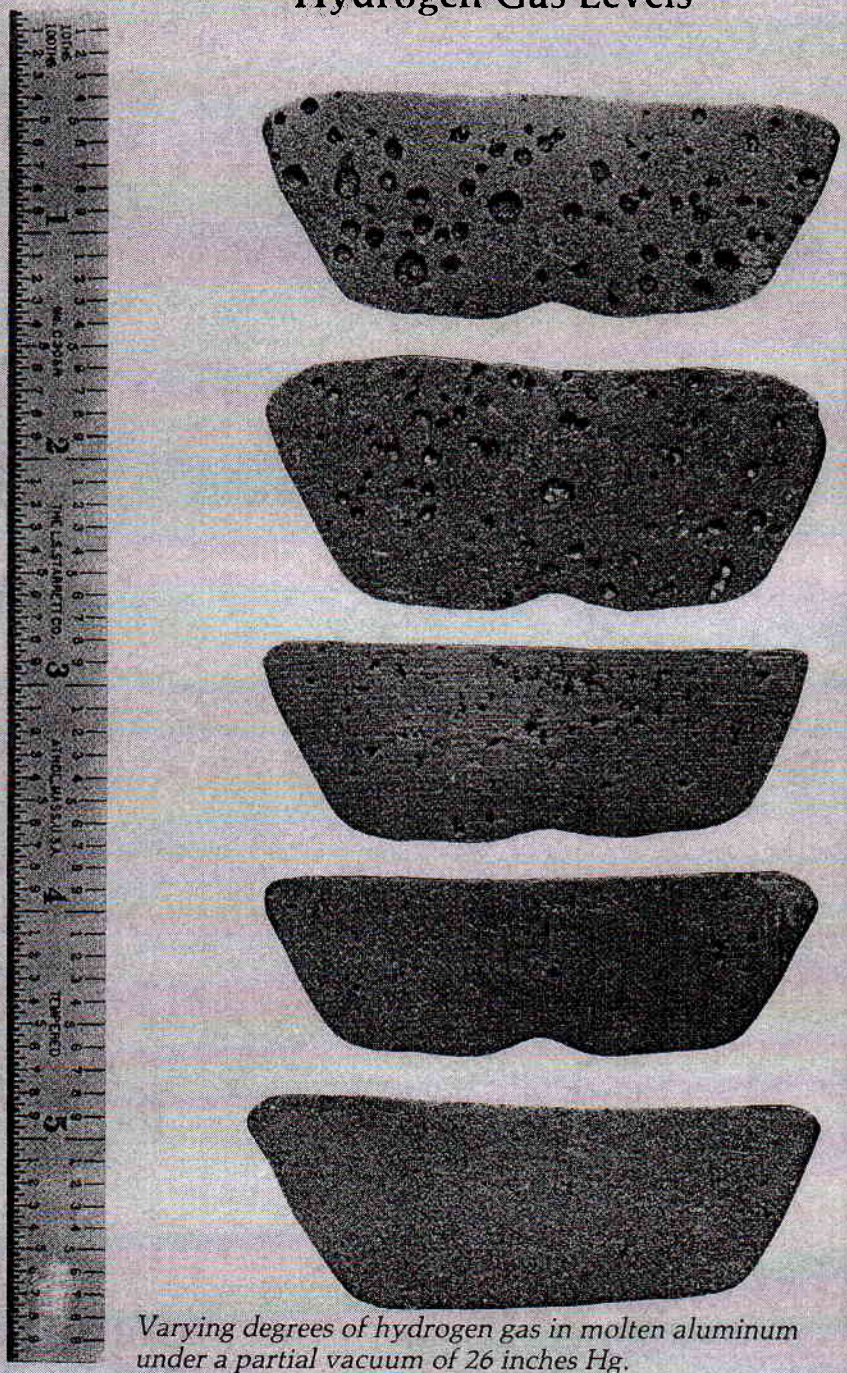
Vacuum (inches Hg.)	Pressure (torr)	(psia)
28	50	0.98
26	100	1.96
24	150	2.94
22	200	3.92
20	250	4.90
0	760	14.70



Specimens poured at various inches of vacuum (reduced pressure) as listed above.

Do you measure your gas level?

Hydrogen Gas Levels



Varying degrees of hydrogen gas in molten aluminum under a partial vacuum of 26 inches Hg.

Extensive testing proves this reduced pressure test unit to be a highly accurate and reliable system for measuring hydrogen gas levels in molten aluminum by shop floor personnel. Without the accuracy and reliability of the reduced pressure test equipment, it is virtually impossible to maintain accurate control of the gas level in your aluminum melt. assures consistent, reliable control in everyday foundry melt procedures.

Of all possible gases, only hydrogen is soluble to any extent in molten aluminum and its alloys.

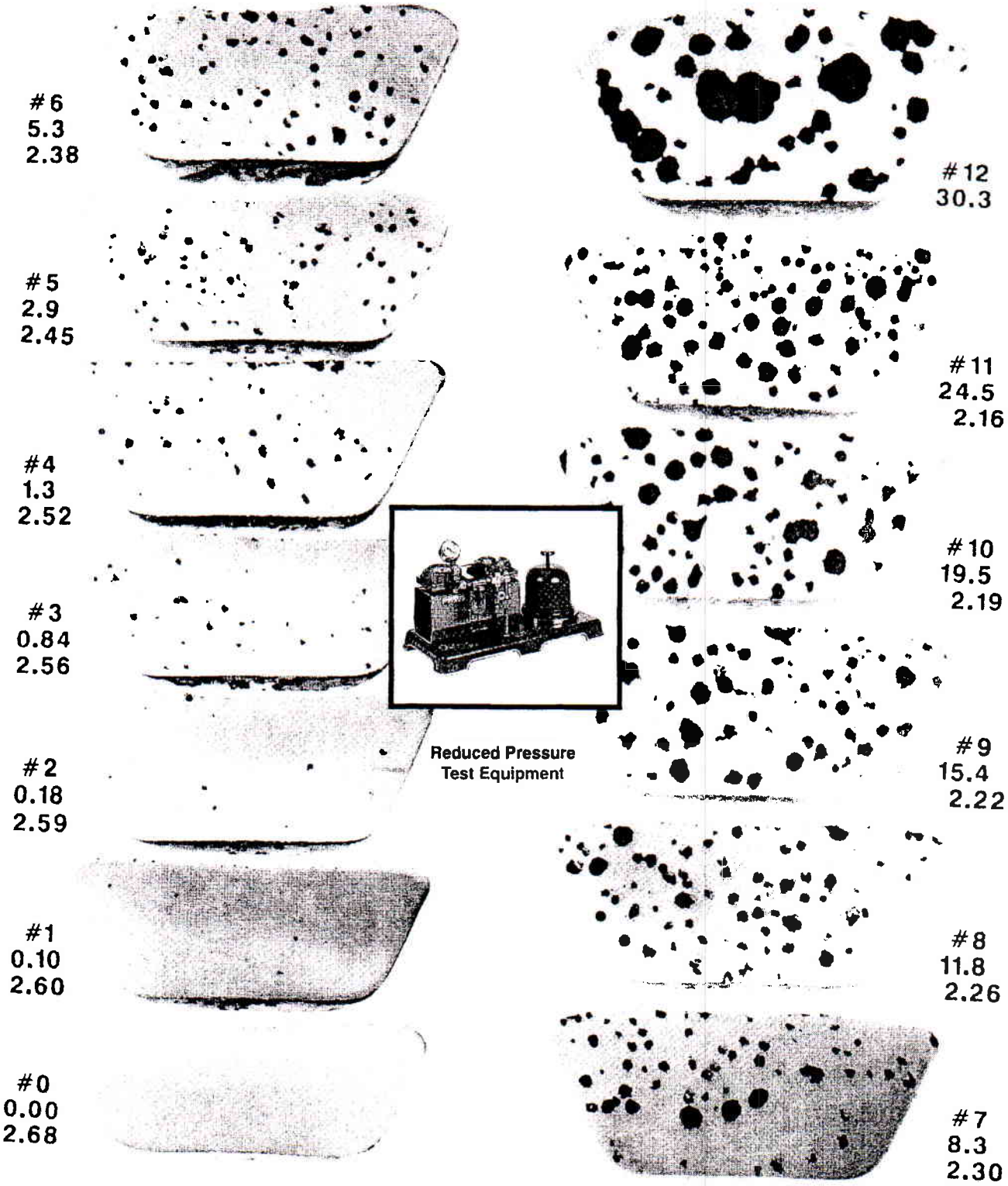
Most methods of determining gas content are either time consuming or require laboratory equipment. They usually start with a solid sample and are not suited for quick measurement of gas levels in molten aluminum, which is an important process control function in today's productive foundry.

Practical methods for qualitative control might be:

- Pour out test
- Reduced pressure test
- Density measurements
- Telegas instrument
- First gas bubble

Stahl Specialty engineers and quality control department have developed , a superior reduced pressure test machine for today's modern sand and permanent mold aluminum foundry.

Aluminum Comparative Standards for Gas
Percent Surface Area Porosity
Densities for 356 Alloy
100mm Pressure



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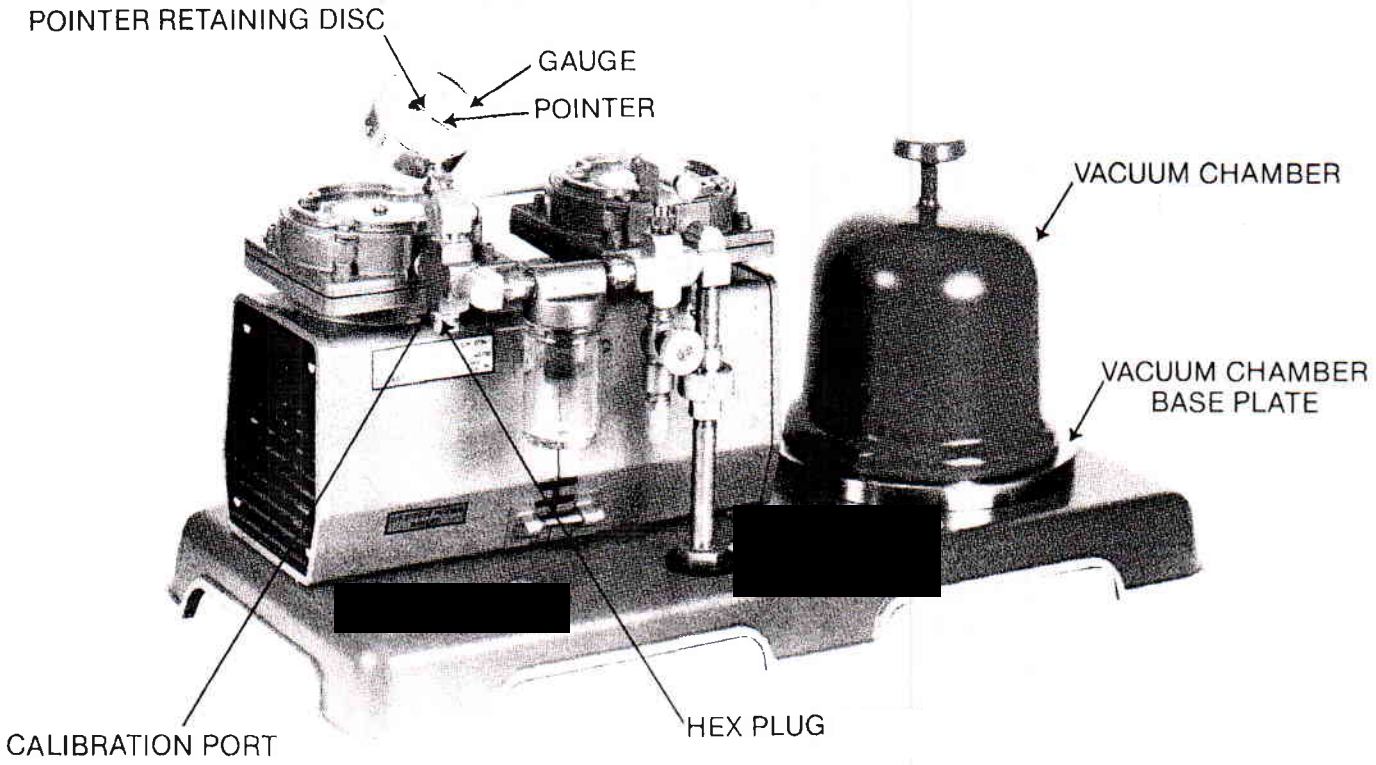

OPTIONAL VACUUM CHAMBER

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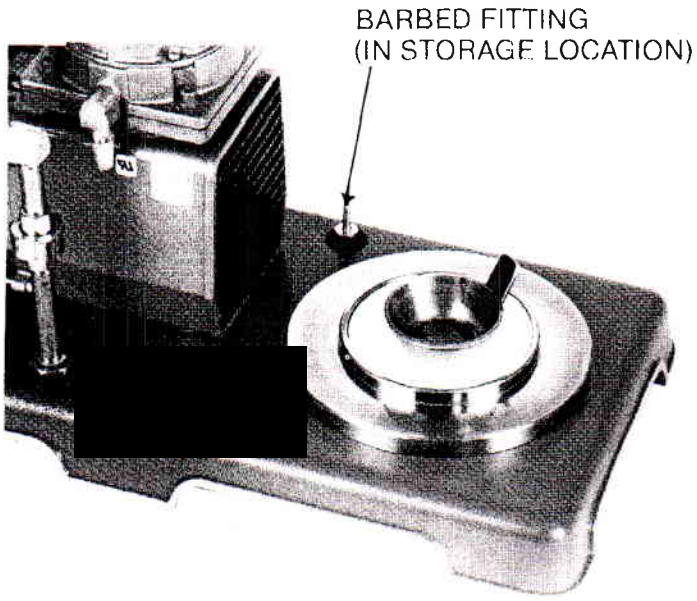

VACUUM GAUGE
CALIBRATION INSTRUCTIONS

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