VACUUM PUMPING SYSTEM SIZING CHART

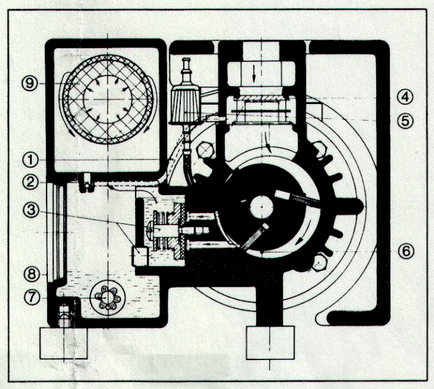
BUSCH — ROTARY VANE PUMPS

Our goal is to supply the best available technical/economical solution to your vacuum needs. This chart is intended as a graphic aid toward that goal. If you know, or can specify, your process mass flow rate, the chart will determine the actual CFM you need at your intended operating absolute pressure. Picking the right pump, or pump combination, to do the job is the final step.

Please make use of our extensive experience in vacuum application engineering to help you in making the best choice of pumping system for your process. The service is free - and prompt. Just call - or write!

R5 SERIES PUMPS

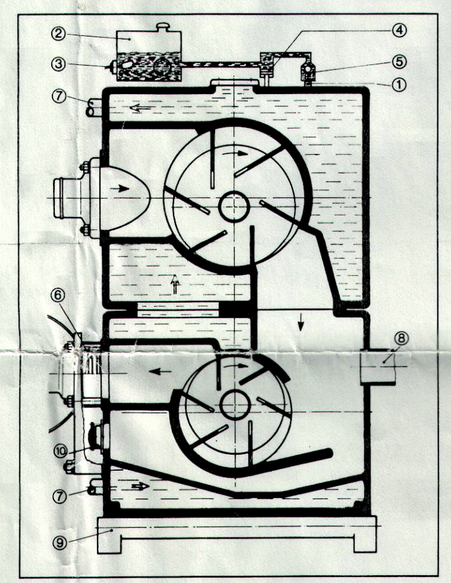
10 sizes are available from 6 to 430 CFM vacuum or pressure



① Oil Return Line (R5 Standard,only)
② Oil Return Check Valve (R5 Super., only)
③ Exhaust Valve (R5 Super, only)
④ Anti-suckback Valve
⑤ Gas Ballast Valve and Filter
⑥ Gas Ballast Port
⑦ Oil Filter in Oil Supply Line
⑧ Oil Sight Glass
⑨ Exhaust Oil-mist Eliminator Filter

HUCKEPACK PUMPS

5 sizes available from 125 to 780 CFM vacuum only.



① Fresh Oil Supply to Mechanical Seal
② Oil Reservoir
③ Low Oil Level Switch
④ Oil Metering Pump
⑤ Oil Reverse-Flow Check Valve
⑥ Air Reverse-Flow Check Valve
⑦ Water Connections
⑧ Interstage Take-off
⑨ Pump Base
⑩ Interstage Over-Pressure Relief Valve

BUSCH

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TO USE CHART:

1. Determine THROUGHPUT in terms of the AIR EQUIVALENT LOAD at 20°C, as follows:
   A. Convert mass flow of *each* vapor stream constituent, i.e.

   $$\frac{29}{\text{Mol. Wt. of Vapor}} \times \text{mass flow rate of vapor} = \text{Air Equivalent Load (at vapor stream temp.)}$$

   B. Make temperature correction to 20°C, i.e.

   $$\frac{\text{Actual Vapor Stream Temp. (°K)}}{293\ (°K)} \times \text{Air Equivalent Load (A. above)} = \text{Air Equivalent Load (at 20°C)}$$

   C. Sum up the individual loads for *each* vapor (B. above) to obtain TOTAL AIR EQUIVALENT LOAD.
2. Determine Actual CFM (ACFM) required from the intersection of THROUGHPUT and INLET PRESSURE. It may be necessary to interpolate between the 45° constant speed lines to obtain the ACFM.
3. The pump size selected should be between 10% and 15% higher than ACFM determined (from 2, above), because pumps are rated on a displacement basis. If the size indicated or selected is marginally close to design requirements, check actual speed curve supplied by the manufacturer.
4. The few typical speed curves shown are provided as representative guidelines for various pumping system combinations. In-depth, custom-designed systems require further calculation and checking of such factors as temperature rise across blowers, horsepower requirements, conductance, vapor compatibility with fluids and materials, etc. The chart is simply intended to obtain first approximations of pumping system requirements.
5. Inlet pressure may be expressed in any of several arbitrary units. The chart is plotted in terms of TORR. 1 TORR = 1 mm Hg (Abs.). Approximate conversion for inches of mercury into TORR is as follows:

1" Hg (Abs.) ≈ 29" Hg (Vacuum) ≈ 25 TORR
2" Hg (Abs.) ≈ 28" Hg (Vacuum) ≈ 50 TORR
3" Hg (Abs.) ≈ 27" Hg (Vacuum) ≈ 75 TORR
4" Hg (Abs.) ≈ 26" Hg (Vacuum) ≈ 100 TORR
10" Hg (Abs.) ≈ 20" Hg (Vacuum) ≈ 250 TORR
20" Hg (Abs.) ≈ 10" Hg (Vacuum) ≈ 500 TORR
30" Hg (Abs.) ≈ 0" Hg (Vacuum) ≈ 750 TORR

A "standard Atmosphere" = 29.92" Hg - 760 TORR
0°C = 273°K

CALCULATION WORK SPACE

INLET PRESSURE—TORR

THROUGHPUT — TORR-CFM

THROUGHPUT — LB/HR AIR @ 20°C (293°K)

ROOTS-TYPE BOOSTER — 15,000 CFM DISPL.
ROOTS-TYPE BOOSTER — 6,500 CFM DISPL.
ROOTS-TYPE BOOSTER — 2,900 CFM DISPL.
HUCKEPACK "41" — 780 CFM DISPL.
"HUCKEPACK" "40" — 390 CFM DISPL.
R5 SUPER 1200/12 — 170 CFM DISPL.
R5 SUPER 650/12 — 90 CFM DISPL.
R5 SUPER 315/12 — 40 CFM DISPL.

100,000 CFM
50,000 CFM
25,000 CFM
10,000 CFM
5,000 CFM
2,500 CFM
1,000 CFM
500 CFM
250 CFM
100 CFM
50 CFM
25 CFM
10 CFM
5 CFM
1 CFM

*ARBITRARY APPROXIMATION OF CUT-IN POINTS FOR BLOWERS.

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