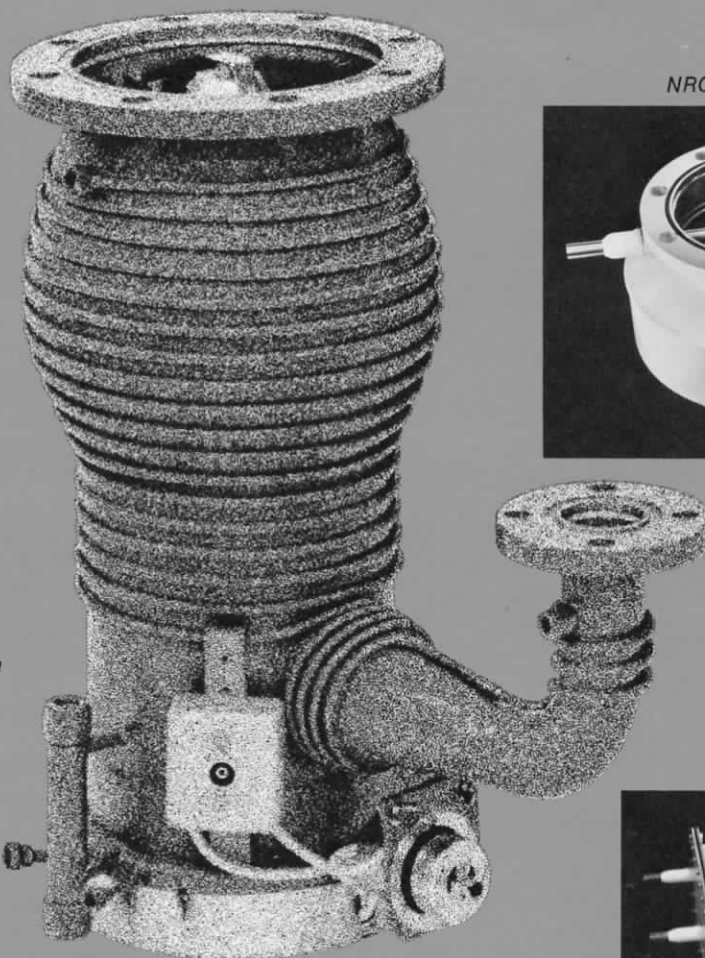


VHS-6

NRC Diffusion Pump And Components



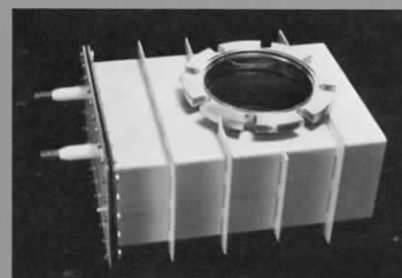
*NRC 1293S-6 Aluminum
 Solid-Body Slide Valve*



VHS-6 Diffusion Pump



NRC 316-6 Cryotrap



NRC 326-6 Long-Life Cryotrap



Mexican Hat Cold Cap



*NRC 336 Low-Profile
 Water-Cooled Baffle*

VHS-6 Diffusion Pump



The VHS-6 is the fastest and cleanest diffusion pump of its size available today. It comes closer than any other pump to the theoretically perfect pump—one that removes every gas molecule without discharging any molecules into the chamber being evacuated. Here's why:

HIGHEST SPEED: the patented bulge contour doubles gas capture and maintains lower pressures for your process.

CLEANEST OPERATION: a low boiler temperature minimizes pumping fluid breakdown; fully compartmented jet separates and ejects any light fractions that are produced.

LOWEST BACKSTREAMING: the patented Cold Cap* intercepts 98% of the backstreaming fluid (by actual measurement) without significantly affecting pumping speed.

Full thermostatic protection is ensured against inadequate cooling water, low pump fluid level, or inoperative forepump. The ejector stage at the foreline provides high forepressure tolerances and allows use of a smaller forepump.

*licensed exclusively from Edwards High Vacuum Ltd.; U.S. patent No. 2919061

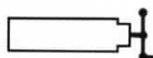
Mexican Hat Cold Cap



The Mexican Hat is an optional extended cold cap which fits inside the VHS-6 Diffusion Pump in place of the standard cold cap. It stops backstreaming as effectively as an optically dense baffle, yet retains 66% of the pump's intrinsic speed. (Residual backstreaming cannot be measured by the American Vacuum Society's standard collection method.) Available only from Varian/NRC, the Mexican Hat makes optical baffles redundant in most cases, especially when used together with cryogenic traps. In fact, the Long-Life Cryotrap (NRC 326-6) is designed to complement the Mexican Hat.



NRC 1293S-6 Aluminum Solid-Body Slide Valve



Because of its low profile and full-diameter opening, the NRC 1293S-6 slide valve provides the highest possible conductance. With the mechanism under vacuum, the solid cast-aluminum body and the double-pumped stem seal combine to give low gas contribution to your system. The self-adjusting disc with 90° motion at point of contact gives a no-scuff O-ring seal against the seat and provides long trouble-free service.

NRC 336 Low-Profile Water-Cooled Baffle



This compact, optically-dense chevron baffle provides complete interception of backstreaming while retaining about 45% of pumping speed. (Residual backstreaming cannot be measured by the American Vacuum Society's standard collection method.) This is useful in applications without cryogenic traps where clean operation at 10^{-8} Torr or above is required, but traces of pump fluid vapor are not objectionable. The vapor pressure of modern pump fluids is in the 10^{-8} to 10^{-10} Torr range at room temperature. Mechanical refrigeration can be used to produce lower temperatures than possible by water cooling. The low profile adds only 2 inches of height to the pumping combination.

NRC 316-6 Cryotrap



This trap is ideal for applications requiring critical cleanliness, pressures below 10^{-8} Torr, or high pumping speed for condensables. While retaining about 42% of the VHS-6 pump speed, its compact, optically-dense circular-chevron geometry assures the interception of molecules by cryogenic surfaces regardless of the direction from which they come. Filling is easy with the concentric fill/vent tube which also accepts standard liquid level control probes. Duration of a charge is typically 5 hours.

NRC 326-6 Long-Life Cryotrap



A large, built-in reservoir allows 20 hours of uninterrupted operation of this cryogenic trap. Efficient baffle geometry provides full effective trapping while retaining about 42% of the VHS-6 pump speed when used without other baffles. Cryogenic temperatures are sustained even as the liquid nitrogen level drops. Net pumping speed for water vapor is 6000 l/s. The total internal cryogenic area is equivalent to 30,000 l/s.

An additional feature is a built-in ambient temperature* partial baffle designed specifically to supplement the pump's cold cap or Mexican Hat. This stops backstreaming before it can reach the underside of the cryogenic surface, thus preventing pump fluid buildup during sustained operation, even for many weeks, and generally improving trapping efficiency for cycles of any length.






The complete reservoir/baffle/trap assembly is easily removed from the outer shell without dismantling the diffusion pump system. The ambient baffle can be easily detached from the trap assembly if desired. Construction is of electropolished stainless steel with a nickel-plated copper central disc.

*during operation this temperature is lower than that provided by water cooling

Matched For Top Performance

NRC's outstanding VHS diffusion pumps provide twice the speed of other like-sized pumps and less than half the backstreaming of the closest rival.

Nominally a 6-inch pump, the VHS-6 actually performs as well as most competitive 10-inch pumps. Here you'll see the VHS-6 with a complete array of matching components, together with performance information on various combinations. Now you can easily select the best combination for your requirements at the lowest possible cost.

Combinations		Typical Applications	Pumping Speed l/s (air)	
			With Cold Cap	With Mexican Hat
PUMP ONLY <ul style="list-style-type: none">• highest speed• lowest cost		GENERAL PURPOSE VACUUM FURNACES	2400	1600
PUMP AND LOW-PROFILE BAFFLE <ul style="list-style-type: none">• high speed• clean• fast cycles (valved)		METALLIZING PROTECTIVE COATINGS (Cadmium, etc.) VACUUM FURNACES 10 ⁻⁴ to 10 ⁻⁷ Torr range	900 800	Water-Cooled Baffle not necessary when Mexican Hat is used
PUMP AND CRYOTRAP <ul style="list-style-type: none">• high speed• very clean• fast cycles (valved)		THIN FILM DEPOSITION OPTICAL COATINGS ELECTRONIC COATINGS SOLID-STATE RESEARCH MOLECULAR BEAMS	1000 870	820 700
PUMP AND LONG-LIFE CRYOTRAP <ul style="list-style-type: none">• high speed• extremely clean• long LN₂ duration		10 ⁻⁶ to low 10 ⁻⁸ Torr range	1000 870	820 700
PUMP LOW-PROFILE BAFFLE CRYOTRAP AND SLIDE VALVE <ul style="list-style-type: none">• extremely clean• extra protection		THIN FILM DEPOSITION OPTICAL COATINGS ELECTRONIC COATINGS SOLID-STATE RESEARCH MOLECULAR BEAMS 10 ⁻⁶ to low 10 ⁻⁸ Torr range	550 550	Water-Cooled Baffle not necessary when Mexican Hat is used

The combinations given below are included for information purposes, the Mexican Hat and Long-Life Cryotrap. Also, they reduce pumping speed protection against accidental exposure of the diffusion pump to pressure.

*Backstreaming rates near ambient temperatures vary directly with vapor pressure
**Approximate values at inlet of pumping combination system ultimate; depends on
***Too small to be measured by standard collection method of American Vacuum Society

Start with the VHS-6 pump. Then choose low-profile water-cooled baffles, high-conductance cryogenic traps, and aluminum slide valves. You also have further choice: the Mexican Hat Cold Cap for even lower pump backstreaming rates, Long-Life Trap for extended holding times, and air-operated valves for remote or automatic cycles.

With the comprehensive selection table below, you can now eliminate tedious calculations and benefit from our years of application experience as you choose a pumping combination to meet your needs. You'll gain superior performance and reduced cost through the use of Varian/NRC vacuum components.

Backstreaming Rate*		Ultimate Pressure**		Total Height	Model Number	LN ₂ Duration
Mg/cm ² /min. (DC-704)		Torr		inches		hours
With Cold Cap	With Mexican Hat	Using DC-704	Using DC-705 or S-5	With Cold Cap or Mexican Hat	Specify Mexican Hat Separately	With Cold Cap or Mexican Hat
5x10 ⁻⁴	<1x10 ^{-4***}	<5x10 ⁻⁸	<5x10 ⁻⁹	18	VHS-6	—
<1x10 ^{-4***}	<1x10 ^{-4***}	<5x10 ⁻⁸	<5x10 ⁻⁹	20	VHS-6, 336	—
<1x10 ^{-4***}	<1x10 ^{-4***}	5x10 ⁻⁸	1x10 ⁻⁸	24.5	VHS-6, 336, 1293S-6	—
1x10 ⁻⁷	1x10 ⁻⁷	5x10 ⁻⁹	1x10 ⁻⁹	23.5	VHS-6, 316-6	5
1x10 ⁻⁷	1x10 ⁻⁷	<1x10 ⁻⁸	<5x10 ⁻⁹	28	VHS-6, 316-6, 1293S-6	5
<1x10 ⁻⁷	<1x10 ⁻⁷	<5x10 ⁻⁹	<1x10 ⁻⁹	26	VHS-6, 326-6	20
<1x10 ⁻⁷	<1x10 ⁻⁷	5x10 ⁻⁹	2x10 ⁻⁹	30.5	VHS-6, 326-6, 1293S-6	20

are not usually recommended because they offer no significant advantages over the combinations which utilize ed by approximately 20% (550 l/s vs. 700 l/s for valved combinations). These systems may provide added s exceeding the normal operating range.

<1x10 ⁻⁷	<1x10 ⁻⁷	<1x10 ⁻⁸	<5x10 ⁻⁹	30	VHS-6, 336, 316-6, 1293S-6	5.5
<1x10 ⁻⁷	<1x10 ⁻⁷	5x10 ⁻⁹	2x10 ⁻⁹	32.5	VHS-6, 336, 326-6, 1293S-6	24

fluid.
amber design, type of seals, and process outgassing. Mild bakeout is usually required to reach 10⁻⁹ Torr levels.
ty.

Specifications

VHS-6 DIFFUSION PUMP

Speed (maximum):	Air	2400 l/s
	Helium	3000 l/s
Throughput at 10^{-2} Torr:		4 Torr l/s
Forepressure (maximum):		6.5×10^{-1} Torr
		(no load)
		5.5×10^{-1} Torr
		(at 2.5 Torr l/s)
Fluid Charge:		500 cc
Heat-up:		10 minutes
Cool-down:		10 minutes
Water:		0.25 gpm at 60°F to 85°F
Heater Rating:		2200 watts
		(120/240/1/60) $\pm 5\%$
Jet Assembly:		Four-stage self-aligning, stainless steel
Foreline Baffle:		Stacked half-moon, stainless steel
Water Connections:		$\frac{1}{8}$ inch F.P.T.
Body and Flanges:		Stainless steel, copper
		cooling coils
Heater Skirt:		Aluminum
Net Weight:		45 pounds
Shipping Weight:		75 pounds

NRC 336 LOW-PROFILE WATER-COOLED BAFFLE

Conductance:	1500 l/s
Recommended Flow:	Less than 0.1 gpm*

NRC 316-6 CRYOTRAP

Conductance	
(below 10^{-4} Torr):	1700 l/s
Reservoir Volume:	1750 cc
Liquid Nitrogen required	
	to fill and cool
initially (approx):	3500 cc
Holding Time for single	
Liquid Nitrogen charge	
using auxiliary water	
baffle below NRC 316-6	
Cryotrap (approx):	5½ hours

NRC 326-6 LONG-LIFE CRYOTRAP

Conductance	
(below 10^{-4} Torr):	1700 l/s
Reservoir Volume:	10 liters
Liquid Nitrogen Duration:	20 hours
Initial Cooling:	15 liters

NRC 1293S-6 SLIDE VALVE

Conductance:	6500 l/s**
Seal (nonscuff):	O-ring

*Can be used in series with pump cooling (0.25 gpm).

**Calculated from speed measurements taken by AVS method.

