

# Small Dry Pumps

6 to 18 cfm • 10 to 28 m<sup>3</sup>/hr • 170 to 500 l/min

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**Lowest Cost to Own and Install**

- ***No Cooling Water!***
- ***No Purge Gas!***
- ***No Oil Whatsoever!***
- ***No Waste Disposal!***
- ***No Maintenance!***



**Vacuum Research Limited**

# The Absolutely Oil Free Difference

For more than 10 years the Vacuum Research Limited **Absolute** Dry Pumps have set the standard for absolutely oil-free roughing pumps. The **Absolute** Dry Pumps offer low cost of installation, low cost of ownership, and the most reliable performance of any dry pumps available for use in clean vacuum systems.

The **Absolute** Pumps initially cost less than most oil-free pumps, plus they are less costly to install. Auxiliary equipment such as traps and exhaust filters are unnecessary. There are no purge gas or cooling water lines to install. The **Absolute** pumps are easy to connect to your system with simple NW inlet and outlet flanges. And to maximize your work space you have the option of mounting the pumps in any plane. They can be mounted on the wall, on the floor, or standing on end. Electrical power is all that is required to put the **Absolute** Dry Pump into service in your system.

Ownership costs are low because with no oil or fluid to check the VRL pumps require no costly maintenance.

In fact, VRL pumps have a proven life expectancy of more than 10,000 hours for the direct drive models and 20,000 hours for the belt drive models. Oil level monitoring and the frequent oil addition and replacement tasks needed in other pumps are eliminated. There are no costs for disposal and handling of waste oils either.

Most importantly, the unique construction of these pumps allows for long and reliable service life. All sealing surfaces in VRL pumps are made of composite non-metallic materials which allow them to function without any oil or fluids for sealing or lubricating. No fluids means total elimination of backstreaming found in rotary vane and pseudo dry pumps. Although many so-called dry pumps actually have large reservoirs of oil, the **Absolute** pumps use absolutely no oil or fluid of any type. This means no seals to fail and no oil or hydrocarbon contamination of your system, ever.

## Lowest Cost of Ownership

When you add it all up, VRL **Absolute** Pumps offer more for less. You don't have to invest in expensive synthetic oils, oil filters or oil mist eliminators because our oil-free pump is true to its name: no oil! And the VRL **Absolute** truly dry pumps are competitively priced. Less than 1/2 the price of many other dry pumps. Operating costs are also reduced because there is no cooling water or purge gas, and of course, no hazardous waste to dispose of. The savings in water, sewage, and purge gas in one year will often pay the entire cost of the pump.

## Belt Drive & Direct Drive

VRL offers both direct and belt drive dry pumps and the selection of the drive most suitable for you is usually based on the following considerations.

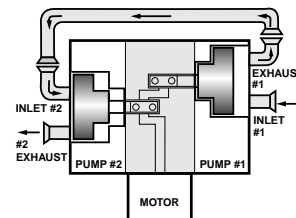
The belt drive pumps turn slower and thereby have a 20,000 hour service life compared to the faster turning direct drive pumps which have a 10,000 hour life before service. Because they turn faster, our direct drive pumps have about 15% higher pumping speed than our belt drive pumps. In applications such as roughing for ion or cryo pumps high speed is usually selected because the dry pump is turned off after roughing and the 10,000 hour life will provide years of service without down time. In applications where the dry pump will be used to back a turbo pump or to continuously pump a vacuum oven the slower pumping but longer life belt drive is usually selected.

The drive belt used by VRL is polyurethane with steel reinforcing which will provide many years of continuous operation.



## Multistage Dry Pumps, 20 mTorr, .026 mbar, 3 Pa Ultimate Pressure

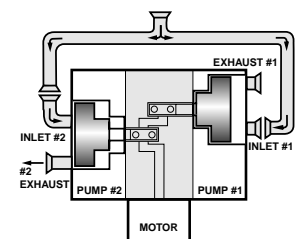
	<b>2 By 6 Series - \$6,800 With Soft Start - \$8,500</b>	<b>2 By 9 Series - \$6,800 With Soft Start - \$8,500</b>	<b>2 By 8 Series - \$6,800 With Soft Start - \$8,500</b>
<b>Pumping Speed</b>	6 CFM, 170 l/min, 10 m <sup>3</sup> /hr, 50/60 Hz.	9 CFM, 250 l/min, 15 m <sup>3</sup> /hr, 50/60 Hz.	8 CFM, 225 l/min, 14 m <sup>3</sup> /hr, 60 Hz.
<b>Ultimate Pressure</b>	Less than 20 mTorr, .026 mbar, 2.6 Pa.	Less than 20 mTorr, .026 mbar, 2.6 Pa.	Less than 20 mTorr, .026 mbar, 2.6 Pa.
<b>Inlet &amp; Outlet Ports</b>	NW-25 ports for inlet and outlet.	NW-25 outlet, NW-25 or NW-40 inlet.	NW-25 ports for inlet and outlet.
<b>Drive System</b>	Heavy duty timing belt, pump speed is only 850 RPM	Heavy duty timing belt, pump speed is only 1200 RPM.	Direct coupled motor, 1140 RPM.
<b>Maintenance</b>	None required for 20,000 hours. Motor may require occasional lubrication.	None required for 10,000 hours. Motor may require occasional lubrication.	None required for 10,000 hours. Motor may require occasional lubrication.
<b>Gas Ballast</b>	Needle valve and gas flow meter included.	Needle valve and gas flow meter included.	Needle valve and gas flow meter included.
<b>Noise Level</b>	Extremely quiet; only 850 RPM pump speed, under 52 db(A) @ 1 Meter at low pressures.	Extremely quiet, 1200 RPM pump speed, under 56 db(A) @ 1 Meter at low pressures.	Extremely quiet, 1140 RPM pump speed, under 56 db(A) @ 1 Meter at low pressures.
<b>Standard Motor</b>	1 hp, 3 $\phi$ , TEFC, 208-230/460, 60 Hz 3 $\phi$ , 190/380 V, 50 Hz	1 hp, 3 $\phi$ , TEFC, 208-230/460, 60 Hz 3 $\phi$ , 190/380, 50 Hz	1 1/2 hp, 3 $\phi$ , TEFC, 208-230/460, 60 Hz 3 $\phi$ , 190/380 V, 50 Hz
<b>Special Motors</b>	Other voltages, 50 Hz, single phase, CE Mark, explosion proof and other special motors available.		



**2 PISTONS IN SERIES**  
20 mTorr Ultimate Pressure

## Parallel Dry Pumps, Double Capacity, 700 mTorr, 0.93 mbar, 93 Pa Ultimate Pressure

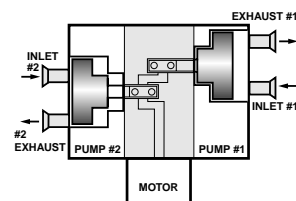
	<b>1 By 12 Parallel - \$6,800 With Soft Start - \$8,500</b>	<b>1 By 18 Parallel - \$6,800 With Soft Start - \$8,500</b>	<b>1 By 16 Parallel - \$6,800 With Soft Start - \$8,500</b>
<b>Pumping Speed</b>	12 CFM, 340 l/min, 20 m <sup>3</sup> /hr, 50/60 Hz.	18 CFM, 500 l/min, 30 m <sup>3</sup> /hr, 50/60 Hz.	16 CFM, 450 l/min, 28 m <sup>3</sup> /hr, 60 Hz.
<b>Ultimate Pressure</b>	Less than 700 mTorr, 0.93 mbar, 93 Pa.	Less than 700 mTorr, 0.93 mbar, 93 Pa.	Less than 700 mTorr, 0.93 mbar, 93 Pa.
<b>Inlet &amp; Outlet Ports</b>	NW-40 inlet, 2 NW-25 outlets.	NW-40 inlet, 2 NW-25 outlets.	NW-40 inlet, 2 NW-25 outlets.
<b>Drive System</b>	Heavy duty timing belt, pump speed is only 850 RPM	Heavy duty timing belt, pump speed is only 1200 RPM.	Direct coupled motor, 1140 RPM.
<b>Maintenance</b>	None required for 20,000 hours. Motor may require occasional lubrication.	None required for 10,000 hours. Motor may require occasional lubrication.	None required for 10,000 hours. Motor may require occasional lubrication.
<b>Noise Level</b>	Extremely quiet; only 850 RPM pump speed, under 52 db(A) @ 1 Meter at low pressures.	Extremely quiet, 1200 RPM pump speed, under 56 db(A) @ 1 Meter at low pressures.	Extremely quiet, 1140 RPM pump speed, under 56 db(A) @ 1 Meter at low pressures.
<b>Standard Motor</b>	1 hp, 3 $\phi$ , TEFC, 208-230/460, 60 Hz 3 $\phi$ , 190/380 V, 50 Hz	1 hp, 3 $\phi$ , TEFC, 208-230/460, 60 Hz 3 $\phi$ , 190/380, 50 Hz	1 1/2 hp, 3 $\phi$ , TEFC, 208-230/460, 60 Hz 3 $\phi$ , 190/380 V, 50 Hz
<b>Special Motors</b>	Other voltages, 50 Hz, single phase, CE Mark, explosion proof and other special motors available.		



**2 PISTONS IN PARALLEL**  
700 mTorr Ultimate Pressure

## Duplex Pumps, 2 Pumps in a Single Crankcase, 700 mTorr, 0.93 mbar, 93 Pa Ultimate Pressure

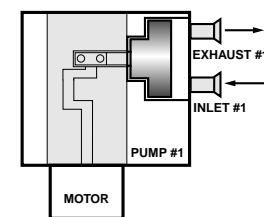
	<b>1 By 6 Duplex - \$6,800 (2 Separate Pumps with 1 Piston) With Soft Start - \$8,500</b>	<b>1 By 9 Duplex - \$6,800 (2 Separate Pumps with 1 Piston) With Soft Start - \$8,500</b>	<b>1 By 8 Duplex - \$6,800 (2 Separate Pumps with 1 Piston) With Soft Start - \$8,500</b>
<b>Pumping Speed</b>	6 CFM, 170 l/min, 10 m <sup>3</sup> /hr, 50/60 Hz.	9 CFM, 250 l/min, 15 m <sup>3</sup> /hr, 50/60 Hz.	8 CFM, 225 l/min, 14 m <sup>3</sup> /hr, 60 Hz.
<b>Ultimate Pressure</b>	Less than 700 mTorr, 0.93 mbar, 93 Pa.	Less than 700 mTorr, 0.93 mbar, 93 Pa.	Less than 700 mTorr, 0.93 mbar, 93 Pa.
<b>Inlet &amp; Outlet Ports</b>	2 sets of NW-25 inlet/outlet ports.	2 NW-25 outlets, 2 NW-25 or NW-40 inlets.	2 NW-25 outlets, 2 NW-25 or NW-40 inlets.
<b>Drive System</b>	Heavy duty timing belt, pump speed is only 850 RPM	Heavy duty timing belt, pump speed is only 1200 RPM.	Direct coupled motor, 1140 RPM.
<b>Maintenance</b>	None required for 20,000 hours. Motor may require occasional lubrication.	None required for 10,000 hours. Motor may require occasional lubrication.	None required for 10,000 hours. Motor may require occasional lubrication.
<b>Noise Level</b>	Extremely quiet; only 850 RPM pump speed, under 52 db(A) @ 1 Meter at low pressures.	Extremely quiet, 1200 RPM pump speed, under 56 db(A) @ 1 Meter at low pressures.	Extremely quiet, 1140 RPM pump speed, under 56 db(A) @ 1 Meter at low pressures.
<b>Standard Motor</b>	1 hp, 3 $\phi$ , TEFC, 208-230/460, 60 Hz 3 $\phi$ , 190/380 V, 50 Hz	1 hp, 3 $\phi$ , TEFC, 208-230/460, 60 Hz 3 $\phi$ , 190/380, 50 Hz	1 1/2 hp, 3 $\phi$ , TEFC, 208-230/460, 60 Hz 3 $\phi$ , 190/380 V, 50 Hz
<b>Special Motors</b>	Other voltages, 50 Hz, single phase, CE Mark, explosion proof and other special motors available.		



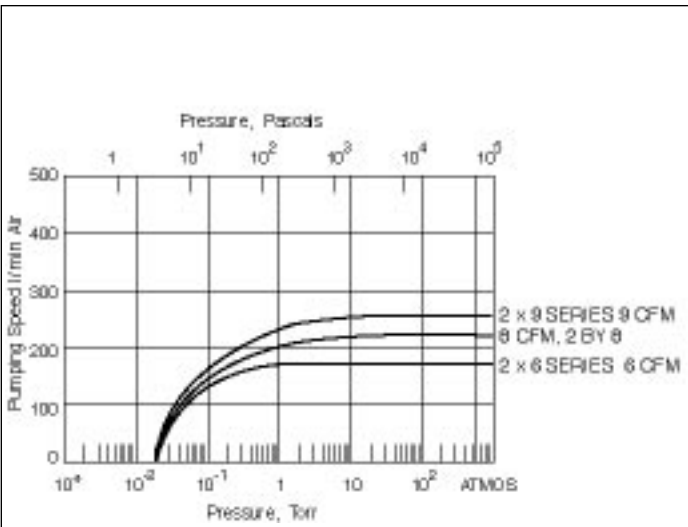
**DUPLEX DRY PUMPS**  
2 Independent Pumps  
700 mTorr Ultimate Pressure

## Simplex Pumps, Single Stage, 700 mTorr, 0.93 mbar, 93 Pa Ultimate Pressure

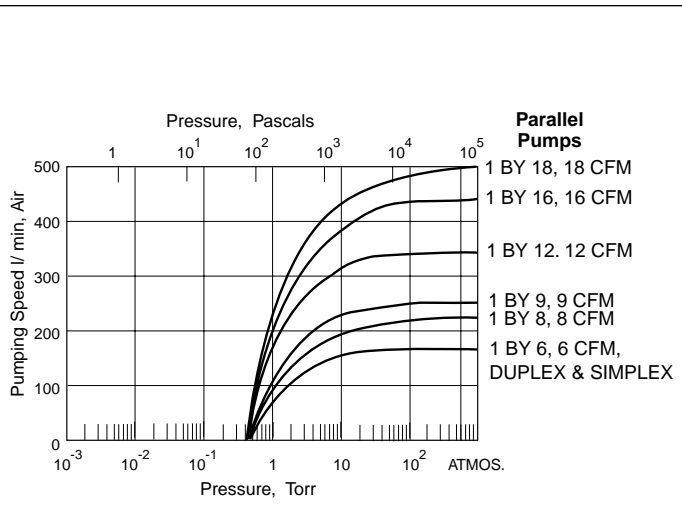
	<b>1 By 6 Simplex - \$4,600 With Soft Start - \$5,600</b>	<b>1 By 9 Simplex - \$4,600 With Soft Start - \$5,600</b>	<b>1 By 8 Simplex - \$4,600 With Soft Start - \$5,600</b>
<b>Pumping Speed</b>	6 CFM, 170 l/min, 10 m <sup>3</sup> /hr.	9 CFM, 250 l/min, 15 m <sup>3</sup> /hr.	8 CFM, 225 l/min, 14 m <sup>3</sup> /hr, 60 Hz.
<b>Ultimate Pressure</b>	Less than 700 mTorr, 0.93 mbar, 93 Pa.	Less than 700 mTorr, 0.93 mbar, 93 Pa.	Less than 700 mTorr, 0.93 mbar, 93 Pa.
<b>Inlet &amp; Outlet Ports</b>	Both ports NW-25.	Both ports NW-25.	Both ports NW-25.
<b>Drive System</b>	Heavy duty timing belt, pump speed is only 850 RPM	Heavy duty timing belt, pump speed is only 1200 RPM.	Direct coupled motor, 1140 RPM.
<b>Maintenance</b>	None required for 20,000 hours. Motor may require occasional lubrication.	None required for 10,000 hours. Motor may require occasional lubrication.	None required for 10,000 hours. Motor may require occasional lubrication.
<b>Noise Level</b>	Extremely quiet; only 850 RPM pump speed, under 52 db(A) @ 1 Meter at low pressures.	Extremely quiet, 1200 RPM pump speed, under 56 db(A) @ 1 Meter at low pressures.	Extremely quiet, 1140 RPM pump speed, under 56 db(A) @ 1 Meter at low pressures.
<b>Standard Motor</b>	1 hp, 3 $\phi$ , TEFC, 208-230/460, 60 Hz 3 $\phi$ , 190/380 V, 50 Hz	1 hp, 3 $\phi$ , TEFC, 208-230/460, 60 Hz 3 $\phi$ , 190/380, 50 Hz	1 1/2 hp, 3 $\phi$ , TEFC, 208-230/460, 60 Hz 3 $\phi$ , 190/380 V, 50 Hz
<b>Special Motors</b>	Other voltages, 50 Hz, single phase, CE Mark, explosion proof and other special motors available.		



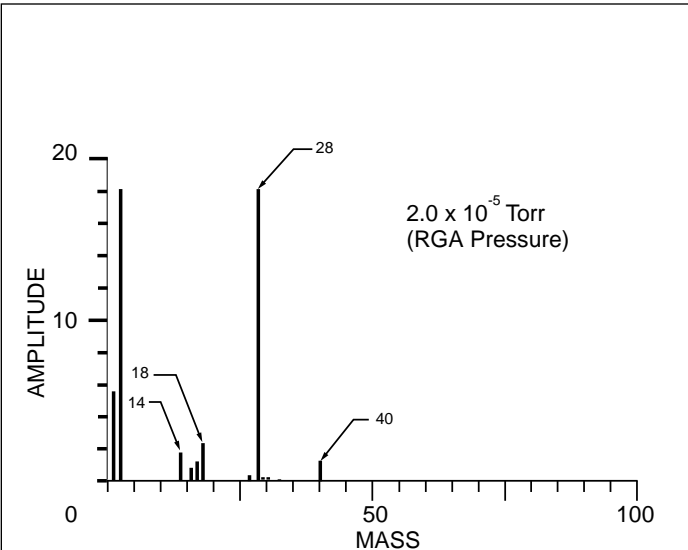
**SIMPLEX DRY PUMPS**  
One Piston  
700 mTorr Ultimate Pressure



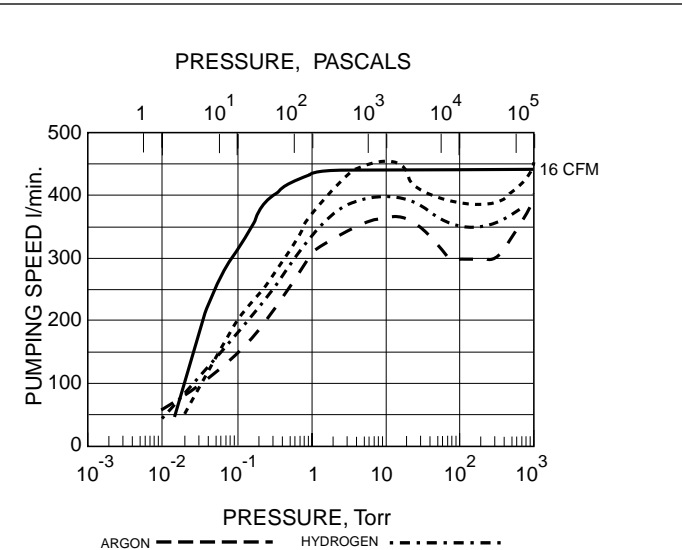
**Pumping Speed for Air;  
Multistage Dry Pumps**



**Pumping Speed for Air;  
Parallel, Duplex, and Simplex Dry Pumps**



**Hydrocarbon-Free Mass Spectra**



**High Pumping Speed for All Gases**

## 24 Hour Replacement

Although our oil-free pump requires no regular maintenance and has a longer-than-normal life, there will be times when the units need reconditioning. When this happens, exchange replacement pumps with the same specifications as new pumps are quickly available from our service centers in the United States, Japan, and Europe.

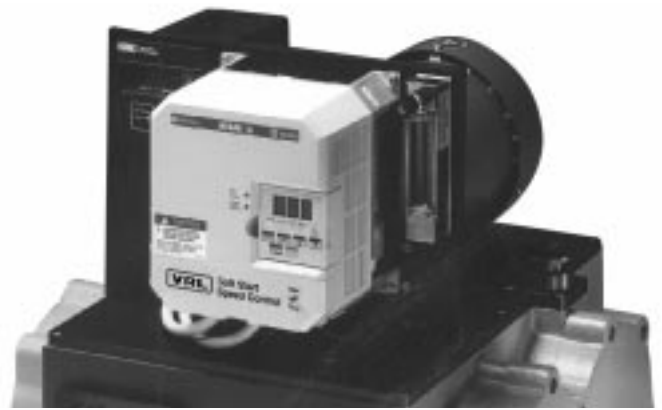
## Absolutely No Maintenance

No fluids to buy, check or discard. No traps or filters to service. These features improve uptime and productivity by eliminating the need for regular maintenance. In fact, the proven reciprocating piston design typically provides more than 20,000 hours for belt drive pumps and 10,000 hours for direct drive pumps before any service is needed.

# Soft Start and Speed Control

The optional **Soft Start Speed Control** will extend the life of your dry pump by many years. This feature will automatically slow the pump speed when the gas load and pressure are low and will immediately increase the pump capacity should the pressure increase.

The speed control system includes a VRL Pirani gauge switch with set point adjustable from 5 to 5000 mTorr (0.6 to 660 Pa) and a 5 VDC analog output. Motor speed is controlled by a variable frequency drive which can be programmed by you for soft start ramps from 1 second to 600 seconds and for capacity between 20% and 100%.



Soft start speed control shown mounted on Dry Pump.

## Turbo and Molecular Drag Pumps

Your VRL Dry Pump will run at maximum speed for fast roughing until you reach a pressure suitable for the turbo pumps. Once the turbo starts the gas load is small and the dry pump will slow to whatever speed you select, usually 25% to 50% of maximum speed. This not only dramatically increases the pump life but reduces power consumption and noise as well.

## Cryo and Ion Pumps

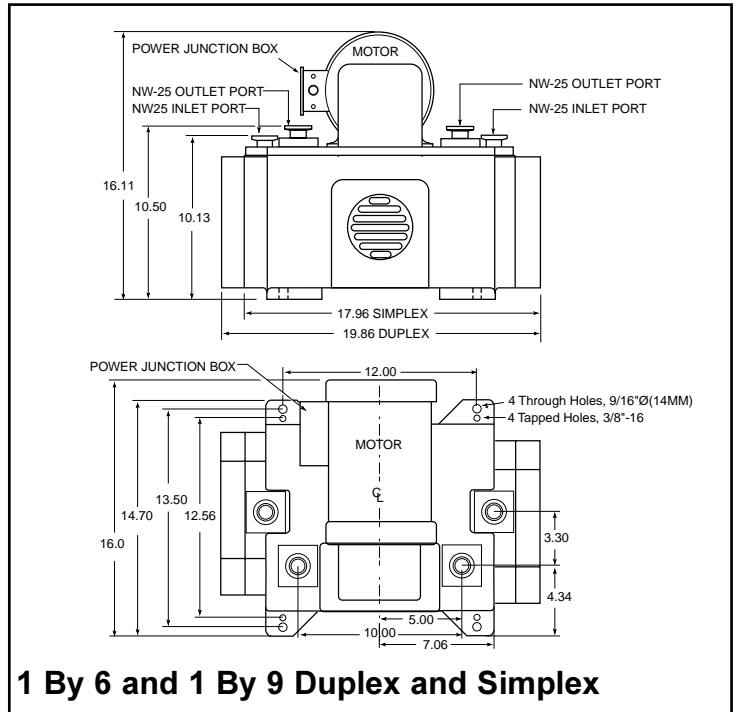
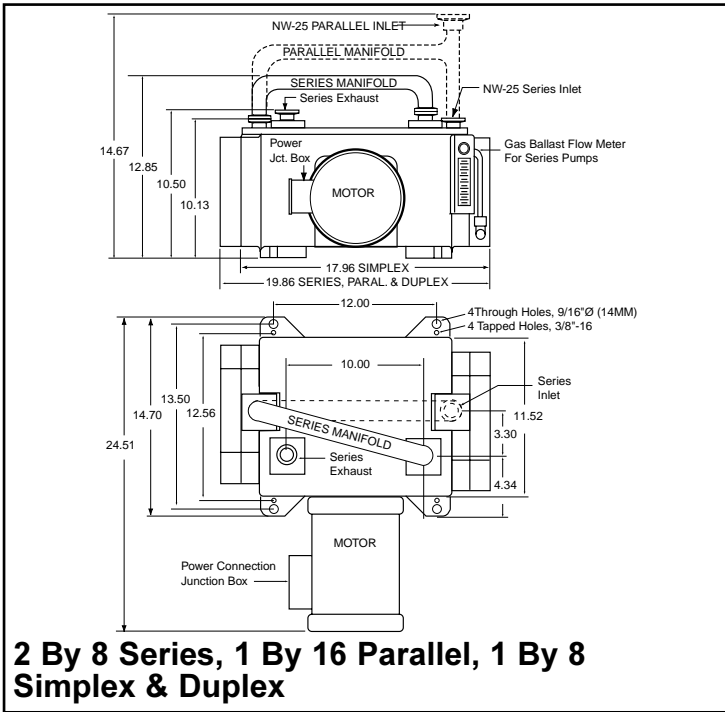
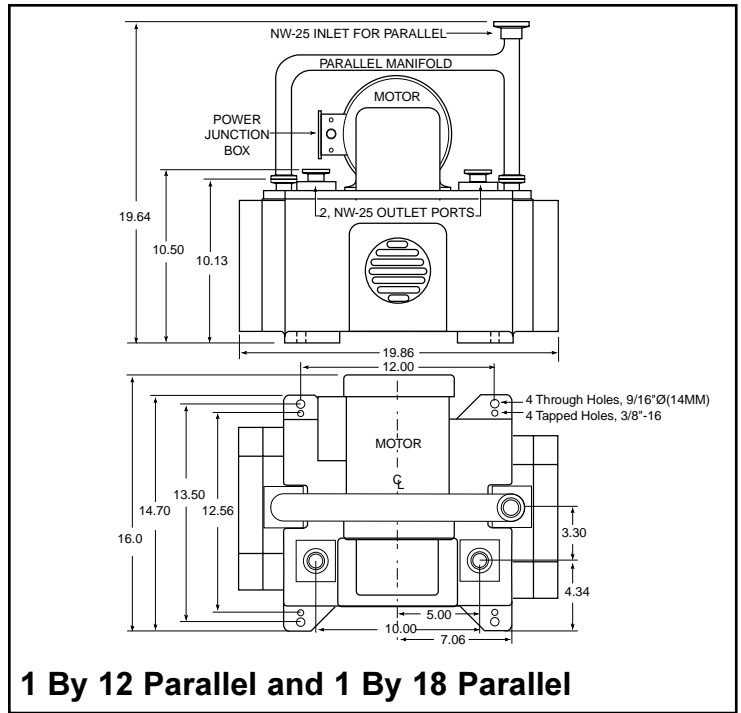
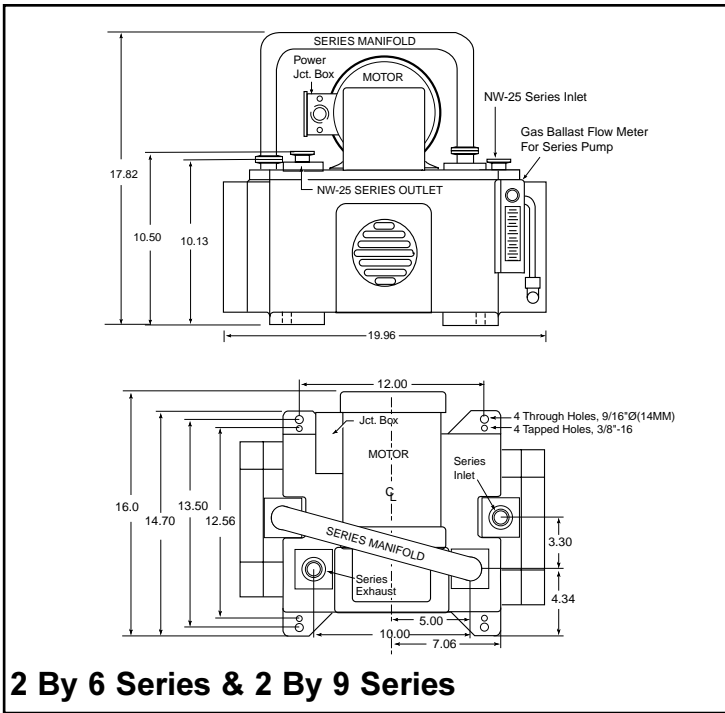
Because the VRL pumps are true positive displacement pumps their speed for all gasses, even argon, hydrogen and helium is about the same as the speed for air. This means no enrichment of concentration for these troublesome gasses. Because the VRL pumps have no oil to warm up or degas, they reach their ultimate pressure and full capacity almost immediately from a cold start. The speed control can therefore turn the dry pump off when roughing is complete or reduce the speed to perhaps 25% of maximum and this results in substantial savings of power and pump life.

## Serial Communication with PLCs and Computers

The **Soft Start Speed Control** has a serial communication option that allows Programmable Logic Controllers (PLCs) and computers to monitor parameters such as pump motor speed, amps, and volts. For installations with only a few pumps and communication distances of less than 50 feet (17 m) RS-232 is usually the best choice. For distances up to 4000 feet (1200 m) or if more than 2 or 3 pumps are involved then RS-485 may be better suited for serial communication. Please contact VRL for additional details about this feature.

## Specifications

<b>PUMP SPEED SWITCHING POINT</b>	Controller includes a Pirani sensor vacuum switch with an adjustable set point range of 5 to 5000 mT (0.6 to 600 Pa). Up to 7 additional inputs and 7 speeds can be programmed.
<b>ANALOG OUTPUT</b>	The Pirani vacuum switch provides 0 to 2 VDC for computer or PLC interface for pressure from 5 to 5000 mTorr.
<b>PUMP MOTORS</b>	Standard motors are TEFC but explosion proof and CE Mark motors are also available on most pump models.
<b>SOFT START RAMP</b>	Programmable from 1 to 600 seconds. Optimum length of ramp for your system will depend on chamber size, pump size and the conductance of your vacuum line.
<b>INPUT VOLTAGE</b>	208V (-10%) to 240 V (+10%), 50 or 60 Hz, single or three phase. 380 to 460 VAC available.
<b>MOUNTING</b>	Standard mounting is on the end of the pump as shown in the photograph. However, you may relocate the controller in the field up to 320 feet (100 m) from the pump.
<b>SERIAL COMMUNICATION</b>	With this option, motor parameters such as frequency and current can be sent to a serial port on your computer or PLC. The serial output is compatible with all popular networks.



**2 By 6 Series**  
**Dimensions** 20 inches X 16 inches X 18 inches high (51 cm X 41 cm X 46 cm high)  
**Weight** Net: 118 pounds (54 kg), Shipping: 158 pounds (71 kg)

**2 By 9 Series**  
**Dimensions** 20 inches X 16 inches X 18 inches high (51 cm X 41 cm X 46 cm high)  
**Weight** Net: 118 pounds (54 kg), Shipping: 158 pounds (71 kg)

**2 By 8 Series**  
**Dimensions** 20 inches X 24.5 inches X 13 inches high (51 cm X 62 cm X 33 cm high)  
**Weight** Net: 118 pounds (54 kg), Shipping: 158 pounds (71 kg)

**1 By 12 Parallel**  
**Dimensions** 20 inches X 16 inches X 20 inches high (51 cm X 41 cm X 46 cm high)  
**Weight** Net: 118 pounds (54 kg), Shipping: 158 pounds (71 kg)

**1 By 18 Parallel**  
**Dimensions** 20 inches X 16 inches X 20 inches high (51 cm X 41 cm X 46 cm high)  
**Weight** Net: 118 pounds (54 kg), Shipping: 158 pounds (71 kg)

**1 By 16 Parallel**  
**Dimensions** 20 inches X 24.25 inches X 15 inches high (51 cm X 62 cm X 38 cm high)  
**Weight** Net: 118 pounds (54 kg), Shipping: 158 pounds (71 kg)

**1 By 6 Duplex**  
**Dimensions** 20 inches X 16 inches X 16 inches high (51 cm X 41 cm X 41 cm high)  
**Weight** Net: 118 pounds (54 kg), Shipping: 158 pounds (71 kg)

**1 By 9 Duplex**  
**Dimensions** 20 inches X 16 inches X 16 inches high (51 cm X 41 cm X 41 cm high)  
**Weight** Net: 118 pounds (54 kg), Shipping: 158 pounds (71 kg)

**1 By 8 Duplex**  
**Dimensions** 20 inches X 24.5 inches X 10.5 inches high (51 cm X 62 cm X 27 cm high)  
**Weight** Net: 118 pounds (54 kg), Shipping: 158 pounds (71 kg)

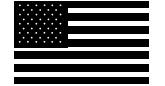
**1 By 6 Simplex**  
**Dimensions** 18 inches X 16 inches X 16 inches high (46 cm X 41 cm X 41 cm high)  
**Weight** Net: 110 pounds (50 kg), Shipping: 150 pounds (68 kg)

**1 By 9 Simplex**  
**Dimensions** 18 inches X 16 inches X 16 inches high (46 cm X 41 cm X 41 cm high)  
**Weight** Net: 110 pounds (50 kg), Shipping: 150 pounds (68 kg)

**1 By 8 Simplex**  
**Dimensions** 18 inches X 24.5 inches X 10.5 inches high (46 cm X 62 cm X 26 cm high)  
**Weight** Net: 110 pounds (50 kg), Shipping: 150 pounds (68 kg)



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VRL Pumps are Made in the USA.