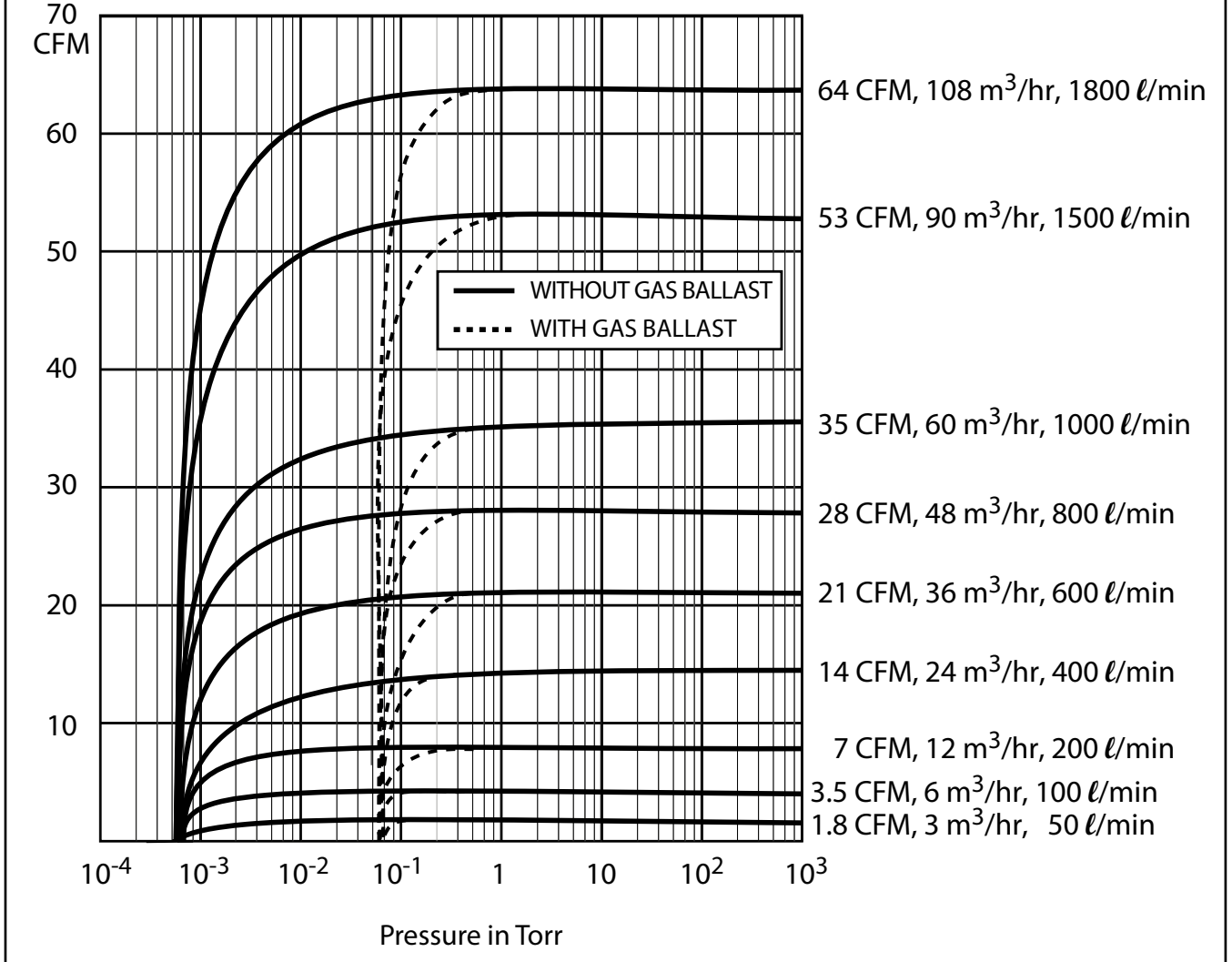




Rotary Vane Vacuum Pumps

9 Sizes to Choose From



- Ultimate Vacuum Better Than 5 X 10⁻⁴ Torr
- Motors Are Available for Every Voltage
- Full Two Year Warranty on All Parts & Labor
- Your Complete Satisfaction is Guaranteed



March 2018

Prices and specifications shown in this catalog supersede the information shown in earlier catalog printings.

Vacuum Research Corp. • 100 Chapel Harbor Drive, #4 • Pittsburgh, PA 15238 USA • www.vacuumresearch.com
Phone: 800-426-9340 • 412-261-7630 • FAX: 412-261-7220 • e-mail: VRC@vacuumresearch.com

Rotary Vane Vacuum Pumps

Ultimate Vacuum 5×10^{-4} Torr, 6.7 Pascal, .0006 mbar



**Capacity Control
for Vacuum Pumps**

page 4

**1.8 CFM
50 l/min, 3 m³/hr**

page 5



**3.5 CFM
100 l/min, 6 m³/hr**

page 6

**7 CFM
200 l/min, 12 m³/hr**

page 7



**14 CFM
400 l/min, 24 m³/hr**

page 8

**21 CFM
600 l/min, 36 m³/hr**

page 9



**28 CFM
800 l/min, 48 m³/hr**

page 10

**35 CFM
1000 l/min, 60 m³/hr**

page 11



**53 CFM
1500 l/min, 90 m³/hr**

page 12

**64 CFM
1800 l/min, 108 m³/hr**

page 13



**Intermittent Duty
5 CFM, 8.5 m³/hr.**

page 14

Pump Inlet Traps

page 15

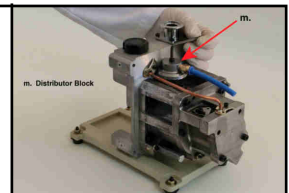


**Foreline Traps Keep
Vapor Out of System**

page 15

**Pump Repair Guides;
Major & Minor Kits**

pages 16 & 17



**Vacuum Pump Fluid,
Flushing Fluid & Ex-
haust Mist Eliminators**
page 18

**NW (KF) Clamps, Hose,
Tees, Elbows, Reducers,
Adapters, Bellows**
pages 19, 20, 21





**Aluminum Cylinders
and Base Plates**

page 22

**Feedthroughs
Rotary & Push-Pull Motion**

page 23



**NW (KF) Angle Valves
3 Way Valves & Small
Valve Accessories**
pages 24 & 25

**Diaphragm Manometer
1 mTorr to 1500 Torr**

pages 26 & 27



**Digital Convection
Gauge
1 X 10⁻³ Torr to Atmos.**
page 28

**Vacuum-Pressure
Gauges
30 In. Hg to 150 PSIG**
page 29



**Pirani Gauge
1 mTorr to 2000 mTorr
.01 Torr to 20 Torr**
pages 30 & 31

**Gauges Using 24 VDC
10⁻⁵ Torr to 1500 Torr**

page 32



**Active Pirani; 1 to
2000 mT, 2000 Microns,
2,000 mbar, 2,000 Pa**
page 33

**Thermocouple Gauges
1 mTorr to 1000 mTorr
1 mTorr to 2000 mTorr**
pages 34 & 35



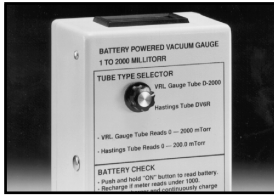
**Portable Micron Gauge
1 to 20,000 Microns**
page 36

**3 & 5 Sensor Gauges,
10 mTorr to 150 PSIG
Low Cost Gauges**
page 37



**Explosive & Hazardous
Area Gauges
UL, CSA, FM Approved**
page 38

**IP-65 Water
& Dust Proof
Convection & Pirani**
page 39



**Battery Powered
Gauges Pirani &
Diaphragm Type**
pages 40 & 41

**Self Contained
Gauge/Sensor
1 mTorr to 1500 Torr**
page 42



**Cables, LED Displays,
Couplings, Cabinets,
Switches, Water proof &
Airborne Sensors**
page 43

**NIST Traceable
Calibration Certification;
Calibration Manifolds**
pages 44, 45, 46



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Soft Start & Speed Control



Photo shows Model 800-28 and Model 200-7 Pumps with the Soft Start Variable Frequency Drive (VFD) Unit

- **Soft Start Roughing to Limit Turbulence**
 - **No Moving Parts; No Conductance Limiting**
 - **Control Pressure by Adjusting Pump Speed**
- ### Soft Start

To minimize turbulence and particles during evacuation, you may "Soft Start" your pump down and then switch to maximum speed to give the ultimate vacuum you need.

Pressure Control

Adjust the set point on your vacuum gauge to the vacuum level that is best for your process. The pump will then run at maximum speed until that pressure is reached and will then slow its speed to maintain the vacuum you have selected.

Roughing for Cryo or Ion Pumps

With this system you can operate your mechanical pump at maximum speed. When the high vacuum pump takes over, slow the mechanical pump or turn it off when roughing is complete.

Backing of Turbo and Diffusion Pumps

Use a single mechanical pump for roughing and backing for turbo or diffusion pumps. For roughing, ramp the pump speed up slowly to minimize turbulence in the chamber. For backing slow the mechanical pump to 25% of capacity.

Install Remote From Pump

The Soft Start Control can be located up to 300 feet from the pump and it will accept 4-20 mA or serial inputs or contact closures for start, stop, speed and ramp.

When the Soft Start is ordered with a new vane pump it is shipped with a 6 ft. (2 m) cord wired from the VFD to the pump motor. Cords available up to 100 ft.

Soft Start Ordering Information

P/N	Soft-220-1/2 HP	price each	.....	\$.495.
		for pump models	100-3.5 and 200-7	
P/N	Soft-220-1 to 2 HP	price each	.....	\$.695.
		for pump models	400-14, 600-21, 800-28, and 1000-35	
P/N	Soft-220-3 to 5 HP	price each	.....	\$.995.
		for pump models	1500-53 and 1800-64	

High - Low Vacuum Control



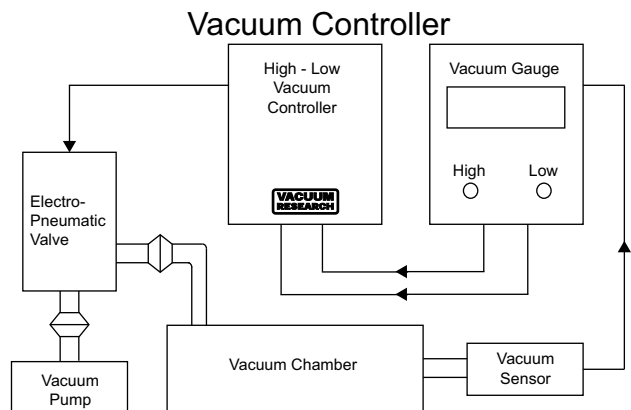
Photo shows the High-Low controller with standard NW-25 isolation valve

- **Works with Your Existing 2 Set Point Gauge**
 - **Pressure Control for Your Vacuum Chamber**
 - **Directly Control Pump Isolation Valve**
- ### Pressure Control

This inexpensive device allows your existing vacuum gauge with high and low set points to directly control your vacuum pump isolation valve to keep the vacuum in your system between the high and low limits that you select. The High-Low vacuum control will work with any pump of any size and any vacuum gauge with 2 set-points. An electropneumatic valve is required.

The contacts in this controller can directly switch the current needed to operate the solenoid on any size electropneumatic vacuum valve.

If the vacuum gets too low the valve will close, when rising pressure reaches your upper limit the valve will open and your system will be pumped back down to the pressure you have selected.



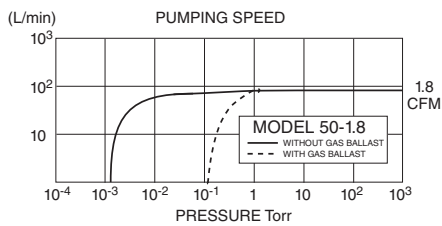
High-Low Controller Ordering Information

The High-Low Controller includes NW-25 Aluminum Vacuum Valve (fail safe, close on power failure). Select proper voltage: 24VDC, 120 VAC or 220 VAC. Vacuum Gauge is available at additional cost as are NW-16, NW-40, and NW-50 valves.

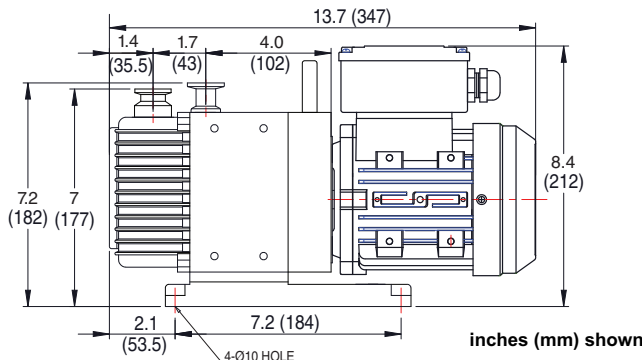
P/N	RV801005-24VDC	for 24 VDC solenoid	.....	\$.565.
P/N	RV801005-120VAC	for 120 VAC solenoid	.....	\$.565.
P/N	RV801005-220VAC	for 220 VAC solenoid	.....	\$.565.



Photo shows Pump with optional inlet trap installed and exhaust mist eliminator. See pages 14 and 15 to order these accessories. Power on/off switch, resettable circuit breaker and line cord are standard on pumps shipped with single phase motors.



Pumping Speed @ 60 Hz	50 l/min, 1.8 CFM, 3 m ³ /hr.
Pumping Speed @ 50 Hz	42 l/min, 1.5 CFM, 2.5 m ³ /hr.
Ultimate Pressure Gas Ballast Closed	2x10 ⁻³ Torr, 0.27 Pa, 0.01 mbar
Ultimate Pressure Gas Ballast Open	2x10 ⁻¹ Torr, 27 Pa, 0.27 mbar
Standard Motor, On/Off Switch, Circuit Breaker, & Thermal Protection	115/230V, 1 phase, 1/5 hp, 50/60 Hz
CE Mark, complies with	Machinery Directive 98/37/EC
Optional Motors	contact factory
Power Connection	6 ft. (2 m) 3 conductor cord
Motor speed @ 60 Hz	1680 r.p.m.
Noise Level	50 dB
Oil capacity	200 cc; 0.21 Qt.
Weight	Net: 32 lbs., 14.4 kg Shipping: 35 lbs., 16 kg
Intake & exhaust type/diameter	NW-16
Ambient operating temperature	7° to 40°C, 45° to 104°F



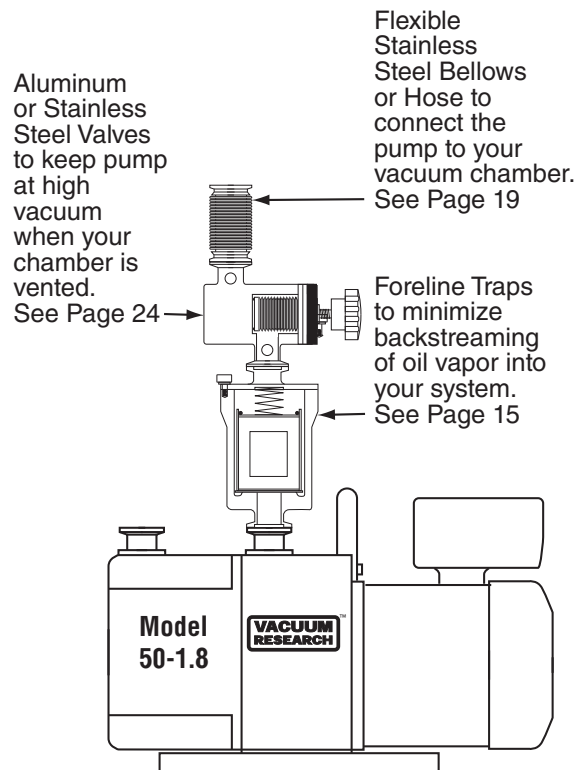
Features

- Extremely Quiet • Anti Suck Back Design
- Satisfaction Guaranteed • Two Year Warranty
- Virtually Vibration Free • Motors for Any Voltage
- Complies with Machinery Directive 98/37/EC

Applications

- Backing Turbo Pumps • Electron Microscopes
- Vacuum Ovens & Furnaces • Freeze Dryers
- Cluster Tool Load Locks • Sputter & Deposition Systems

Typical Installation



Ordering Information

MODEL 50-1.8 Vacuum Pump With Motor:

Note: Tolerance is ± 10% of nominal value for all voltages.

115 or 230V, 50 or 60 Hz, 1 phase, 0.15 kw (1/5 hp)

Full load amps @ 60 Hz: 2.6 or 1.8 amps

Full load amps @ 50 Hz: 2.43 or 1.8 amps

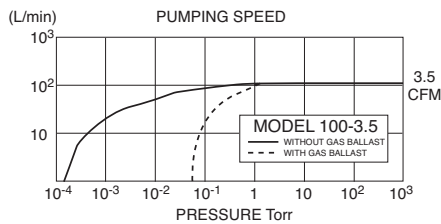
p/n 50-115/230\$1800.

Exhaust Mist EliminatorsSee Page 14

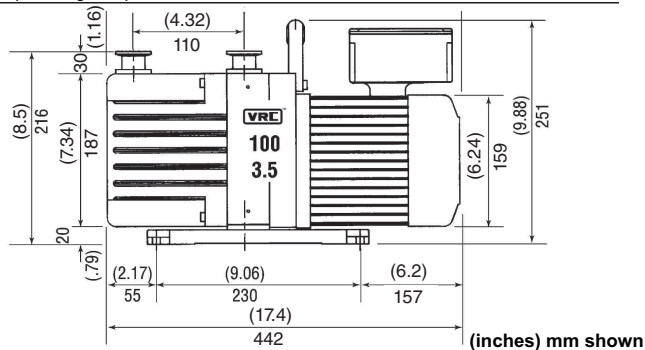
Fomblin: For pumps filled with Fomblin PFPE fluid YL VAC 16/6 add to p/n "Fomblin" and increase the price to\$2310.



Photo shows Pump with optional inlet trap and exhaust mist eliminator installed. See pages 14 and 15 to order these accessories. Power on/off switch, resettable circuit breaker and line cord are standard on pumps shipped with single phase motors.



Pumping Speed @ 60 Hz	100 l/min, 3.5 CFM, 6 m ³ /hr.
Pumping Speed @ 50 Hz	83 l/min, 3 CFM, 5 m ³ /hr.
Ultimate Pressure Gas Ballast Closed	5x10 ⁻⁴ Torr, 6.7x10 ⁻² Pa, .0006 mbar
Ultimate Pressure Gas Ballast Open	5x10 ⁻² Torr, 6.7 Pascal, .06 mbar
Standard Motor, On/Off Switch, Circuit Breaker, & Thermal Protection	115/208-230V, 1 phase, 1/2 hp, 60 Hz (50Hz Avail)
CE Mark, complies with	Machinery Directive 98/37/EC
Optional Motors	See ordering information
Power Connection	6 ft. (2 m) 3 conductor cord
Motor speed @ 60 Hz	1700 r.p.m.
Noise Level	50 dB
Water Vapor Tolerance	25 mbar, 19 Torr
Oil capacity	500 cc; 0.53 Qt.
Weight Net: 50 lbs., 23 kg	Shipping: 54 lbs., 24 kg
Intake & exhaust type/diameter	NW-25 standard (NW-16 or 26 mm O.D. Tube optional)
Ambient operating temperature	7° to 40°C, 45° to 104°F



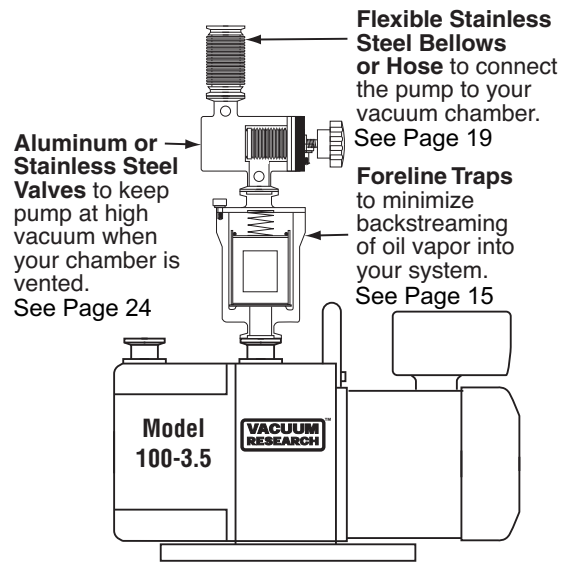
Features

- Extremely Quiet • Anti Suck Back Design
- Satisfaction Guaranteed • Two Year Warranty
- Virtually Vibration Free • Motors for Any Voltage
- Complies with Machinery Directive 98/37/EC

Applications

- Backing Turbo Pumps • Electron Microscopes
- Vacuum Ovens & Furnaces • Freeze Dryers
- Cluster Tool Load Locks • Sputter & Deposition Systems

Typical Installation



Ordering Information

MODEL 100-3.5 Vacuum Pump With Motor:

Note: Tolerance is ± 10% of nominal value for all voltages.

100 or 200V, 50 or 60 Hz, 1 phase, 0.4 kw (1/2 hp)
p/n 100-100/200-50/60 or 100-100/200-50/60-NW16\$1900.

115 or 208 to 230V, 60 Hz, 1phase, 0.4 kw (1/2 hp)
 Full load amps: 8.5 or 4.5 to 4.0 amps
p/n 100-115/230-60 or 100-115/230-60-NW16\$1900.

115 or 230V, 50 or 60 Hz, 1 phase, 0.4 kw (1/2 hp)
 Full load amps @ 50 Hz; 8.8 or 4.4 A @ 60 Hz; 7.2 or 3.6 A
p/n 100-115/230-50/60 or 100-115/230-50/60-NW16\$1900.

230 or 380V, 50 or 60 Hz, 3 phase, 0.4 kw (1/2 hp)
 Full load current: 1.82 or 1.3 A
p/n 100-OPT-380-50/60 or 100-OPT-380-50/60-NW16\$1900.

230 or 460V, 60 Hz, 3 phase, 0.4 kw (1/2 hp) Full load current: 1.8 or 0.9 A
p/n 100-230-/460-60 or 100-230-/460-60-NW16\$1900.

Exhaust Mist EliminatorsSee Page 14

Optional NW-16 Inlet & Outlet\$52.

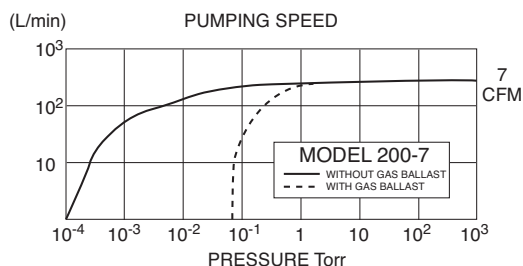
Fomblin: For pumps filled with Fomblin PFPE fluid YL VAC 16/6 add to p/n "Fomblin" and increase the price to\$2410.



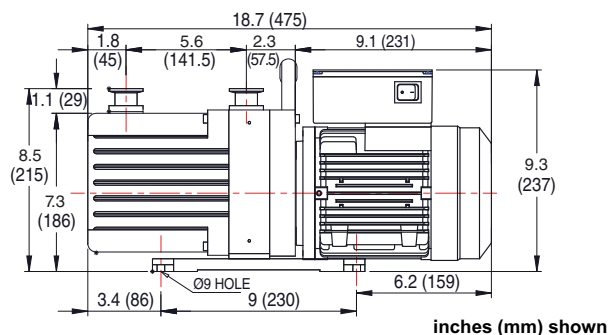
200 l/min • 7 CFM • 12 m³/hr. Two Stage Rotary Vane Vacuum Pump



Photo shows Pump with optional inlet trap and exhaust mist eliminator installed. See pages 14 and 15 to order these accessories. Power on/off switch, resettable circuit breaker and line cord are standard on pumps shipped with single phase motors.



Pumping Speed @ 60 Hz	200 l/min, 7.0 CFM, 12 m ³ /hr.
Pumping Speed @ 50 Hz	166 l/min, 5.8 CFM, 10 m ³ /hr.
Ultimate Pressure Gas Ballast Closed	5x10 ⁻⁴ Torr, 6.7x10 ⁻² Pa, .0006 mbar
Ultimate Pressure Gas Ballast Open	5x10 ⁻² Torr, 6.7 Pascal, .06 mbar
Standard Motor; On/Off Switch, Circuit Breaker & Thermal Protection, CE Mark, complies with	115/208-230V, 1 phase, 1/2 hp, 60 Hz (50Hz Avail) Machinery Directive 98/37/EC
Optional Motors	See ordering information
Power Connection	6 ft. (2 m) 3 conductor cord
Motor speed @ 60 Hz	1700 r.p.m.
Noise Level	50 dB
Water Vapor Tolerance	25 mbar, 19 Torr
Oil capacity	600 cc; 0.63 Qt.
Weight Net: 50 lbs., 23 kg	Shipping: 54 lbs., 24 kg
Intake & exhaust type/diameter	NW-25 standard (NW-16 or 26 mm O.D. Tube optional)
Ambient operating temperature	7° to 40°C, 45° to 104°F



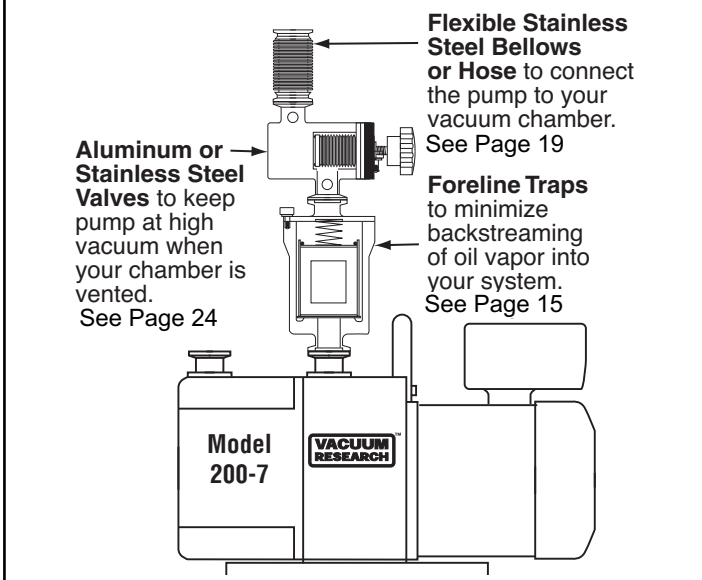
Features

- Extremely Quiet • Anti Suck Back Design
- Satisfaction Guaranteed • Two Year Warranty
- Virtually Vibration Free • Motors for Any Voltage
- Complies with Machinery Directive 98/37/EC

Applications

- Backing Turbo Pumps • Electron Microscopes
- Vacuum Ovens & Furnaces • Freeze Dryers
- Cluster Tool Load Locks • Sputter & Deposition Systems

Typical Installation



Ordering Information

MODEL 200-7 Vacuum Pump With Motor:

Note: Tolerance is ± 10% of nominal value for all voltages.

100 or 200V, 50 or 60 Hz, 1 phase, 0.4 kw (1/2 hp)
p/n 200-100/200-50/60 or 200-100/200-50/60-NW16 \$1980.

115 or 208 to 230V, 60 Hz, 1 phase, 0.4 kw (1/2 hp)
 Full load amps: 8.5 or 4.5 to 4.0 amps
p/n 200-115/230-60 or 200-115/230-60-NW16 \$1980.

115 or 230V, 50 or 60 Hz, 1 phase, 0.4 kw (1/2 hp)
 Full load amps @ 50 Hz; 8.8 or 4.4 A @ 60 Hz; 7.2 or 3.6 A
p/n 200-115/230-50/60 or 200-115/230-50/60-NW16 \$1980.

230 or 380V, 50 or 60 Hz, 3 phase, 0.4 kw (1/2 hp)
 Full load current: 1.82 or 1.3 A
p/n 200-OPT-380-50/60 or 200-OPT-380-50/60-NW16 \$1980.

230 or 460V, 60 Hz, 3 phase, 0.4 kw (1/2 hp) Full load current: 1.8 or 0.9 A
p/n 200-230-/460-60 or 200-230-/460-60-NW16 \$1980.

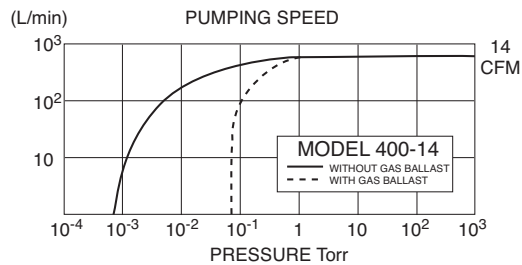
Exhaust Mist Eliminators See Page 14

Optional NW-16 Inlet & Outlet \$52.

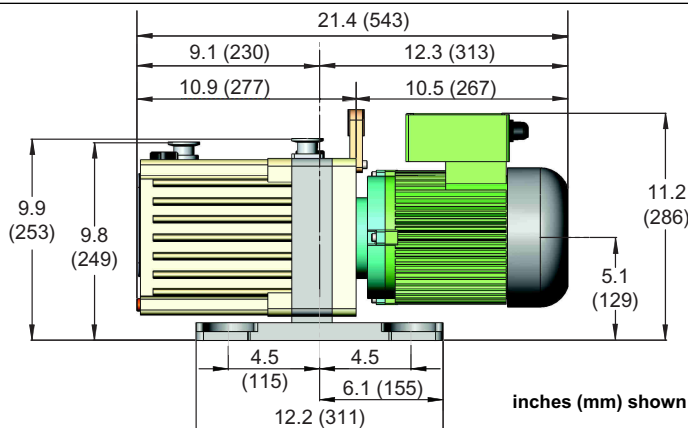
Fomblin: For pumps filled with Fomblin PFPE fluid YL VAC 16/6 add to p/n "Fomblin" and increase the price to \$2550.



Photo shows Pump with optional inlet trap and exhaust mist eliminator installed. See pages 14 and 15 to order these accessories.



Pumping Speed @ 60 Hz	400 l/min, 14 CFM, 24 m ³ /hr.
Pumping Speed @ 50 Hz	333 l/min, 11.6 CFM, 20 m ³ /hr.
Ultimate Pressure Gas Ballast Closed	5x10 ⁻⁴ Torr, 6.7x10 ⁻² Pa, .0006 mbar
Ultimate Pressure Gas Ballast Open	5x10 ⁻² Torr, 6.7 Pascal, .06 mbar
Standard Motor	115/230V, 1 phase, 50/60 Hz, 1 hp
CE Mark, complies with	Machinery Directive 98/37/EC
Power Connection	Junction Box
Motor speed @ 60 Hz	1700 r.p.m.
Noise Level	52 dB
Water Vapor Tolerance	30 mbar, 22 Torr
Oil capacity	1500 cc; 1.5 Qt.
Weight Net: 70 lbs., 32 kg	Shipping: 75 lbs., 34 kg
Intake & exhaust type or diameter	NW-25 or 26 mm O.D. Tube
Ambient operating temperature	7° to 40°C, 45° to 104°F



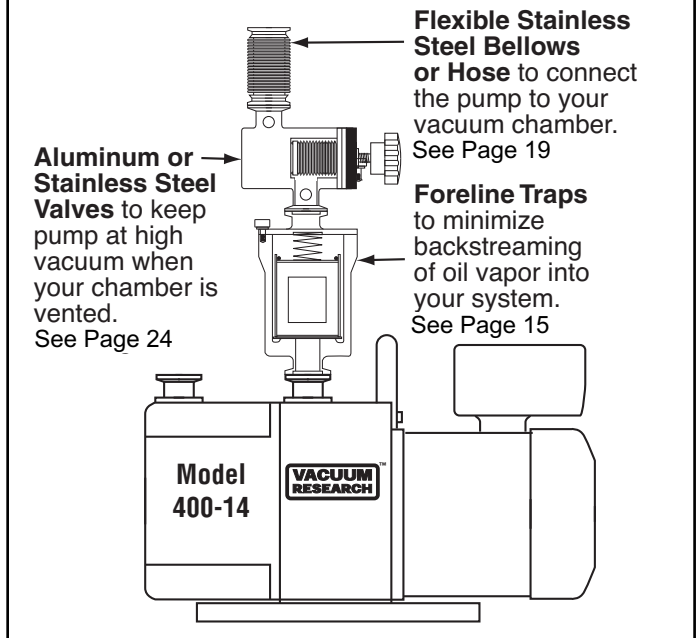
Features

- Extremely Quiet • Anti Suck Back Design
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- Virtually Vibration Free • Motors for Any Voltage
- Complies with Machinery Directive 98/37/EC

Applications

- Backing Turbo Pumps • Electron Microscopes
- Vacuum Ovens & Furnaces • Freeze Dryers
- Cluster Tool Load Locks • Sputter & Deposition Systems

Typical Installation



Ordering Information

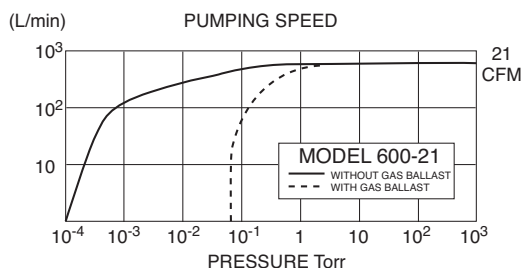
MODEL 400-14 Vacuum Pump With Motor:

Note: Tolerance is ± 10% of nominal value for all voltages.

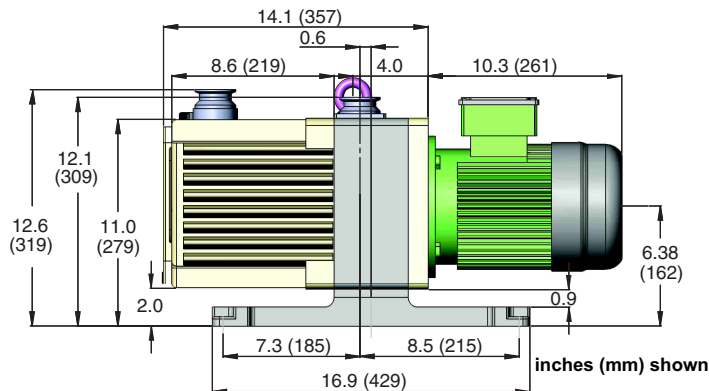
- 100 or 200V, 50 or 60 Hz, 1 phase, 0.75 kw (1 hp)
 p/n 400-100/200-50/60 \$2700.
- 115 or 230V, 50 or 60 Hz, 1 phase, 0.75 kw (1 hp)
 Full load amps @ 50 Hz; 14.7 or 8.5 A @ 60 Hz; 13 or 7.5 A
 p/n 400-115/230-50/60 \$2700.
- 220 or 380V, 50 or 60 Hz, 3 phase, 0.75 kw (1 hp)
 Full load current: @50 Hz; 3.6 or 2.1 A
 @60 Hz; 3.1 or 1.8 A
 p/n 400-OPT-380-50/60 \$2700.
- 230 or 460V, 60 Hz, 3 phase, 0.75 kw (1 hp) Full load
 current: 3.2 or 1.6 A
 p/n 400-230/460-60 \$2700.
- Exhaust Mist Eliminators See Page 14
- Fomblin: For pumps filled with Fomblin PFPE fluid YL VAC 16/6
 add to p/n "Fomblin" and increase the price to \$3950.



Photo shows Pump with optional inlet trap and exhaust mist eliminator installed. See pages 14 and 15 to order these accessories.



Pumping Speed @ 60 Hz	600 l/min, 21 CFM, 36 m ³ /hr.
Pumping Speed @ 50 Hz	500 l/min, 17.5 CFM, 30 m ³ /hr.
Ultimate Pressure Gas Ballast Closed	5x10 ⁻⁴ Torr, 6.7x10 ⁻² Pa, .0006 mbar
Ultimate Pressure Gas Ballast Open	5x10 ⁻² Torr, 6.7 Pascal, .06 mbar
Standard Motor, Thermal Protection CE Mark, complies with	230/380V, 3 phase, 50/60 Hz, 2 hp Machinery Directive 98/37/EC
Power Connection	Junction Box
Motor speed @ 60 Hz	1700 r.p.m.
Noise Level	54 dB
Water Vapor Tolerance	30 mbar, 22 Torr
Oil capacity	2300 cc; 2.4 Qt.
Weight Net: 117 lbs., 53 kg	Shipping: 133 lbs., 60 kg
Intake & Exhaust type or diameter	NW-40 or 36 mm O.D. Tube
Ambient operating temperature	7° to 40°C, 45° to 104°F



Features

- Extremely Quiet • Anti Suck Back Design
- Satisfaction Guaranteed • Two Year Warranty
- Virtually Vibration Free • Motors for Any Voltage
- Complies with Machinery Directive 98/37/EC

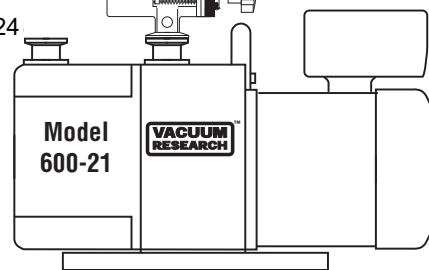
Applications

- Backing Turbo Pumps • Electron Microscopes
- Vacuum Ovens & Furnaces • Freeze Dryers
- Cluster Tool Load Locks • Sputter & Deposition Systems

Typical Installation

Aluminum or Stainless Steel Valves to keep pump at high vacuum when your chamber is vented. See Page 24

Flexible Stainless Steel Bellows or Hose to connect the pump to your vacuum chamber. See Page 19



Ordering Information

MODEL 600-21 Vacuum Pump With Motor:

Note: Tolerance is ± 10% of nominal value for all voltages.

200V, 50 or 60 Hz, 3 phase, 1.5 kw (2 hp)
 p/n 600-CE-100/200-50/60 \$4000.

230 or 460V, 60 Hz, 3 phase, 1.5 kw (2 hp)
 Full load current 6.0 or 3.0 Amps
 p/n 600-CE-230-460-60 \$4000.

220 or 380V, 50/60 Hz, 3 phase, 1.5 kw (2 hp)
 Full load Current @ 50 Hz; 6.5 or 4 A @60 Hz; 6.0 or 3.6 A
 p/n 600-CE-380-50/60 \$4000.

208 or 380V, 50 Hz, 3 phase, 1.5 kw (2 hp)
 Full load current: 7.2 or 4.0 Amps
 p/n 600-CE-380-50 \$4000.

Pumps with motors for other voltages and single phase power also available. Please contact the factory for price and availability.

Exhaust Mist Eliminators

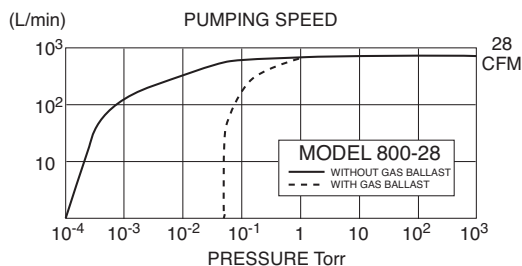
Exhaust Filter Coalescing filter for exhaust mist elimination. 99.97% removal efficiency of droplets down to 0.3 micron diameter. Model EX.FIL, NW-40, 21 cfm

p/n RV810240 \$373.

Fomblin: For pumps filled with Fomblin PFPE fluid YL VAC 16/6 add to p/n "Fomblin" and increase the price to \$5730.



Photo shows Pump with optional inlet trap and exhaust mist eliminator installed. See pages 14 and 15 to order these accessories.



Pumping Speed @ 60 Hz	800 l/min, 28 CFM, 48 m ³ /hr.
Pumping Speed @ 50 Hz	666 l/min, 23 CFM, 40 m ³ /hr.
Ultimate Pressure Gas Ballast Closed	5x10 ⁻⁴ Torr, 6.7x10 ⁻² Pa, .0006 mbar
Ultimate Pressure Gas Ballast Open	5x10 ⁻² Torr, 6.7 Pascal, .06 mbar
Standard Motor, Thermal Protection, CE Mark, complies with	230/380V, 3 phase, 50/60 Hz, 2 hp Machinery directive 98/37/EC
Power Connection	Junction Box
Motor speed @ 60 Hz	1700 r.p.m.
Noise Level	54 dB
Water Vapor Tolerance	40 mbar, 30 Torr
Oil capacity	2700 cc; 2.9 Qt.
Weight Net: 117 lbs., 53 kg	Shipping: 133 lbs., 60 kg
Intake & Exhaust type or diameter	NW-40 or 36 mm O.D. Tube
Ambient operating temperature	7° to 40°C, 45° to 104°F

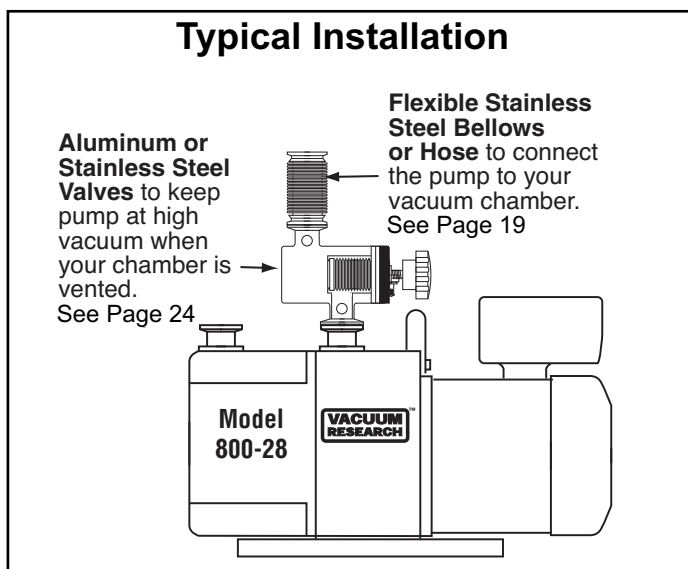
Features

- Extremely Quiet • Anti Suck Back Design
- Satisfaction Guaranteed • Two Year Warranty
- Virtually Vibration Free • Motors for Any Voltage
- Complies with Machinery Directive 98/37/EC

Applications

- Backing Turbo Pumps • Electron Microscopes
- Vacuum Ovens & Furnaces • Freeze Dryers
- Cluster Tool Load Locks • Sputter & Deposition Systems

Typical Installation



Ordering Information

MODEL 800-28 Vacuum Pump With Motor:

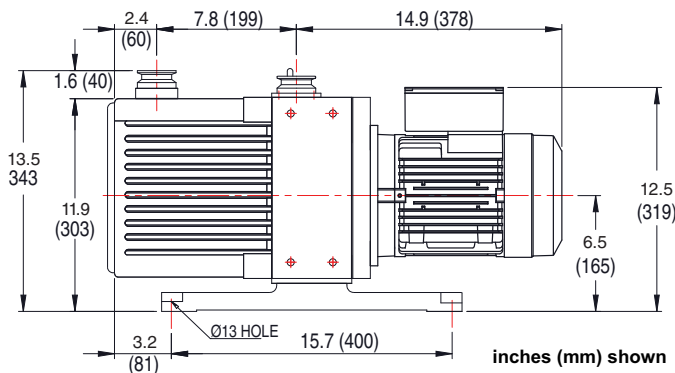
- Note: Tolerance is ± 10% of nominal value for all voltages.
- 200V, 50 or 60 Hz, 3 phase, 1.5 kw (2 hp)
p/n 800-CE-100/200-50/60 **\$5450.**
 - 230 or 460V, 60 Hz, 3 phase, 1.5 kw (2 hp)
 Full load current 6.0 or 3.0 Amps
p/n 800-CE-230-460-60 **\$5450.**
 - 220 or 380V, 50/60 Hz, 3 phase, 1.5 kw (2 hp)
 Full load Current @ 50 Hz; 6.5 or 4 A @60 Hz; 6.0 or 3.6 A
p/n 800-CE-380-50/60 **\$5450.**
 - 208 or 380V, 50 Hz, 3 phase, 1.5 kw (2 hp)
 Full load current: 7.2 or 4.0 Amps
p/n 800-CE-380-50 **\$5450.**

Pumps with motors for other voltages and single phase power also available. Please contact the factory for price and availability.

Exhaust Mist Eliminators

- Exhaust Filter** Coalescing filter for exhaust mist elimination. 99.97% removal efficiency of droplets down to 0.3 micron diameter.
 Model EX.FIL, NW-40, 28 cfm
p/n RV810240 **\$373.**

Fomblin: For pumps filled with Fomblin PFPE fluid YL VAC 16/6 add to p/n "Fomblin" and increase the price to **\$720.**

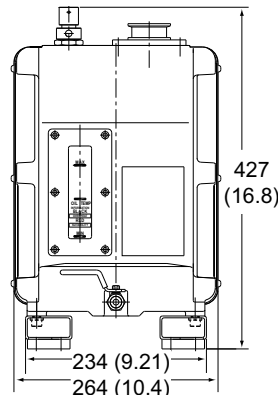
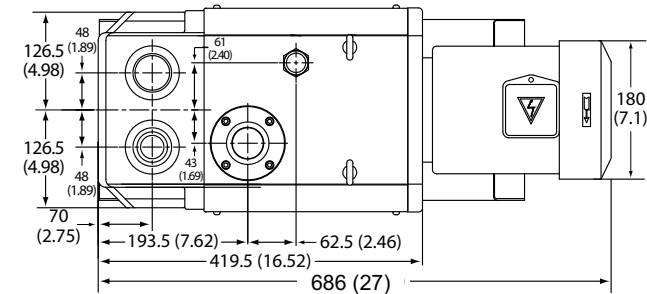
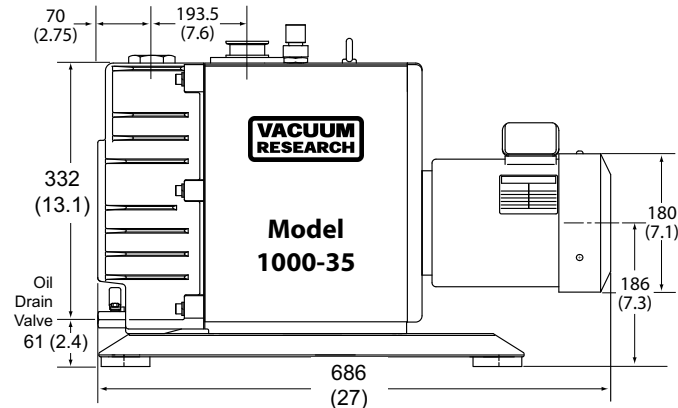




1000 l/min • 35 CFM • 60 m³/hr. Two Stage Rotary Vane Vacuum Pump



Model 1000-35 has NW-40 flanges for inlet and exhaust ports



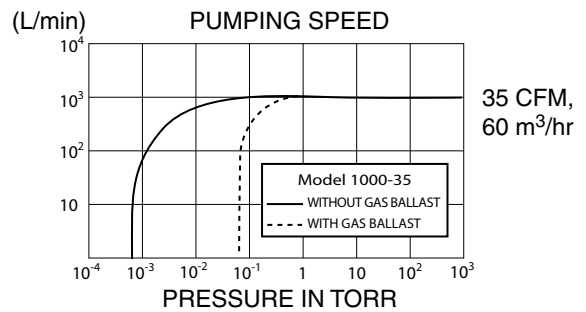
mm (inches) shown

Features

- Extremely Quiet • Anti Suck Back Design
- Satisfaction Guaranteed • Two Year Warranty
- Virtually Vibration Free • Motors for Any Voltage
- Complies with Machinery Directive 98/37/EC

Applications

- Plasma Systems • Electron Microscopes
- Vacuum Ovens & Furnaces • Freeze Dryers
- Cluster Tool Load Locks • Backing Turbo Pumps • Sputter & Deposition Systems



Pumping Speed @ 60 Hz	1000 l/min, 35 CFM, 60 m ³ /hr.
Pumping Speed @ 50 Hz	833 l/min, 29 CFM, 50 m ³ /hr.
Ultimate Pressure Gas Ballast Closed	5 x 10 ⁻⁴ Torr, 6.7x10 ⁻² Pa, .0006 mbar
Ultimate Pressure Gas Ballast Open	5 x 10 ⁻² Torr, 6.7 Pascal, .06 mbar
Standard Motor,	220/380V, 3 phase, 2 hp, 50/60 Hz
CE Mark, complies with	Machinery Directive 98/37/EC
Optional Motors	See ordering information
Power Connection	Junction box
Motor speed @ 60 Hz	1700 r.p.m.
Noise Level	56 dB
Water Vapor Tolerance	40 mbar, 30 Torr
Oil capacity	4500 cc; 4.75 Qt.
Lifting Lugs (on center of gravity)	2 Rings, 3/4" (19 mm) ID, M8 Thread
Holes in Base for Lag Bolts	4 Holes, 0.5" (12 mm) 20"x7" (508x178)
Weight Net: 176 lbs., 80 kg	Shipping: 276 lbs., 125 kg
Intake & exhaust type/diameter	NW-40 standard (Contact factory for more options)
Inlet Screen	Cone Shaped Removable Screen
Ambient operating temperature	7° to 40°C, 45° to 104°F

Ordering Information

MODEL 1000-35 Vacuum Pump With Motor:

Note: Tolerance is ± 10% of nominal value for all voltages.

200V, 50/60 Hz, 3 phase, 1.5 kw (2 hp)	
p/n 1000-CE-200 50/60	.....\$7220.
220/380V, 50/60 Hz, 3 phase, 1.5 kw (2 hp)	
p/n 1000-CE-380 50/60	.....\$7220.
230/460V, 50/60 Hz, 3 phase, 1.5 kw (2 hp)	
p/n 1000-CE-230-460 50/60	.....\$7220.

Fomblin: For pumps filled with Fomblin PFPE fluid YL VAC 16/6 add to p/n "Fomblin" and increase the price to\$9950.



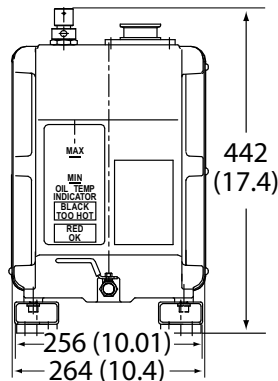
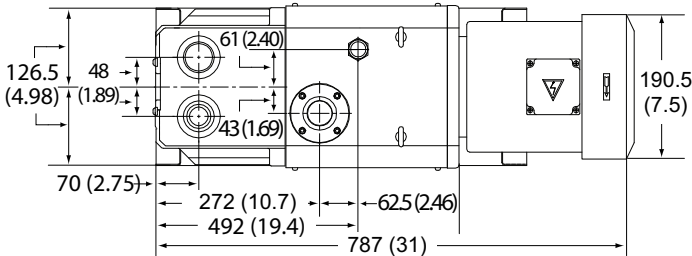
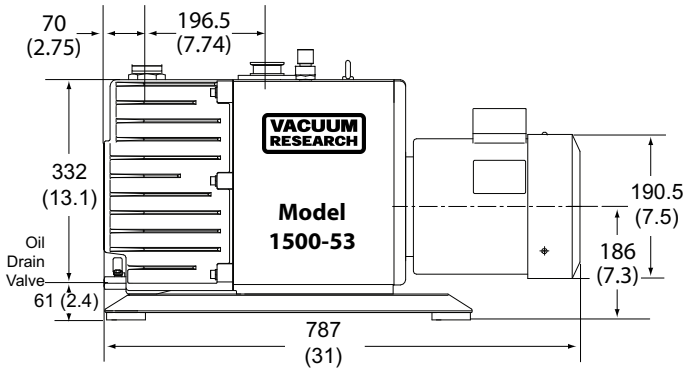
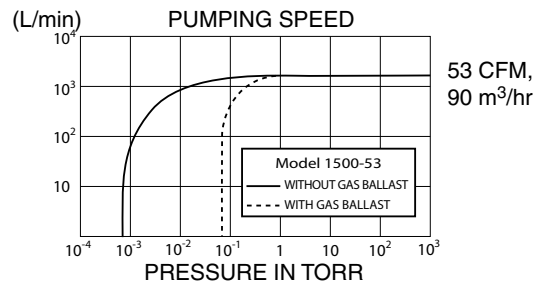
Model 1500-53 has NW-40 flanges for inlet and exhaust ports

Features

- Extremely Quiet • Anti Suck Back Design
- Satisfaction Guaranteed • Two Year Warranty
- Virtually Vibration Free • Motors for Any Voltage
- Complies with Machinery Directive 98/37/EC

Applications

- Plasma Systems • Electron Microscopes
- Vacuum Ovens & Furnaces • Freeze Dryers
- Cluster Tool Load Locks • Backing Turbo Pumps • Sputter & Deposition Systems



mm (inches) shown

Pumping Speed @ 60 Hz	1500 l/min, 53 CFM, 90 m ³ /hr.
Pumping Speed @ 50 Hz	1250 l/min, 44 CFM, 75 m ³ /hr.
Ultimate Pressure Gas Ballast Closed	5 x 10 ⁻⁴ Torr, 6.7x10 ⁻² Pa, .0006 mbar
Ultimate Pressure Gas Ballast Open	5 x 10 ⁻² Torr, 6.7 Pascal, .06 mbar
Standard Motor,	220/380V, 3 phase, 5 hp, 50/60 Hz
CE Mark, complies with	Machinery Directive 98/37/EC
Optional Motors	See ordering information
Power Connection	Junction box
Motor speed @ 60 Hz	1700 r.p.m.
Noise Level	56 dB
Water Vapor Tolerance	40 mbar, 30 Torr
Oil capacity	6200 cc; 6.5 Qt.
Lifting Lugs (on center of gravity)	2 Rings, 3/4" (19 mm) ID, M8 Thread
Holes in Base for Lag Bolts	4 Holes, 0.5" (12 mm) 22"x7" (550x178)
Weight Net: 242 lbs., 110 kg	Shipping: 367 lbs., 167 kg
Intake & exhaust type/diameter	NW-40 standard (Contact factory for more options)
Inlet Screen	Cone Shaped Removable Screen
Ambient operating temperature	7° to 40°C, 45° to 104°F

Ordering Information

MODEL 1500-53 Vacuum Pump With Motor:

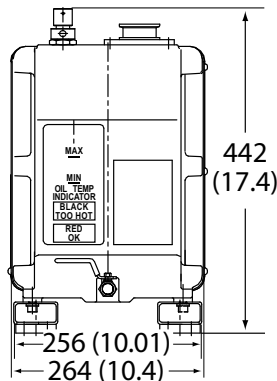
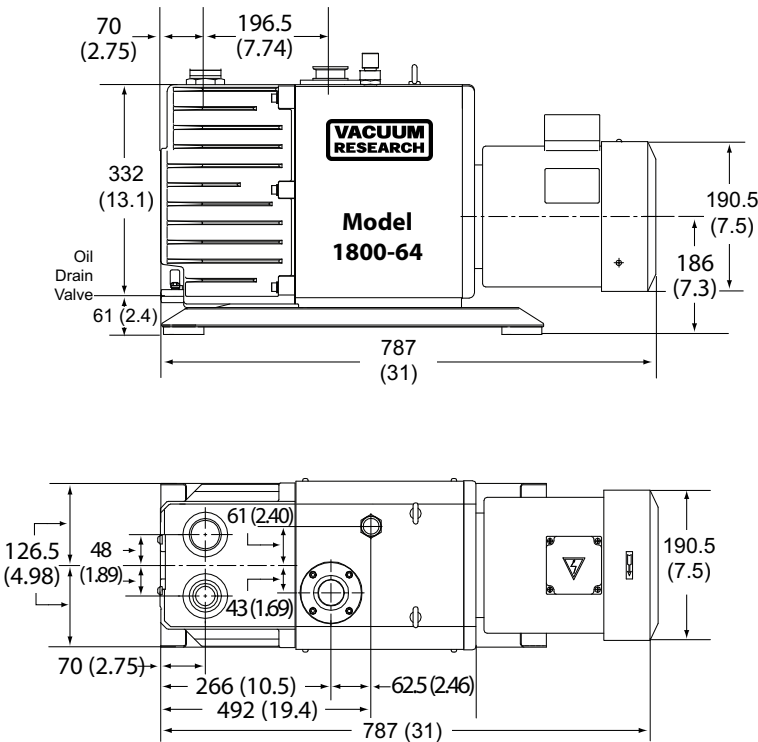
Note: Tolerance is ± 10% of nominal value for all voltages.

- 200V, 50/60 Hz, 3 phase, 3.7 kw (5 hp)
p/n 1500-CE-200 50/60 \$7960.
- 220/380V, 50/60 Hz, 3 phase, 3.7 kw (5 hp)
p/n 1500-CE-380 50/60 \$7960.
- 230/460V, 50/60 Hz, 3 phase, 3.7 kw (5 hp)
p/n 1500-CE-230-460 50/60 \$7960.

Fomblin: For pumps filled with Fomblin PFPE fluid YL VAC 16/6 add to p/n "Fomblin" and increase the price to \$11,820.



Model 1800-64 has NW-40 flanges for inlet and exhaust ports



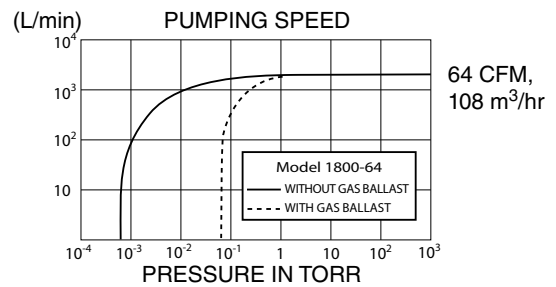
mm (inches) shown

Features

- Extremely Quiet • Anti Suck Back Design
- Satisfaction Guaranteed • Two Year Warranty
- Virtually Vibration Free • Motors for Any Voltage
- Complies with Machinery Directive 98/37/EC

Applications

- Plasma Systems • Electron Microscopes
- Vacuum Ovens & Furnaces • Freeze Dryers
- Cluster Tool Load Locks • Backing Turbo Pumps • Sputter & Deposition Systems



Pumping Speed @ 60 Hz	1800 l/min, 64 CFM, 108 m ³ /hr.
Pumping Speed @ 50 Hz	1500 l/min, 53 CFM, 90 m ³ /hr.
Ultimate Pressure Gas Ballast Closed	5 x 10 ⁻⁴ Torr, 6.7x10 ⁻² Pa, .0006 mbar
Ultimate Pressure Gas Ballast Open	5 x 10 ⁻² Torr, 6.7 Pascal, .06 mbar
Standard Motor,	220/380V, 3 phase, 5 hp, 50/60 Hz
CE Mark, complies with	Machinery Directive 98/37/EC
Optional Motors	See ordering information
Power Connection	Junction box
Motor speed @ 60 Hz	1700 r.p.m.
Noise Level	57 dB
Water Vapor Tolerance	40 mbar, 30 Torr
Oil capacity	6200 cc; 6.5 Qt.
Lifting Lugs (on center of gravity)	2 Rings, 3/4" (19 mm) ID, M8 Thread
Holes in Base for Lag Bolts	4 Holes, 0.5" (12 mm) 22"x7" (550x178)
Weight Net: 265 lbs., 120 kg	Shipping: 410 lbs., 186 kg
Intake & exhaust type/diameter	NW-40 standard (Contact factory for more options)
Inlet Screen	Cone Shaped Removable Screen
Ambient operating temperature	7° to 40°C, 45° to 104°F

Ordering Information

MODEL 1800-64 Vacuum Pump With Motor:

Note: Tolerance is ± 10% of nominal value for all voltages.

200V, 50/60 Hz, 3 phase, 3.7 kw (5 hp)
p/n 1800-CE-200 50/60\$8760.

220/380V, 50/60 Hz, 3 phase, 3.7 kw (5 hp)
p/n 1800-CE-380 50/60\$8760.

230/460V, 50/60 Hz, 3 phase, 3.7 kw (5 hp)
p/n 1800-CE-230-460 50/60\$8760.

Fomblin: For pumps filled with Fomblin PFPE fluid YL VAC 16/6 add to p/n "Fomblin" and increase the price to\$12,260.

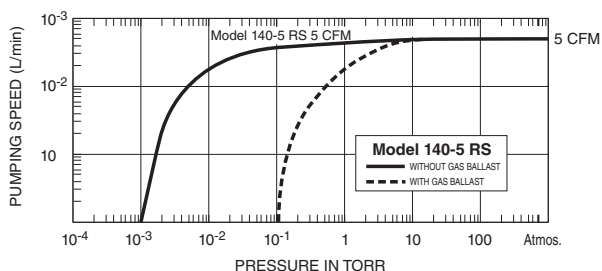


Features

- Extremely Quiet
- Virtually Vibration Free
- Two Year Warranty
- Anti Suck Back Design
- Corrosion Resistant
- Motors for Any Voltage
- Satisfaction Guaranteed
- Complies with Machinery Directive 98/37/EC

Applications

- Refrigeration and A/C Service
- Vacuum Ovens and Furnaces
- Electron Microscopes
- Freeze Dryers
- Cluster Tool Load Locks
- Sputter and Deposition Systems



Pumping Speed @ 60 Hz	140 l/min, 5 CFM, 8.5 m ³ /hr.
Ultimate Pressure Gas Ballast Closed	5x10 ⁻³ Torr, .007 mbar, 5 Microns
Ultimate Pressure Gas Ballast Open	5x10 ⁻² Torr, .07 mbar, 50 Microns
Standard Motor, Includes On/Off Switch & Circuit Breaker	115V, 1 phase, 60 Hz, 1/2 hp
CE Mark, complies with	Machinery Directive 98/37/EC
Optional Motor	230V, 1 phase, 50 Hz, 1/2 hp
Power Connection	6 ft. (2 m) 3 conductor cord
Motor speed @ 60 Hz	1700 r.p.m.
Oil capacity	500 cc; 0.53 Qt.
Weight Net: 40 lbs., 18 kg	Shipping wt.: 45 lbs., 21 kg
Intake & exhaust type/diameter	Tee with 1 of 3/8 & 1 of 1/4 in. fittings NW-16 or NW-25 optional
Exhaust	Through Handle
Ambient operating temperature	7° to 40°C, 45° to 104°F

Ordering Information

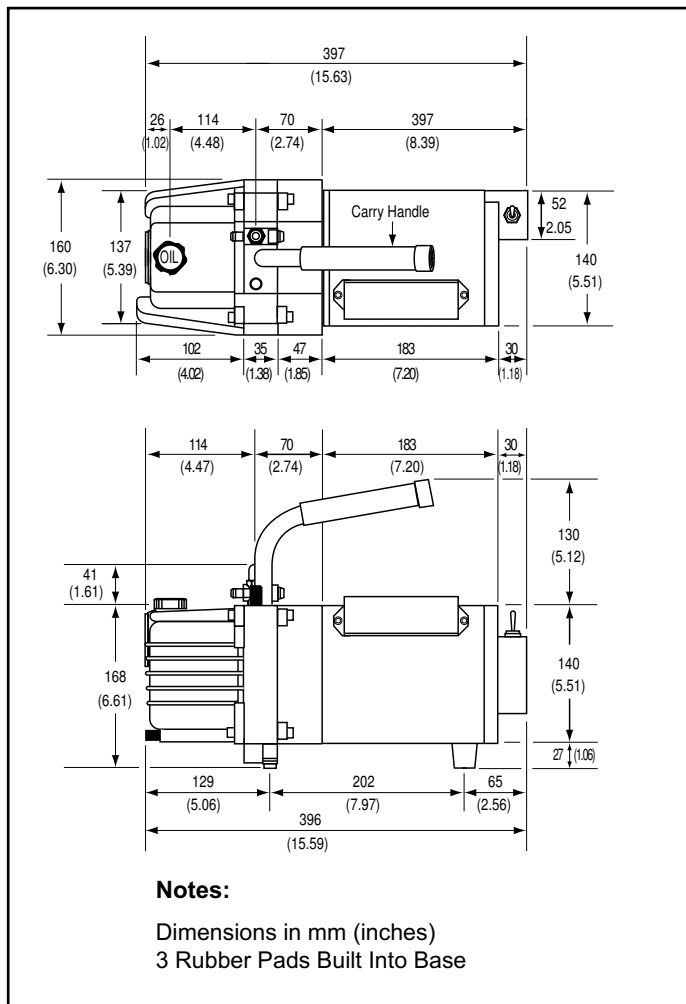
MODEL 140-5 Rotary Vane Vacuum Pump

p/n 140-115-60 115V, 60 Hz, 1 phase, 1/2 hp \$900.

p/n 140-230-60 230V, 50 Hz, 1 phase, 1/2 hp \$900.

NW-16 or NW-25 Intake instead of tube tee described in specifications. Order as a separate item: P/N 140-16 or P/N 140-25 . . . \$70.

NW-16 and NW-25 intake flanges face the side of the pump.



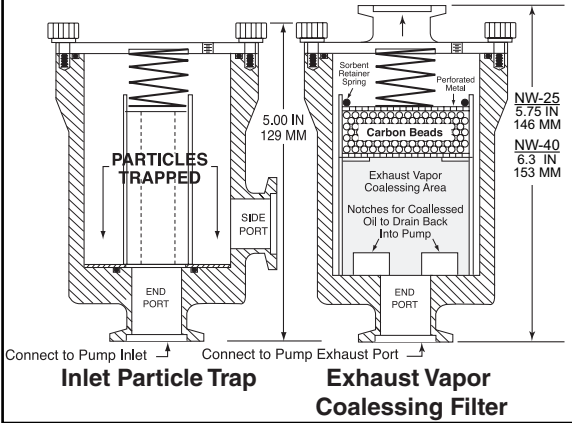
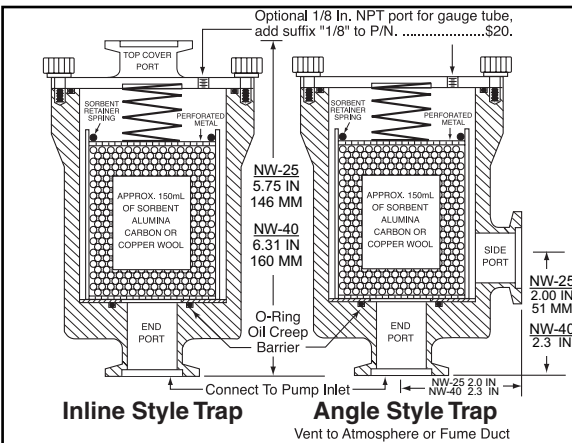


Foreline Traps to Keep Pump Vapor Out of Your System



Photo shows Inline style and Angle style with NW-25 flanges. NW-16, NW-40, and connections for 3/4" and 1" rubber hose also available.

- Select Copper Wool, Activated Alumina or Carbon
- Available in Both Right Angle and Inline Styles
- Orient in Any Direction, Spring Loaded Sorbent Bed
- Positive Creep Proof Design with O-Ring Seal
- Fits Pumps up to 21 CFM, 36 m³/Hr, 600 l/min.
- Leak Tested to Better than 2 X 10⁻⁹ scc/sec
- Any Mix of Ports for Rubber Hose or NW Flanges
- No Tools Needed For Easy Sorbent Replacement
- Aluminum Body and Sorbent Basket; 316 SS Spring



Inline Trap		Exhaust Vapor Coalescing Filter		Port Size & Flange Style
Part Number	Price	Any Angle or Inline P/N	\$396.	
INLINE TRAP 16	\$376.	ANG EX COALES 16	INL EX COALES 16	NW-16 Flange
INLINE TRAP 25	\$376.	ANG EX COALES 25	INL EX COALES 25	NW-25 Flange
INLINE TRAP 3/4	\$376.	ANG EX COALES 3/4	INL EX COALES 3/4	3/4" Outside Diam.
INLINE TRAP 1.0	\$376.	ANG EX COALES 1.0	INL EX COALES 1.0	1" Outside Diam.
INLINE TRAP 40	\$535.	NOT AVAILABLE	NOT AVAILABLE	NW-40 Flange

Angle Trap		Inlet Particle Trap		Port Size & Flange Style
Part Number	Price	Part Number	Price	
ANGLE TRAP 16	\$376.	ANG TRAP PART 16	\$356.	NW-16 Flange
ANGLE TRAP 25	\$376.	ANG TRAP PART 25	\$356.	NW-25 Flange
ANGLE TRAP 3/4	\$376.	ANG TRAP PART 3/4	\$356.	3/4" Outside Diam.
ANGLE TRAP 1.0	\$376.	ANG TRAP PART 1.0	\$356.	1" Outside Diam.
ANGLE TRAP 40	\$535.	ANG TRAP PART 40	\$535.	NW-40 Flange

Also available with mixed flanges, such as: NW-16 on one port and NW-25 on the other. Specify Alumina, Carbon, Copper Wool Sorbent.

Replacement Sorbent and Spare Parts

Description	Part #	Price	Description	Part #	Price
Active Alumina Sorbent, approximately 300 ml (two charges)	V801163	\$25.	Sorbent Basket Assembly (without sorbent)	V801160	\$87.
Activated Carbon Sorbent, approximately 300 ml (two charges)	V801164	\$24.	Particle Trap Standpipe	V74050	\$66.
Copper Wool Sorbent, approximately 300 ml (two charges)	V801165	\$35.	Top Cover O-Ring	V206141	\$3.
			Sorbent Basket O-Ring	V206142	\$4.
			Spring	V308654	\$10.
			Thumb Screws, set of 4	V801162	\$3.

One container of two sorbent charges is included with each trap.



Inlet Trap with NW-40 Flanges

Pump Inlet Traps Keep Process Debris out of Pump

- Use with Vane, Piston & Scroll Vacuum Pumps
- Safeguard From Particles and Contamination
- Protect Vacuum System from Backstreaming

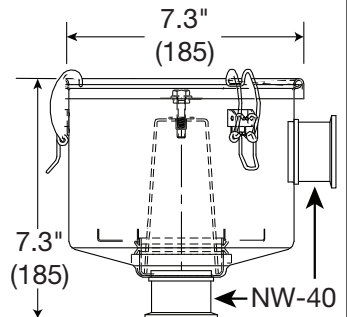
VRC's low cost inlet traps protect your pump from damage due to process debris entering the pump. Easy to change fiberglass, alumina or paper element and high flow NW-40 ports. Install in any orientation.

- P/N: INLET TRAP 40 FIBERGLASS\$690.
- P/N: INLET TRAP 40 ALUMINA\$690.
- P/N: INLET TRAP 40 PP (PAPER)\$690.

Replacement Fiberglass Element
P/N: RV801268\$24.

Replacement Alumina Element
P/N: RV810266\$24.

Replacement Paper Element
P/N: RV810267\$24.





Repair of VRC Vane Pumps

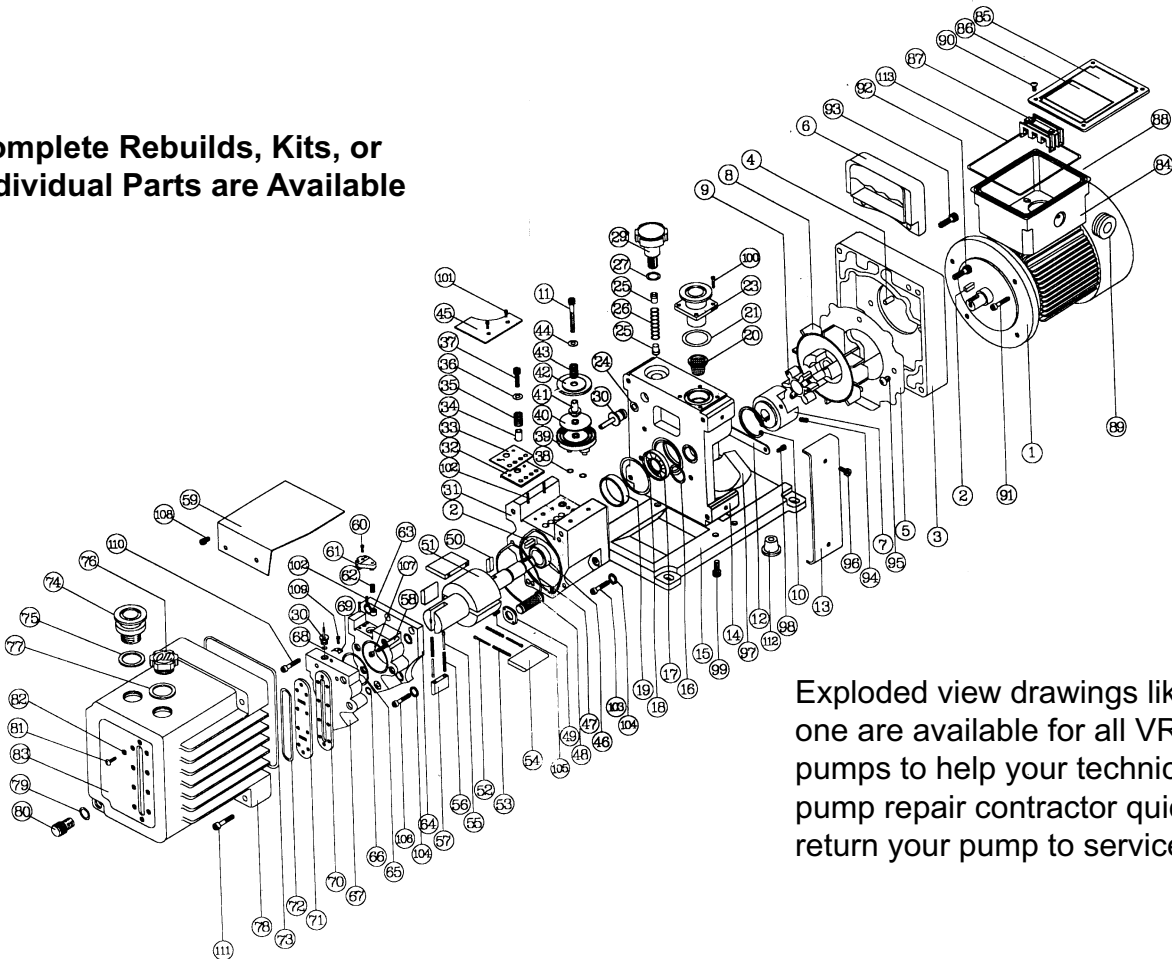
VRC Vane Pumps are extremely reliable and will give years of service in almost any application. This long service life is the reason for our 2 Year Warranty for both parts and labor. But also important is the ease with which the pumps can be repaired in the field if eventually repairs are needed. Virtually any mechanic using common hand tools and without special training can completely overhaul our pumps and, with the appropriate replacement parts, restore the pump to like new performance levels.

When provided with the proper replacement parts, your in-house technicians or local pump repair contractor can easily repair your VRC Pump. Part numbers, prices and complete ordering information for both minor and major parts kits are included in our paper catalog and at www.vacuumresearch.com. Exploded view drawings similar to the example below are available for all of our pumps. Minor and major kits for all models are in stock in Pittsburgh, and individual parts are also available.

With regard to getting the best performance from your Vacuum Pump, it is important to pay careful attention to the pump oil. Most obvious is to keep the oil level where it is supposed to be. Just as important is the color of the oil, and any change will tell you to change the oil, or at least run the pump with the gas ballast open. Unfortunately such monitoring is often easier said than done, because the pumps are typically installed on the floor, and in areas that are not so accessible. Best practice when installing your pump is to keep in mind the need to regularly monitor the sight glass and to periodically change the pump oil.

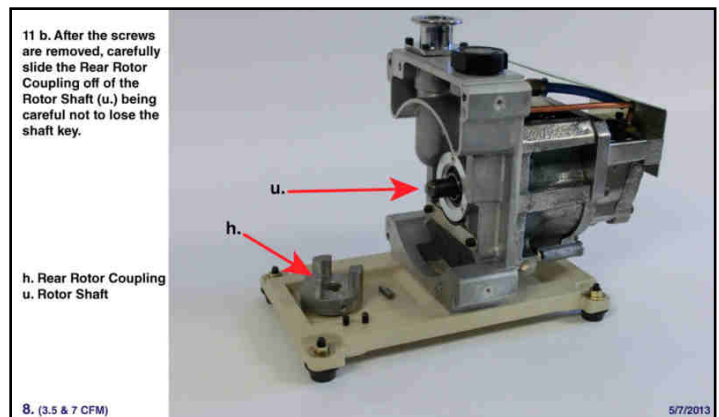
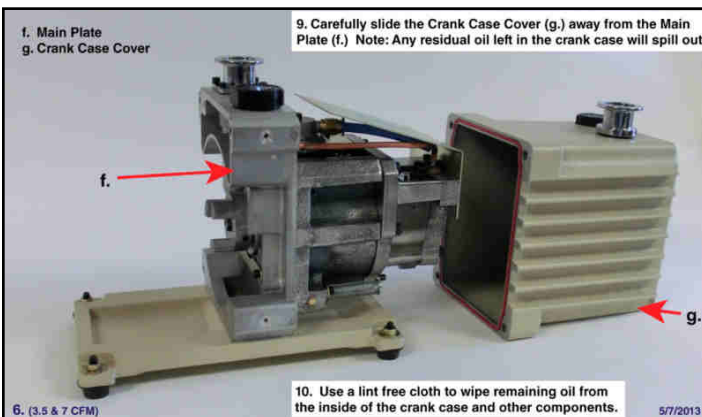
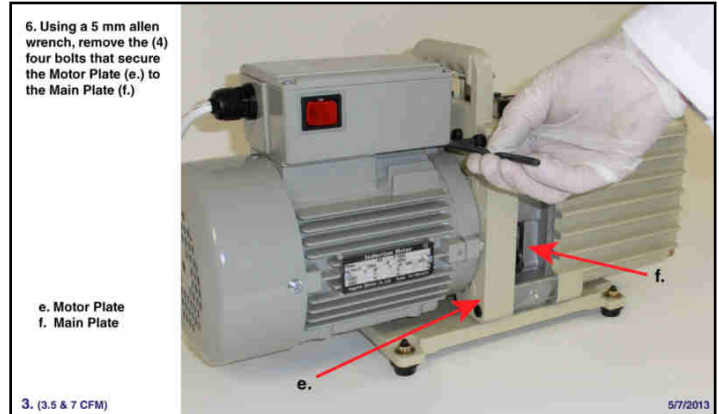
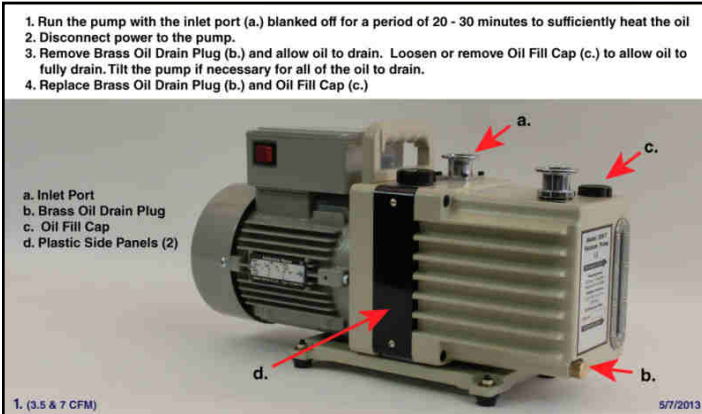


Complete Rebuilds, Kits, or Individual Parts are Available



Exploded view drawings like this one are available for all VRC pumps to help your technicians or pump repair contractor quickly return your pump to service.

An experienced pump repair technician with the correct replacement parts can rebuild any VRC pump using common hand tools and his personal experience with similar rotary vane pumps. As an aid to less experienced technicians and even those with no experience at all VRC provides for all pump models online repair guides with photographs and detailed instructions. Samples of the guides for our model 100-35 and 200-70 pumps are shown below. If during your attempt to rebuild your VRC pump you encounter some difficulty or have questions not covered by the guide you should not hesitate to call or email our factory in Pittsburgh. Naturally there is no charge for such questions.



Minor Parts Kits	Minor kits include all O-Rings, seals, check valves, and coupling inserts for the particular model of pump.	
Pump Capacity	Kit Part Number	Price
Model 50-1.8	RV 900005	\$95.
Model 100-3.5	RV 900001	\$110.
Model 200-7	RV 900002	\$115.
Model 400-14	RV 900004	\$145.
Model 600-21	RV 900006	\$170.
Model 800-28	RV 900008	\$290.
Model 1000-35	RV 900010	\$345.
Model 1500-53	RV 900015	\$360.
Model 1800-64	RV 900018	\$375.

Major Parts Kits	Major kits include all the O-Rings and seals found in the Minor Kits plus a complete set of valves, valve springs and spring guides.	
Pump Capacity	Kit Part Number	Price
Model 50-1.8	RV 9000050	\$315.
Model 100-3.5	RV 900100	\$330.
Model 200-7	RV 900200	\$410.
Model 400-14	RV 900400	\$530.
Model 600-21	RV 900600	\$815.
Model 800-28	RV 900800	\$940.
Model 1000-35	RV 901000	\$1,010.
Model 1500-53	RV 901500	\$1,150.
Model 1800-64	RV 901800	\$1,190.



Vacuum Pump Fluids and Exhaust Mist Eliminators



VPO-3000 Vacuum Pump Fluid

This hydrocarbon vacuum pump fluid is intended for use in VRC Rotary Vane Pumps. Our VPO-3000 fluid is a narrow cut distillation fraction that gives good ultimate vacuum with low back-streaming yet it provides the excellent lubrication needed for long pump life.

VPO-3000 is a good choice in a wide variety of general and special vacuum services that require frequent pumpdown cycles including optical film coating, heat treating furnaces, vacuum ovens, decorative coatings by evaporation, sputtering and LPCVD.

Specifications VPO-3000

Vapor Pressure
(Torr) @ 25°C 1 x 10⁻⁶
Boiling Point
@ 0.01 Torr 130 °C
Pour Point -13 °C
Flash Point 241 °C
Fire Point 253 °C
Specific Gravity (g/cc) ... 0.872

Viscosity (cSt/SUS)
@40 °C/100 °F 63.9/320
@100 °C/210 °F 8.5/54
Form Clear amber liquid
Hazardous
Decomposition None
Incompatibility Flame
Hazardous Ingredients .. None

Size / Volume	Part Number	Price
1 gallon (3.8 liter)	VPO-3000GAL	\$28.00
5 gallon pail (18.9 liter)	VPO-30005GAL	\$140.00



VPF-1000 Vacuum Pump Flushing Fluid

This flushing fluid was developed to improve and simplify cleaning procedures for VRC Rotary Vane Pumps. This low viscosity fluid will flush out particulates and residuals that usually settle in the bottom of pumps.

Flushing with VPF-1000 is recommended during oil changes before the addition of the new fluid as part of a regular preventive maintenance program. Such regular use improves the service life of all mechanical pumps. It is recommended that the pump be drained while hot, filled with flushing fluid and run for about 10 minutes to properly flush. The pump is then immediately drained again and refilled with our VPO-3000.

Specifications VPF-1000

Vapor Pressure
(Torr) @ 25°C 1 x 10⁻⁵
Boiling Point
@ 0.01 Torr 112 °C
Pour Point -15 °C
Flash Point 218 °C
Fire Point 244 °C
Specific Gravity (g/cc) ... 0.860

Viscosity (cSt/SUS)
@40 °C/100 °F 28/150
@100 °C/210 °F 4.5/41
Form Clear amber liquid
Hazardous
Decomposition None
Incompatibility Flame
Hazardous Ingredients .. None

Size / Volume	Part Number	Price
1 gallon (3.8 liter)	VPF-1000GAL	\$24.00
5 gallon pail (18.9 liter)	VPF-10005GAL	\$115.00

Exhaust Mist Eliminators



For 100-3.5 & 200-7 Pumps
Model Ex. Fil. **NW-25 7 cfm**, P/N RV810220\$211.

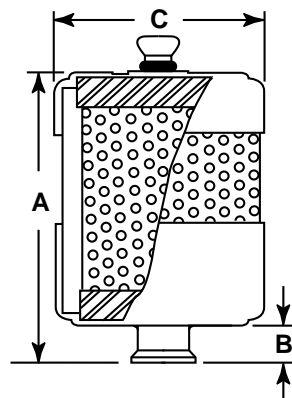
For 400-14 Pumps
Model Ex. Fil. **NW-25 14 cfm**, P/N RV810230.....\$265.

For Applications with High Flow
Model Ex. Fil. **NW-25**, P/N RV810250\$340.

For 600-21, 800-28, 1000-35, 1500-53 & 1800-64 Pumps
Model Ex. Fil. **NW-40 64 cfm**, P/N RV810240....\$481.

Replacement Fiberglass Elements

Model RPL. Elem. 7 cfm P/N RV810221 (4.0 in. high X 2.2 in. O.D.).....\$42.
Model RPL. Elem. 14 cfm P/N RV810231 (3.8 in. high X 4.0 in. O.D.).....\$67.
Model RPL. Elem. 64 cfm P/N RV810241 (4.75 in. high X 9.2 in. O.D.).....\$176.
Model RPL. Elem. Hi Flo P/N RV810251 (6.15 in. high X 4.0 in. O.D.).....\$67.



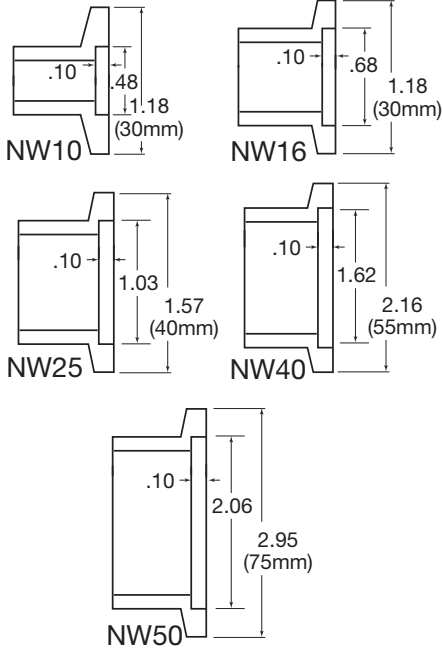
Dimensions					
P/N	A Height	B	C Diameter	Flanges	Flow
RV 810220	5.5	0.88	2.5	NW-25	3.5 or 7 cfm pumps
RV 810230	5.25	0.88	5.13	NW-25	10 to 14 cfm pumps High Flow Applications
RV 810240	7.13	2.13	10.25	NW-40	20 to 64 cfm pumps
RV 810250	9.25	0.88	5.13	NW-25	High Flow Applications



NW Style Clamps, Centering Rings, Hose and Bellows

NW Style Flange Dimensions

May Still be Referred to as 'KF' or 'QF' Style



Centering Rings, SS, Viton O-Ring



Flange	A	B	Part No.	Price
NW 16	0.63 (16)	0.21 (53)	CTR-RING-16	\$4.00
NW 25	0.984 (25)	0.21 (53)	CTR-RING-25	\$5.00
NW 40	1.575 (40)	0.21 (53)	CTR-RING-40	\$7.00
NW 50	1.969 (50)	0.21 (53)	CTR-RING-50	\$9.00

Replacement Viton O-Rings

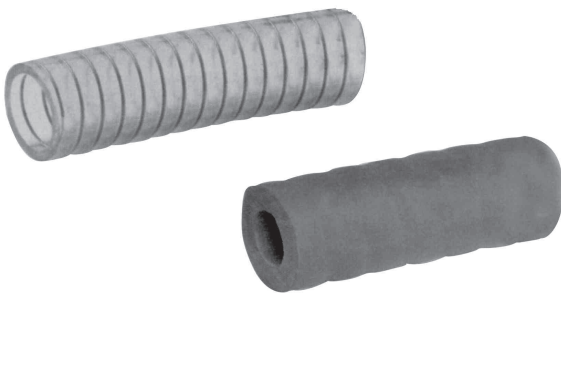
Part No.	Pack of 5
X701314V	\$8.00
X701320V	\$13.00
X701326V	\$17.00
X701330V	\$19.00

Clamps, Cast Aluminum



Flange	A	B	Thickness	Part No.	Price
NW 16	2.24 (57)	1.69 (43)	0.63 (16)	AL-CLAMP-16	\$4.00
NW 25	2.76 (70)	2.17 (55)	0.63 (16)	AL-CLAMP-25	\$5.00
NW 40	3.39 (88)	2.76 (70)	0.63 (16)	AL-CLAMP-40	\$6.00
NW 50	4.33 (110)	3.70 (94)	0.79 (20)	AL-CLAMP-50	\$8.00

Rubber and PVC Vacuum Hose

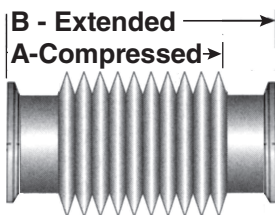


Hose Material	Hose I.D.	Hose O.D.	Part No.	Price
Rubber	.188 "	.563 "	HOSE-RUB-3/16"	\$8.00/Foot
Rubber	.25 "	.625 "	HOSE-RUB-1/4"	\$14.00/Foot
Rubber	.75 "	1.5 "	HOSE-RUB-3/4"	\$13.00/Foot
Rubber	1 "	2 "	HOSE-RUB-1"	\$22.00/Foot
Reinforced PVC	1.5 "	1.8125 "	HOSE-PVC-1.5"	\$13.00/Foot
Reinforced PVC	2 "	2.375 "	HOSE-PVC-2"	\$16.00/Foot

Stainless Steel Hose Clamps

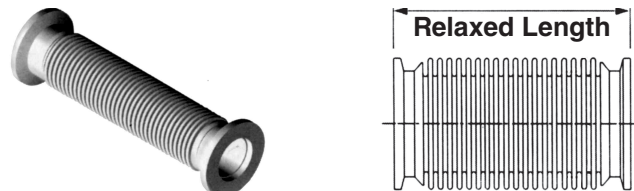
Hose I.D.	Part No.	Price
For 1.5 " O.D. Rubber Hose	HOSE CLAMP 1.5	\$3.00
For 2 " O.D. Rubber Hose	HOSE CLAMP 2.0	\$2.00
For 1.8 " O.D. PVC Hose	HOSE CLAMP 2.0	\$2.50
For 2.4 " O.D. PVC Hose	HOSE CLAMP 2.5	\$2.50

Compressible/Formatted Bellows



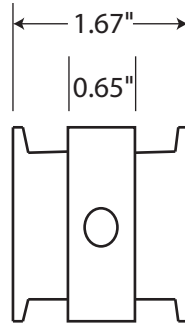
Flange	Material	A mm	B mm	Part No.	Price
NW 16	304 S.S.	80	100	COMP-BEL-16-100	\$212.00
NW 25	304 S.S.	80	100	COMP-BEL-25-100	\$130.00
NW 40	304 S.S.	80	100	COMP-BEL-40-100	\$140.00
NW 50	304 S.S.	80	100	COMP-BEL-50-100	\$160.00

Formatted Stainless Steel Bellows



250 mm (10 inches)		500 mm (19 inches)		1000 mm (38 inches)	
Part No.	Price	Part No.	Price	Part No.	Price
BEL-16-250	\$60.00	BEL-16-500	\$98.00	BEL-16-1000	\$117.00
BEL-25-250	\$75.00	BEL-25-500	\$98.00	BEL-25-1000	\$122.00
BEL-40-250	\$95.00	BEL-40-500	\$134.00	BEL-40-1000	\$190.00
BEL-50-250	\$125.00	BEL-50-500	\$143.00	BEL-50-1000	\$202.00

Gauge Tube Spool Piece

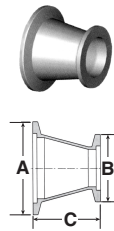


These small aluminum spool pieces make it easy to install 1/8 NPT or VCR-4 vacuum sensors into any system using NW style flanges. Other special connections can be provided. Two (2) ports are standard with up to four (4) available.

Flange	Part No. for 1/8 NPT Ports	Price
NW 16	SPOOL PC - 16 - 1/8 NPT	\$65.
NW 25	SPOOL PC - 25 - 1/8 NPT	\$80.
NW 40	SPOOL PC - 40 - 1/8 NPT	\$95.
NW 50	SPOOL PC - 50 - 1/8 NPT	\$105.

Flange	Part No. for VCR Ports	Price
NW 16	SPOOL PC - 16 - VCR 4 MALE	\$125.
NW 25	SPOOL PC - 25 - VCR 4 MALE	\$140.
NW 40	SPOOL PC - 40 - VCR 4 MALE	\$155.
NW 50	SPOOL PC - 50 - VCR 4 MALE	\$165.

NW-NW Conical Reducers



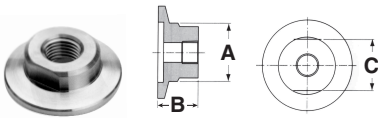
Flange	Material	A	B	C	Part No.	Price
NW25 / NW16	Aluminum	40	30	40	CONRED-NW-25-16	\$43.
NW40 / NW16	Aluminum	55	30	40	CONRED-NW-40-16	\$49.
NW40 / NW25	Aluminum	55	40	40	CONRED-NW-40-25	\$52.
NW50 / NW16	Aluminum	75	30	40	CONRED-NW-50-16	\$58.
NW50 / NW25	Aluminum	75	40	40	CONRED-NW-50-25	\$62.
NW50 / NW40	Aluminum	75	55	40	CONRED-NW-50-40	\$64.

ISO-NW Conical Reducers



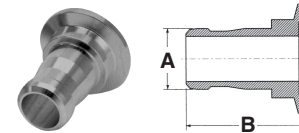
Flange	Material	A	B	C	Part No.	Price
ISO80/NW40	Aluminum	110	55	63	CONRED-80/NW40	\$150.
ISO100/NW40	Aluminum	130	55	63	CONRED-100/NW40	\$175.
ISO80/NW50	Aluminum	110	75	63	CONRED-80/NW50	\$160.
ISO100/NW50	Aluminum	130	75	63	CONRED-100/NW50	\$190.
ISO63/NW25	Aluminum	95	40	63	CONRED-63/NW25	\$120.
ISO63/NW40	Aluminum	95	55	63	CONRED-63/NW40	\$130.
ISO63/NW50	Aluminum	95	75	63	CONRED-80/NW50	\$140.

NW Female Pipe Adaptors



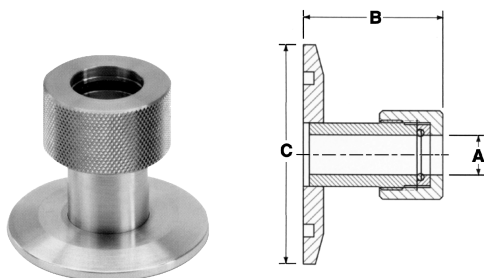
Flange	Material	A	B	C	Part No.	Price
NW16/1/8" FNPT	Aluminum	19.05	25	17	NW16/1/8"FNPT-ADP	\$23.
NW16/1/4" FNPT	Aluminum	19.05	25	17	NW16/1/4"FNPT-ADP	\$23.
NW25/1/8" FNPT	Aluminum	25.4	25	19	NW25/1/8"FNPT-ADP	\$25.
NW25/1/4" FNPT	Aluminum	25.4	25	19	NW25/1/4"FNPT-ADP	\$25.
NW40/1/8" FNPT	Aluminum	38.1	25	32	NW40/1/8"FNPT-ADP	\$28.
NW40/1/4" FNPT	Aluminum	38.1	25	32	NW40/1/4"FNPT-ADP	\$28.
NW40/1/2" FNPT	Aluminum	38.1	25	32	NW40/1/2"FNPT-ADP	\$28.
NW50/1/8" FNPT	Aluminum	50.8	25	46	NW50/1/8"FNPT-ADP	\$38.
NW50/1/4" FNPT	Aluminum	50.8	25	46	NW50/1/4"FNPT-ADP	\$38.
NW50/2" FNPT	304 SS	75	79	63	NW50/2"FNPTSS-ADP	\$260.

NW Rubber Hose Adaptor



Flange	Material	A (inch)	B (inch)	Part No.	Price
NW16	Aluminum	6.4 (.25)	19 (.75)	NW16-HOSE-0.25	\$18.
NW16	Aluminum	9.6 (.38)	19 (.75)	NW16-HOSE-0.38	\$18.
NW16	Aluminum	12.5 (.50)	19 (.75)	NW16-HOSE-0.50	\$18.
NW16	Aluminum	19 (.75)	40 (1.57)	NW16-HOSE-.75	\$18.
NW25	Aluminum	6.35 (.25)	19 (.75)	NW25-HOSE-.25	\$20.
NW25	Aluminum	9.5 (.38)	19 (.75)	NW25-HOSE-0.38	\$20.
NW25	Aluminum	12.7 (.50)	19 (.75)	NW25-HOSE-.50	\$20.
NW25	Aluminum	15.9 (.625)	57 (2.25)	NW25-HOSE-.625	\$20.
NW25	Aluminum	19 (.75)	40 (1.57)	NW25-HOSE-.75	\$20.
NW25	Aluminum	22.2 (.875)	40 (1.57)	NW25-HOSE-.875	\$20.
NW25	Aluminum	26.7 (1.05)	40.6 (1.6)	NW25-HOSE-1.0	\$20.
NW40	Aluminum	39 (1.55)	40 (1.57)	NW40-HOSE-1.55	\$27.
NW40	Aluminum	41.3 (1.625)	40 (1.57)	NW40-HOSE-1.6	\$27.
NW50	Aluminum	47.7 (1.875)	40 (1.57)	NW50-HOSE-1.9	\$37.
NW50	Aluminum	50.8 (2.00)	50.8 (2.00)	NW50-HOSE-2.0	\$45.

NW Quick-Connect Adaptors

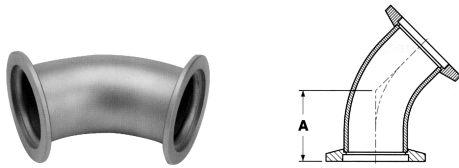


Flange	Material	A	B	C	Tube Size	Part No.	Price
NW16 to 1/4" Tube	304 S.S.	6.5	33.4	30	1/4 inch	QUICK-NW16-1/4	\$50.00
NW16 to 1/2" Tube	304 S.S.	13	36.5	30	1/2 inch	QUICK-NW16-1/2	\$55.00
NW16 to 3/4" Tube	304 S.S.	19.3	44.5	30	3/4 inch	QUICK-NW16-3/4	\$60.00
NW25 to 1/2" Tube	304 S.S.	13	36.5	40	1/2 inch	QUICK-NW25-1/2	\$60.00
NW25 to 3/4" Tube	304 S.S.	19.3	44.5	40	3/4 inch	QUICK-NW25-3/4	\$65.00
NW25 to 1" Tube	304 S.S.	25.7	50.8	40	1 inch	QUICK-NW25-1	\$77.00
NW40 to 1/2" Tube	304 S.S.	13	36.5	55	1/2 inch	QUICK-NW40-1/2	\$66.00
NW40 to 3/4" Tube	304 S.S.	19.3	44.5	55	3/4 inch	QUICK-NW40-3/4	\$70.00
NW40 to 1" Tube	304 S.S.	25.7	50.8	55	1 inch	QUICK-NW40-1	\$80.00
NW40 to 1 1/2" Tube	304 S.S.	38.4	60.3	55	1 1/2 inch	QUICK-NW40-1.5	\$150.00
NW50 to 1 1/2" Tube	304 S.S.	38.4	60.3	75	1 1/2 inch	QUICK-NW50-1.5	\$170.00
NW50 to 2" Tube	304 S.S.	51	60.3	75	2 inch	QUICK-NW50-2	\$180.00



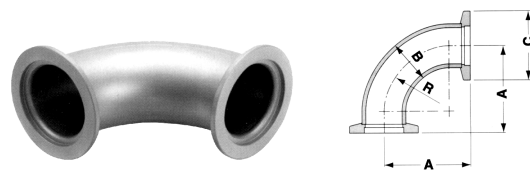
NW Style Elbows, Tees, Crosses, Full Nipples & Blank Caps

NW 45° Elbows



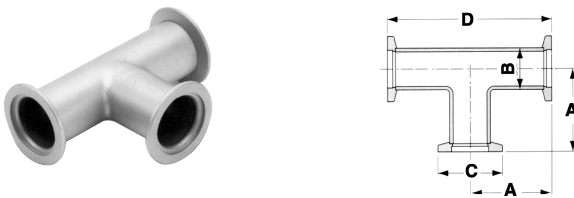
Flange	Material	A	Part No.	Price
NW16	304 S.S.	23	NW-16-45-ELBOW	\$40.
NW25	304 S.S.	28	NW-25-45-ELBOW	\$48.
NW40	304 S.S.	43	NW-40-45-ELBOW	\$60.
NW50	304 S.S.	51	NW-50-45-ELBOW	\$80.

NW 90° Elbows



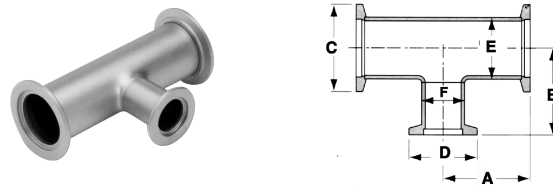
Flange	Material	A	B	C	R	Part No.	Price
NW16	304 S.S.	40	19.05	30	28.6	NW-16-90-ELBOW	\$40.
NW25	304 S.S.	50	25.4	40	38.1	NW-25-90-ELBOW	\$48.
NW40	304 S.S.	65	38.1	55	57.2	NW-40-90-ELBOW	\$60.
NW50	304 S.S.	80	50.8	75	76.2	NW-50-90-ELBOW	\$80.

NW Tees



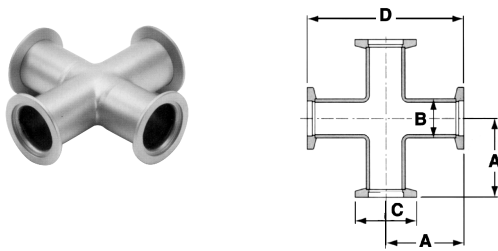
Flange	Material	A	B	C	D	Part No.	Price
NW16	304 S.S.	40	19.05	30	80	NW-16-TEE	\$55.
NW25	304 S.S.	50	25.4	40	100	NW-25-TEE	\$60.
NW40	304 S.S.	65	38.1	55	130	NW-40-TEE	\$75.
NW50	304 S.S.	70	50.8	75	140	NW-50-TEE	\$110.

NW Unequal Tees



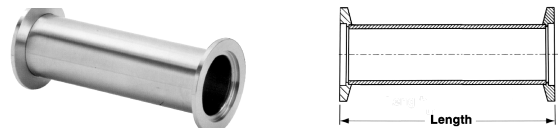
Flange	Material	A	B	C	D	E	F	Part No.	Price
NW-25 to NW16	304 S.S.	50	40	40	30	25.4	19.05	NW-25-UT-16	\$60.
NW-40 to NW16	304 S.S.	65	40	40	100	38.1	19.05	NW-40-UT-16	\$72.
NW50 to NW16	304 S.S.	70	50	75	140	50.8	19.05	NW-50-UT-16	\$110.
NW40 to NW25	304 S.S.	65	50	55	130	38.1	25.4	NW-40-UT-25	\$80.
NW50 to NW25	304 S.S.	70	65	75	140	50.8	38.1	NW-50-UT-25	\$115.

NW 4-Way Crosses



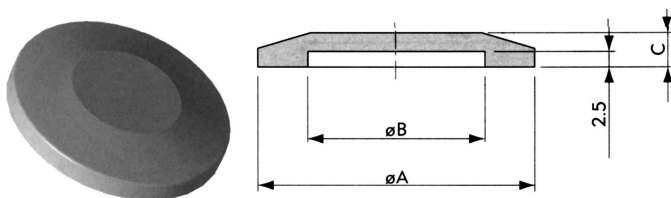
Flange	Material	A	B	C	D	Part No.	Price
NW16	304 S.S.	40	19.05	30	80	NW-16-CROSS	\$85.
NW25	304 S.S.	50	25.4	40	100	NW-25-CROSS	\$95.
NW40	304 S.S.	65	38.1	55	130	NW-40-CROSS	\$125.
NW50	304 S.S.	70	50.8	75	140	NW-50-CROSS	\$170.

NW Full Nipples



Flange	Length	Part No.	Price
NW16	80 mm	NW-16-NIPPLE-S	\$35.
NW16	320 mm	NW-16-NIPPLE-L	\$53.
NW25	100 mm	NW-25-NIPPLE-S	\$73.
NW25	320 mm	NW-25-NIPPLE-L	\$84.
NW40	130 mm	NW-40-NIPPLE-S	\$54.
NW40	320 mm	NW-40-NIPPLE-L	\$94.
NW50	140 mm	NW-50-NIPPLE-S	\$70.
NW50	320 mm	NW-50-NIPPLE-L	\$116.

Blank Caps



Flange	Outside Diam.	Material	Part No.	Price
NW-16	1.18 (30 mm)	Aluminum	Blank-16	\$6.00
NW-25	1.57 (40 mm)	Aluminum	Blank-25	\$7.00
NW-40	2.16 (55 mm)	Aluminum	Blank-40	\$8.00
NW-50	2.95 (75 mm)	Aluminum	Blank-50	\$10.00

Flange	Outside Diam.	Material	Part No.	Price
NW-16	1.18 (30 mm)	304 SS	Blank-16 SS	\$8.00
NW-25	1.57 (40 mm)	304 SS	Blank-25 SS	\$9.00
NW-40	2.16 (55 mm)	304 SS	Blank-40 SS	\$10.00
NW-50	2.95 (75 mm)	304 SS	Blank-50 SS	\$12.00



12 inch cylinder with 'L' gasket, optional Pyrex view port, handles, and top plate. Less outgassing than stainless steel, see page 39.

Aluminum Cylinders with 'L' Shaped Gaskets

Purchase base plates, ports, and gaskets as needed from the lists below.

Inside Diam. (kg)	Inside Height (kg)	Volume		Weight		Price
		In ³	liters	Lbs.	kg	
6 Inch (152)	9 Inch (228)	254	4.2	5	2.3	\$763.
8 Inch (203)	12 Inch (304)	603	9.9	8	3.6	\$927.
10 Inch (254)	15 Inch (381)	1,178	19.3	15	6.8	\$1262.
12 Inch (304)	18 Inch (457)	2,035	33.4	20	9.0	\$1367.
16 Inch (406)	20 Inch (508)	4,021	65.9	30	13.0	\$1881.
18 Inch (457)	25 Inch (635)	6,361	104	43	20.0	\$2172.
20 Inch (508)	25 Inch (635)	7,854	128	50	23.0	\$2851.

Aluminum Cylinders With Flanges

Flanges with O-ring at each end. Purchase base and top plate from the lists below.

Inside Diam. (kg)	Inside Height (kg)	Volume		Weight		Price
		In ³	liters	Lbs.	kg	
6 Inch (152)	9 Inch (228)	254	4.2	2.5	1.1	\$876.
8 Inch (203)	12 Inch (304)	603	9.9	3.8	1.7	\$1056.
10 Inch (254)	15 Inch (381)	1,178	19.3	8	3.6	\$1555.
12 Inch (304)	18 Inch (457)	2,035	33.4	11	5.0	\$1803.

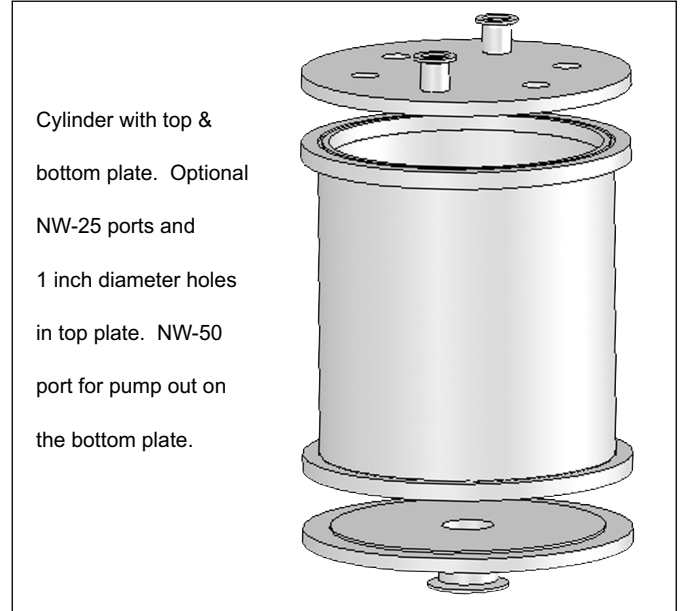
'L' Shaped Gaskets

Cylin. Diam.	6 in.	8 in.	10 in.	12 in.	14 in.	18 in.	22 in.
Buna-N	\$47.	\$53.	\$50.	\$53.	\$56.	\$66.	\$84.
Viton	\$79.	\$96.	\$101.	\$133.	\$143.	\$207.	\$291.

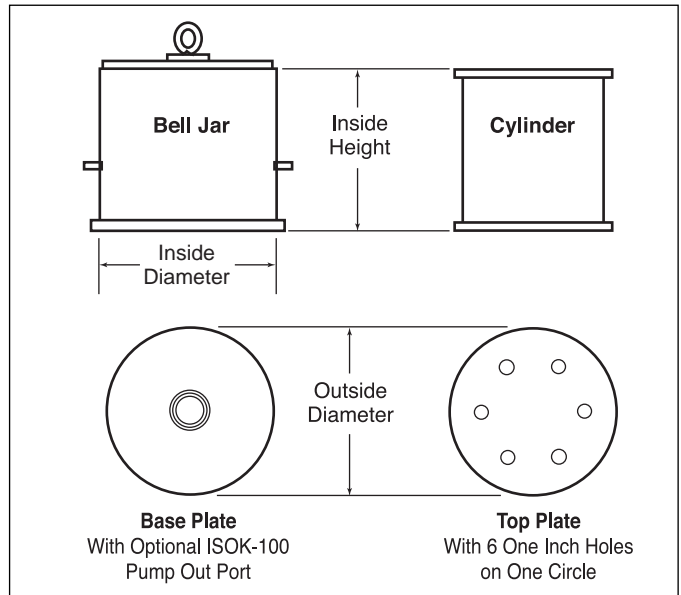
Base Plates and Top Plates

For use with cylinders. Select pump out and view ports as needed for your process.

Use with Cylinder	Outside Diameter	Weight Lbs.(kg)	Price
6 Inch (152)	8 Inch (203)	2.5 (1.1)	\$79.
8 Inch (203)	10 Inch (254)	4 (1.8)	\$96.
10 Inch (254)	12 Inch (304)	6.5 (2.9)	\$371.
12 Inch (304)	14 Inch (355)	8.8 (4.0)	\$504.
16 Inch (406)	18 Inch (457)	15 (6.8)	\$657.
18 Inch (457)	20 Inch (508)	18 (8.2)	\$805.
20 Inch (508)	22 Inch (559)	22 (10.0)	\$943.



Cylinder with top & bottom plate. Optional NW-25 ports and 1 inch diameter holes in top plate. NW-50 port for pump out on the bottom plate.



Pump Out Ports

Located at Center of Base Plate

NW-25	\$126.
NW-40	\$149.
NW-50	\$161.
ISO-100k	\$202.
ISO-160k	\$244.
ISO-200k	\$339.
ANSI LP 4 Inch	\$170.
ANSI LP 6 Inch	\$202.

View Ports

Specify Location

NW-50	Polycarbonate	\$74.
ISO-100	Pyrex	\$318.
ISO-160	Pyrex	\$381.

Feed Through Holes

1 inch diameter holes in base or top plates

Set up holes on 1 circle	\$64.
Plus cost for each hole	\$15.

Lifting Handles

Available on cylinders & plates.

Price per pair. . . . \$133.

Lifting Lug

On top center of plate.

1 inch diameter eye bolt.

Price each. \$127.



- Rotary and Push/Pull in the Same Feedthrough
- High Torque. Use Either Solid or Hollow Shafts
- High Speeds, Tested at 1100 RPM, 24/7 for 90 Days
- All Feedthroughs (RoHS) 2002/95/EC Compliant
- 303 Stainless Steel or Nickel Plated Brass
- Easy to Replace Viton® or Buna-N Chevron Seals
- Conflat®, NW or Pipe Thread Connection to System
- Available For Four Shaft Sizes: 1/4", 3/8", 1/2", 5/8"
- Includes Frelon® Bearing On Atmosphere Side

Shaft finish and hardness should be 4 to 12 RMS with a minimum surface hardness of RC 50 for best results. Softer shafting can be used, but both bearing and shafting may wear at accelerated rates. For any given RMS value radiused or polished peaks will provide the

best rate of wear so electropolished shafts give best results.

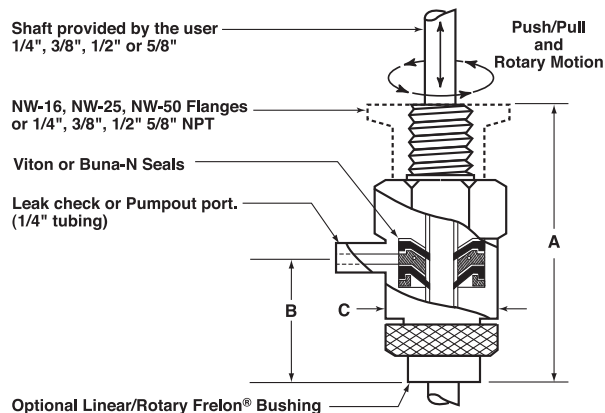
Lubrication with hydrocarbon grease or oil; can reduce friction and improve the seal life. Silicone and flourcarbon lubricants are not recommended because they can inhibit heat flow and increase the seal temperature.

Test Results
 These very rugged and reliable seals have been in production for 50 years and have been tested extensively. In one test after 800,000 reciprocal motions of 1 inch the leak rate was less than 5×10^{-10} scc/sec. In another test the seal operated at 1100 RPM for 90 days, 24/7 and the rate was also less than 5×10^{-10} scc/sec.

Shaft Diameter Shaft is not included Best performance will result when your shaft diameter is held to these dimensions, but smaller diameters are acceptable. See below for optional shaft material.

Connection to System	1/4 inch	3/8 inch	1/2 inch	5/8 inch
	.2495 - .0000 + .0005	.3745 - .0000 + .0005	.4995 - .0000 + .0005	.6245 - .0000 + .0005
2.75 In. Conflat®	Model No. 2.75-B01-SS 303 Stainless Steel \$426.	Model No. 2.75-B02-SS 303 Stainless Steel \$455.	Model No. 2.75-B03-SS 303 Stainless Steel 1/2" \$477. 5/8" \$618.	
NW-16	Model No. 16-B01-SS 303 Stainless Steel \$421.	Model No. 16-B02-SS 303 Stainless Steel \$460.	Model No. 16-B03-SS 303 Stainless Steel 1/2" \$460. 5/8" \$595.	
NW-25	Model No. 25-B01-SS 303 Stainless Steel \$460.	Model No. 25-B02-SS 303 Stainless Steel \$460.	Model No. 25-B03-SS 303 Stainless Steel 1/2" \$477. 5/8" \$619.	
NW-50	Model No. 50-B01-SS 303 Stainless Steel \$550.	Model No. 50-B02-SS 303 Stainless Steel \$545.	Model No. 50-B03-SS 303 Stainless Steel 1/2" \$574. 5/8" \$720.	
Pipe Thread	Model No. P-B01-NB Nickel Plated Brass \$219.	Model No. P-B02-NB Nickel Plated Brass \$236.	Model No. P-B03-NB Nickel Plated Brass 1/2" \$247. 5/8" \$387.	
	Model No. P-B01-SS 303 Stainless Steel \$460.	Model No. P-B02-SS 303 Stainless Steel \$477.	Model No. P-B03-SS 303 Stainless Steel 1/2" \$506. 5/8" \$647.	
For 1 Inch Baseplate Through Hole	Model No. 1in-B01-NB Nickel Plated Brass \$359.	Model No. 1in-B02-NB Nickel Plated Brass \$382.	Model No. 1in-B03-NB Nickel Plated Brass \$421.	
	Model No. 1in-B01-SS 303 Stainless Steel \$686.	Model No. 1in-B02-SS 303 Stainless Steel \$702.	Model No. 1in-B03-SS 303 Stainless Steel \$747.	
Replacement Seal Washers 2 Req'd.	Buna-N, P/N 701101-B \$3.00 each	Buna-N, P/N 701102-B \$3.00 each	Buna-N, P/N 701103-B \$3.00 each	
	Viton®, P/N 701101-V \$5.00 each	Viton®, P/N 701102-V \$5.00 each	Viton®, P/N 701103-V \$5.00 each	

Rotary & Push/Pull Motion Feedthrough



SHAFT DIAM.	NW-16			NW-25			NW-50			PIPE THREAD		
	A	B	C	A	B	C	A	B	C	A	B	C
1/4 INCH SHAFT	2.35	1.00	1.00	2.26	.09	1.0	2.26	.09	1.0	1/4 IN. NPT		
										2.73	1.39	1.00
3/8 INCH SHAFT	2.35	1.00	1.13	2.35	1.00	1.13	2.8	1.50	1.13	3/8 IN. NPT		
										2.75	1.38	1.125
1/2 & 5/8 INCH SHAFT	2.38	1.00	1.25	2.38	1.00	1.25	2.50	1.13	1.25	1/2 IN. NPT		
										2.76	1.38	1.25

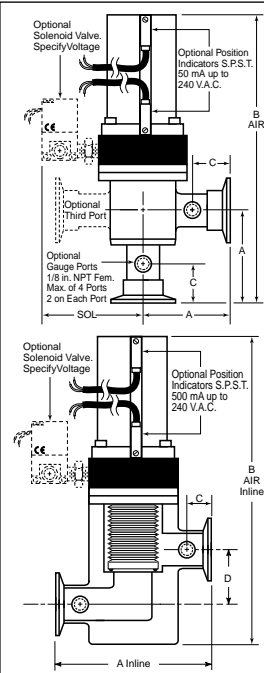
Optional Precision Shaft Material, 316 S.S. The shaft is not included with the feedthrough. Most customers provide their own shaft but we offer this material as a convenience.

- 1/4 inch O.D. by 18 inch (457 mm) long P/N: SHFT-.25-18-316 . . . \$34. ea.
- 3/8 inch O.D. by 18 inch (457 mm) long P/N: SHFT-.37-18-316 . . . \$71. ea.
- 1/2 inch O.D. by 18 inch (457 mm) long P/N: SHFT-.50-18-316 . . . \$83. ea.



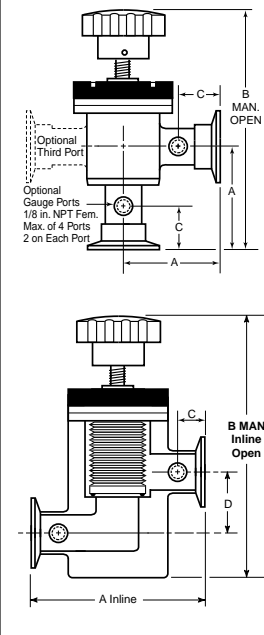
Aluminum and Stainless Steel Pneumatic or Manual Actuators, Angle or Inline Style with Port Sizes from NW-16 To NW-50

- Less Outgassing Than Stainless, See Pg. 39
- Aluminum or 304 Stainless Steel Bodies
- Leak Tested to Better Than 5×10^{-10} scc/s
- Select Welded Bellows or O-Ring Stem Seals
- Viton® Seat And Bonnet Seal Are Standard
- Kalrez® Seat & Bonnet Seals Also Available
- Gauge Fittings Available On Either Port
- Failsafe; Choose Spring Close Or Air Close
- All Valves (RoHS) 2002/95/EC Compliant



Air To Open/Spring To Close
(See "Optional Features" on next page for Air Open/Air Close or Spring to Open)

Part Number For Inline Style replace "ANG" with "INL"	Description	Angle Style			Inline Style					
		Price	A	B Air	C	Price	A	B Air	D	
SS-BEL-ANG-75-AIR	No Flanges, 0.75 O.D.	\$308.	2.1	6.2	.85	\$313.	4.2	5.9	1.1	
SS-BEL-ANG-133-AIR	1.33 CF on Both Ports	\$340.	2.1	6.2	.85	\$349.	4.2	5.9	1.1	
SS-BEL-ANG-16-AIR	NW-16 on Both Ports	\$340.	2.1	6.2	.85	\$349.	4.2	5.9	1.1	
ALUM-BEL-ANG-16-AIR	Aluminum Body, NW-16	\$288.	2.1	6.2	.85	\$314.	4.2	5.9	1.1	
SS-BEL-ANG-1.0-AIR	No Flanges, 1.00 O.D.	\$365.	2.0	5.9	.82	\$377.	4.0	6.1	1.4	
SS-BEL-ANG-212-AIR	2.12 CF on Both Ports	\$383.	2.0	5.9	.82	\$388.	4.0	6.1	1.4	
SS-BEL-ANG-25-AIR	NW-25 on Both Ports	\$383.	2.0	5.9	.82	\$388.	4.0	6.1	1.4	
ALUM-BEL-ANG-25-AIR	Aluminum Body, NW-25	\$328.	2.0	5.9	.82	\$326.	4.0	6.1	1.4	
SS-BEL-ANG-1.5-AIR	No Flanges, 1.50 O.D.	\$410.	2.4	7.8	.90	\$434.	4.8	8.4	1.9	
SS-BEL-ANG-275-AIR	2.75 CF on Both Ports	\$421.	2.4	7.8	.90	\$439.	4.8	8.4	1.9	
SS-BEL-ANG-40-AIR	NW-40 on Both Ports	\$421.	2.4	7.8	.90	\$439.	4.8	8.4	1.9	
ALUM-BEL-ANG-40-AIR	Aluminum Body, NW-40	\$387.	2.4	7.8	.90	\$429.	4.8	8.4	1.9	
SS-BEL-ANG-2.0-AIR	No Flanges, 2.00 O.D.	\$524.	3.4	10.3	1.14	\$553.	6.8	11.0	2.6	
SS-BEL-ANG-338-AIR	3.38 CF on Both Ports	\$530.	3.4	10.3	1.14	\$559.	6.8	11.0	2.6	
SS-BEL-ANG-50-AIR	NW-50 on Both Ports	\$530.	3.4	10.3	1.14	\$559.	6.8	11.0	2.6	
ALUM-BEL-ANG-50-AIR	Aluminum Body, NW-50	\$515.	2.8	10.3	1.14	\$520.	6.8	11.0	2.6	
O-Ring Stem Seal 250,000 Cycles	ALUM-O-ANG-16-AIR	Aluminum NW-16	\$275.	1.6	5.6	.85	\$275.	4.2	5.9	1.1
	ALUM-O-ANG-25-AIR	Body with NW-25	\$288.	2.0	5.9	.82	\$296.	4.0	6.1	1.4
	ALUM-O-ANG-40-AIR	O-Ring NW-40	\$374.	2.6	7.8	.90	\$385.	4.8	8.4	1.9
	ALUM-O-ANG-50-AIR	Shaft Seal NW-50	\$458.	2.8	9.7	1.14	\$469.	6.8	11.0	2.6



Manual Valves

Part Number For Inline Style replace "ANG" with "INL"	Description	Angle Style			Inline Style					
		Price	A	B Man	C	Price	A	B Man	D	
SS-BEL-ANG-75-MAN	No Flanges, 0.75 O.D.	\$286.	2.1	6.2	.85	\$324.	4.2	5.9	1.1	
SS-BEL-ANG-133-MAN	1.33 CF on Both Ports	\$301.	2.1	6.2	.85	\$325.	4.2	5.9	1.1	
SS-BEL-ANG-16-MAN	NW-16 on Both Ports	\$301.	2.1	6.2	.85	\$325.	4.2	5.9	1.1	
ALUM-BEL-ANG-16-MAN	Aluminum Body, NW-16	\$275.	2.1	6.2	.85	\$299.	4.2	5.9	1.1	
SS-BEL-ANG-1.0-MAN	No Flanges, 1.00 O.D.	\$286.	2.0	5.9	.82	\$331.	4.0	6.0	1.3	
SS-BEL-ANG-212-MAN	2.12 CF on Both Ports	\$314.	2.0	5.9	.82	\$337.	4.0	6.0	1.3	
SS-BEL-ANG-25-MAN	NW-25 on Both Ports	\$314.	2.0	5.9	.82	\$337.	4.0	6.0	1.3	
ALUM-BEL-ANG-25-MAN	Aluminum Body, NW-25	\$296.	2.0	5.9	.82	\$331.	4.0	6.0	1.3	
SS-BEL-ANG-1.5-MAN	No Flanges, 1.50 O.D.	\$426.	2.4	7.8	.90	\$426.	4.8	8.4	1.9	
SS-BEL-ANG-275-MAN	2.75 CF on Both Ports	\$434.	2.4	7.8	.90	\$434.	4.8	8.4	1.9	
SS-BEL-ANG-40-MAN	NW-40 on Both Ports	\$434.	2.4	7.8	.90	\$434.	4.8	8.4	1.9	
ALUM-BEL-ANG-40-MAN	Aluminum Body, NW-40	\$426.	2.4	7.8	.90	\$426.	4.8	8.4	1.9	
SS-BEL-ANG-2.0-MAN	No Flanges, 2.00 O.D.	\$469.	3.4	9.9	1.14	\$469.	6.8	10.6	2.6	
SS-BEL-ANG-338-MAN	3.38 CF on Both Ports	\$523.	3.4	9.9	1.14	\$487.	6.8	10.6	2.6	
SS-BEL-ANG-50-MAN	NW-50 on Both Ports	\$513.	3.4	9.9	1.14	\$487.	6.8	10.6	2.6	
ALUM-BEL-ANG-50-MAN	Aluminum Body, NW-50	\$469.	2.8	9.9	1.14	\$445.	6.8	10.6	2.6	
O-Ring Stem Seal 250,000 Cycles	ALUM-O-ANG-16-MAN	Aluminum NW-16	\$256.	1.6	5.6	.85	\$277.	4.2	5.9	1.1
	ALUM-O-ANG-25-MAN	Body with NW-25	\$281.	2.0	5.8	.82	\$301.	4.0	6.0	1.3
	ALUM-O-ANG-40-MAN	O-Ring NW-40	\$374.	2.6	7.8	.90	\$385.	4.8	8.4	1.9
	ALUM-O-ANG-50-MAN	Shaft Seal NW-50	\$433.	2.8	9.3	1.14	\$408.	6.8	10.6	2.6

3 Way Valves, Manual or Air Operated



Photo shows an NW-40 valve with optional position indicators on one side and one optional gauge port. Up to 3 gauge ports available at \$29. each.

Aluminum bodies with bellows shaft seal. The standard pneumatic actuator is air to open, spring to close. Other options such as gauge ports and position indicators are available. Two 3-way solenoids required. See below for cost of solenoids.

- NW-16, P/N: 3W-ALUM-BEL-16AIR.....\$620.
- NW-25, P/N: 3W-ALUM-BEL-25AIR.....\$642.
- NW-40, P/N: 3W-ALUM-BEL-40AIR.....\$707.
- NW-50, P/N: 3W-ALUM-BEL-50AIR.....\$799.
- NW-16, P/N: 3W-ALUM-BEL-16MAN.....\$585.
- NW-25, P/N: 3W-ALUM-BEL-25MAN.....\$602.
- NW-40, P/N: 3W-ALUM-BEL-40MAN.....\$666.
- NW-50, P/N: 3W-ALUM-BEL-50MAN.....\$742.
- 1/8 In. NPT GAUGE PORTS Specify Location.....\$29. each

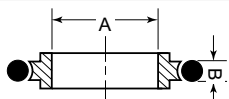
VCR or 1/8 Inch NPT Ports For Gauge Tubes

VCR-4 or 1/8 inch NPT female ports can be provided on the end or side valve ports. Any number of these ports in any combination can be specified by adding the appropriate suffix to the part number. For example, 1/8 RS suffix would specify a 1/8 inch NPT port on the right of the side port.

- 1/8 NPT Port Add: Alum. valves **\$29**. SS valves **\$84**.
- VCR-4 Port Add: Stainless Steel only.....**\$117**.

	Position Reference		P/N for 1/8 NPT Port	P/N for VCR Port
	RS	Right Side Port	H700020	H700033
	LS	Left Side Port	H700021	H700034
	RB	Right Bottom Port	H700022	H700035
	LB	Left Bottom Port	H700023	H700036

Centering Rings



304 Stainless Steel With Viton O-Rings

Flange Size	A	B	Part Number	Price
NW-16	0.63 (16)	0.21 (5.3)	CTR-RING 16	\$4.00
NW-25	0.984 (25)	0.21 (5.3)	CTR-RING 25	\$5.00
NW-40	1.575 (40)	0.21 (5.3)	CTR-RING 40	\$7.00
NW-50	1.969 (50)	0.21 (5.3)	CTR-RING 50	\$9.00

Position Indicators

Pneumatically activated valves can be equipped with a pair of SPST switches to indicate valve open and closed. These unpowered switches have contacts rated for up to 500 mA at up to 240 VAC, non-inductive.

Add the suffix 'PI'. (Open & Closed). . . Add \$110./pair

Optional Third Port for Angle or Inline Valves



Standard angle valves have two ports: one bottom and one side. To add an additional side port for vacuum gauge tube installation, specify the optional third port by simply adding the suffix "3-Port" to any valve part number and add the cost shown below:

- NW-16...add \$110. NW-40...add \$152.
- NW-25...add \$133. NW-50...add \$196.

Spring to Open/Air to Close

For this option, add "SO" to the P/N & add cost below:

- NW-16.....add \$50. NW-25.....add \$50.
- NW-40.....add \$95. NW-50.....add \$102.

Air to Open/Air To Close

Standard valves use air to open and spring to close but as an option the valves can be built for air to open and close. Add the suffix 'AC' to the part number. Note that with this option a 4 way solenoid is required.

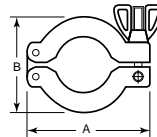
- Air To Close and Open P/N: H700024 Add \$62.**
- 1/8 NPT/ISO Adapter Fitting for Air P/N: H700032. N/C**

Solenoids For Pneumatic Valves

Because many customers use central air manifolds to activate valves we offer these solenoids as an optional rather than standard feature. Solenoids are specified by adding a suffix to Valve part number below.

3 Way for Standard, Spring to Close Valves \$68.		4 Way for Air Open/Air Close Valves. \$98.	
add Suffix to P/N	Solenoid P/N	add Suffix to P/N	Solenoid P/N
SOL-120 VAC	X134003	SOL-120 VAC	X703005
SOL-230 VAC	X134013	SOL-230 VAC	X134010
SOL-24 VDC	X134032	SOL-24 VDC	X703041

Clamps



Aluminum Clamps With Wing Nut & Screw Fastener

Flange Size	A	B	Thickness	Part Number	Price
NW-16	2.24 (57)	1.69 (43)	0.63 (16)	AL-Clamp 16	\$4.00
NW-25	2.76 (70)	2.17 (55)	0.63 (16)	AL-Clamp 25	\$5.00
NW-40	3.39 (88)	2.76 (70)	0.63 (16)	AL-Clamp 40	\$6.00
NW-50	4.33 (110)	3.70 (94)	0.79 (20)	AL-Clamp 50	\$8.00



Wide range manometer with auxiliary outputs and relays shown on right with standard manometer at left. Transducer with NW-16 flange shown in the foreground.

- **Wide Range: 10⁻³ to 1500 Torr**
- **Linear With Any Gas from 2 to 1500 Torr**
- **Available in .001 to 2000 mbar & 0.1 Pa to 200 kPa**
- **Up to 4 Adjustable Set Points and 3 Amp Relays**
- **0 to 2 VDC, 0 to 10 VDC, and 4 to 20 mA Outputs**
- **Linear Analog Outputs for Computer Interface**
- **Large Easy to Read Green LED Display**
- **Stainless Steel or Silicon Diaphragms Available**
- **Bench or Panel Mount Enclosure**
- **400 mSec. Response Time From 2 to 1500 Torr**
- **1.25 Sec. Response Time From 1 to 2000 mTorr**
- **All Cables and Mounting Hardware Included**
- **Extension Cables up to 250 Feet, see page 43**

Fast Response

The Wide Range Manometer uses a fast response diaphragm sensor to provide high accuracy measurements that are unaffected by gas composition from 2 to 1500 Torr. At pressures from 2000 mTorr to one mTorr the easy to read green LED display is driven by a rugged Pirani sensor that is mounted in the transducer next to the Diaphragm sensor. The Diaphragm and Pirani sensors are both mounted in the same transducer body, and the diaphragm sensor is easily replaceable in the field.

Unaffected By Sensor Orientation

This durable process control instrument uses a transducer body machined from a solid block of stainless steel and, unlike convection gauges, our wide range gauge accuracy is not affected by the transducer orientation or gas composition.

Four Set Points for Process Control

The standard Wide Range Manometer includes 2 adjustable set points, while the optional version provides 4 adjustable set points for process control. These process control set points have front panel LED indicators and can be set anywhere in the range of the instrument. Each set point drives its own SPDT relay. Contacts are rated 3 amps @ 220V, non-inductive.

0 to 10 VDC and 4 to 20 mA Outputs

The standard instrument provides 0 to 2 VDC and 0 to 1.5 VDC outputs. In addition to these standard outputs, the optional version provides 2 programmable analog outputs of 0 to 10 VDC or 4 to 20 mA.

Torr, milliBar, Pascals

The Vacuum Research Wide Range Manometer reads directly in Torr and mTorr, but ranges of .001 to 2000 millibar and 0.100 Pascals to 200 kiloPascals are available at no extra charge.

Diaphragm Manometer Applications

Crystal Growing Like many vacuum processes, crystal growing is a two step operation that has traditionally required more than one gauge for control. First, evacuation with a two stage pump to 10 to 15 mTorr (1 to 2 Pascal) removes oxygen and water vapor. Then, the furnace is back filled with argon to approximately 200 Torr (2500 Pa). The wide range diaphragm manometer was designed for processes such as this that require accurate and repeatable measurements at pressures many decades apart.

Lamp Manufacture Measure pump down of mechanical booster pump from atmosphere to less than 5 mTorr (1 Pa) and then monitor pressures of back fill gas mixture of argon, neon, and krypton to 600 Torr (80,000 Pa).

L.P.C.V.D. Evacuate furnace to less than 20 mTorr (2 Pa), close valve in roughing pump line and monitor rate of pressure rise to check for leaks. If rate of rise is satisfactory, then back fill with process gas mixture to between 2 and 10 Torr (200 and 1200 Pascal).

Wide Range Gauge Calibrator

Making sure that your vacuum gauge is working properly has never been easier. Our compact electronic calibrators allow you to adjust your Wide Range Diaphragm Manometer to exactly like new factory specification. No electronics training is required to operate these calibrators which allow you to adjust zero and full scale of the Wide Range Display Unit without using a vacuum system. Just follow the step-by-step procedure on the calibrator front panel to ensure optimum performance of your Wide Range Gauge. P/N: 912110\$602.

Standard and Auxiliary Output Model Specifications	1 to 2000 milli Torr Pirani Sensor	2 to 1500 Torr Diaphragm Sensor
Sensor Type:	Platinum alloy Pirani	Silicon or 316 SS Diaphragm
Resolution and Repeatability:	± 1 mTorr	± 1 Torr
Linearity:	3% of Reading	0.15% of Full Scale
Accuracy:	3% of Reading or 3 mTorr	1% of reading or 2 Torr
Response Time:	Less than 1.25 seconds	Under 400 msec. for 100 % of step change
Hysteresis: (to prevent chatter, up to 5% available)	Less than 2 mTorr minimum	Less than 2 Torr minimum
Analog Output (Standard Model):	0 to 2.000 VDC	0 to 1.500 VDC
Analog Output (Auxiliary Output Model):	0 to 2.000 VDC plus a second output programmable as 0 to 10 VDC or 4-20 mA	0 to 1.500 VDC plus a second output programmable as 0 to 10 VDC or 4-20 mA
Maximum Pressure without Calibration Change:	60,000 Torr (1250 PSIG)	2,300 Torr (30 PSIG)
Effect of Ambient Temp. Changes from 0 °C to 50 °C Reading will change less than:	0.2 mT per °C at 50 mT; 4 mT per °C at 900 mT	± 0.02% per °C
Maximum Transducer Bakeout Temperature:	100 °C	
Display:	3 1/2 Digit, Green LED character height 0.47 in. (11 mm)	
Set Points and Relays:	2 or 4 independent set points with front panel LED indicators and 2 or 4 SPDT relays. 3 amp @ 220 VAC, non-inductive. Front panel adjustable over 100% of range.	
Transducer Orientation:	Calibration is not affected by orientation.	
Line Voltage and Power:	95 to 120V, 50/60 Hz standard; 220 V available. 5 watts with both relays energized.	
Line Cord:	65 inch (1.7 meter) attached, 3 conductor.	
Bench or Panel Mounting:	Panel cutout: 3.62 in. W X 4.68 in. H (92 X 119 mm). Panel mount jack screws included.	
Dimensions:	Standard enclosure: 6.84 in. X 3.5 in. X 3.5 in. L X W X H (174 mm X 89 mm X 89 mm)	
Transducer Cables (see pg. 43 for extension cables):	10 ft. (3 m) with connectors on both ends. Cables up to 250 ft. (75 m) available.	
Weight with Transducer (Standard / Aux. Output):	Net 4 lb. (1.8 kg); Shipping 6.0 lb. (2.7 kg); add 1 lb. (.22 kg) for Auxiliary Output model.	

Buy Now! Go to www.vacuumresearch.com to order online

Display Units Standard and Auxiliary Output Models

Standard Wide Range Gauge Display Units

Digital display unit with 2 set points and 2 analog outputs; 0 - 1.5 & 0 - 2 VDC. 1/4 DIN cabinet suitable for bench or panel mounting. Built to CSA standards. Line cord and 3 meter (10 ft) transducer cable included. Transducer not included. One transducer required.

1 mTorr to 1500 Torr, P/N: 902074 (220VAC 50/60 Hz)	\$900.
.001 to 2000 millibar, P/N: 902075-mbar (220VAC 50/60 Hz)	\$900.
0.1 PA to 200 kPa, P/N: 902076-Pascal (220VAC 50/60 Hz)	\$900.
1 mTorr to 1500 Torr, P/N: 902056 (115VAC 50/60 Hz)	\$900.
.001 to 2000 millibar, P/N: 902072 (115VAC 50/60 Hz)	\$900.
0.1 PA to 200 kPa, P/N: 902073 (115VAC 50/60 Hz)	\$900.

Wide Range Display Units with Auxiliary Outputs

Digital display unit with 4 set points and 4 analog outputs; 0-2 & 0-1.5 VDC plus separate 0-10 VDC and 4-20 mA for Diaphragm and Pirani Gauge signals. Built to CSA standards. Line cord and 10 ft. (3m.) transducer cable included. Transducer not included. One transducer required. For operation from 220VAC power add suffix "220" to P/N.

1 mTorr to 1500 Torr (115VAC 50/60 Hz) P/N: 902081	\$1188.
0.1 Pa to 200 kPa (115VAC 50/60 Hz) P/N: 902127-Pascal	\$1188.
.001 to 2000 millibar (115VAC 50/60 Hz) P/N: 902126-mbar	\$1188.

Replacement Sensors for Mini Transducers, 1999 & later

Pirani Sensor; Mini Transducer, P/N: 902300	\$101.
Silicon Diaphragm Sensor; Mini Transducer, P/N: 902301	\$237.
Stainless Steel Diaphragm Sensor; Mini Transducer, P/N: 902079	\$410.

Replacement Sensors for Older Transducers, 1998 & earlier

Because some critical components used in the manufacture of Wide Range Transducers in 1998 and before are no longer available, it is not possible to provide replacement sensors for installation in the field. However, if a sensor failure occurs in one of these older transducers, it may be returned to the factory for exchange for a rebuilt transducer with new sensors and factory calibration. The exchange transducer will have the same flange or system connection as your original, but it may be the newer "Mini" style. Request an RGA (Return Goods Authorization) number before shipping your transducer.

Exchange Transducer with new Silicon Diaphragm and Pirani Sensors. Calibrated and ready to operate. P/N 902309	\$397. plus old transducer
Exchange Transducer with new Stainless Steel Diaphragm and Pirani Sensors. Calibrated and ready to operate. P/N 902308	\$573. plus old transducer

Transducers (Use with Torr, mbar, or Pascal Display Units)

Mini Transducers with Silicon Diaphragm

The new Mini Transducers operate with all models of VRC Wide Range Manometers regardless of date of manufacture. Transducer body is 304 stainless steel. Pirani gauge materials include 304 SS, platinum alloy and glass to metal seals. Diaphragm sensor is 304 stainless steel except for the diaphragm itself which is pure silicon metal.

1/8 in. NPT	P/N: 902058-mini	\$617.
1/2 in. OD tube	P/N: 902055-mini	\$617.
15 mm OD tube	P/N: 902122-mini	\$617.
NW-16 flange	P/N: 902068-mini	\$673.
NW-25 flange	P/N: 902147-mini	\$673.
VCR-4, Male	P/N: 902085-mini-MAL	\$699.
VCR-4, Female	P/N: 902085-mini-FEM	\$699.
VCR-8, Male	P/N: 902091-mini-MAL	\$699.
VCR-8, Female	P/N: 902091-mini-FEM	\$699.
VCO-8, Male	P/N: 902146-mini-MAL	\$699.
VCO-8, Female	P/N: 902146-mini-FEM	\$699.
1.33 in. Conflat®	P/N: 902153-mini	\$673.
2.75 in. Conflat®	P/N: 902210-mini	\$673.

Mini Transducers with 316 Stainless Steel Diaphragm

Transducer body is 304 stainless steel. Pirani gauge materials include 304 stainless steel, platinum alloy and glass to metal seals. Diaphragm sensor is all 316 L stainless steel including the diaphragm itself. SS Sensor Max. Pressure w/o Damage: 4,500 Torr, burst 6,000 Torr.

1/8 in. NPT	P/N: 902057-mini	\$780.
1/2 in. OD tube	P/N: 902052-mini	\$780.
15 mm OD Tube	P/N: 902121-mini	\$780.
NW-16 flange	P/N: 902067-mini	\$830.
NW-25 flange	P/N: 902151-mini	\$830.
VCR-4, Male	P/N: 902051-mini-MAL	\$856.
VCR-4, Female	P/N: 902051-mini-FEM	\$856.
VCR-8, Male	P/N: 902092-mini-MAL	\$856.
VCR-8, Female	P/N: 902092-mini-FEM	\$856.
VCO-4, Male	P/N: 902157-mini-MAL	\$856.
VCO-4, Female	P/N: 902157-mini-FEM	\$856.
VCO-8, Male	P/N: 902150-mini-MAL	\$856.
VCO-8, Female	P/N: 902150-mini-FEM	\$856.
1.33 in. Conflat®	P/N: 902154-mini	\$830.
2.75 in. Conflat®	P/N: 902211-mini	\$830.



Photo shows digital Convection Gauge Controller with two adjustable setpoints and angle style 1/8" NPT gauge tube

- Wide Range; 1 mTorr to Atmosphere
- Select Calibration in Torr, Pascal, or mBar
- Linear Analog Outputs for Computer Interface
- Large Easy To Read Green LED Display
- 1/4 DIN Bench or Panel Mount Enclosure
- Two Set Points with 3 Amp Relays Optional
- Single Sensor Covers Entire Range
- Under 1 Second Response to Rising Pressure
- All Cables and Mounting Hardware Included
- Extension Cables Available up to 500 Feet

Wide Range and Low Cost

The convection gauge is the lowest cost instrument that can provide continuous monitoring and control of your vacuum system from atmosphere all the way down to 1 mTorr. The gauge tube is all stainless steel and has both 1/8 inch NPT and 1/2 inch O.D. smooth tubulation for sealing in compression ports. Optional flanges include NW and Conflat® and are described in the ordering information section below.

Specifications for Digital Convection Gauges

Range of Measurement: 1 milliTorr to Atmosphere; Pa, mbar available.

Sensor Type: Thermal convection.

Resolution: ± 1 milliTorr from 1 to 2000 milliTorr; ± 1 Torr above 2 Torr.

Response Time: Less than 1 second for 90% of an increase in pressure, less than 4 secs. for a decrease in pressure from atmosphere to 1 mTorr.

Hysteresis: Minimum hysteresis is less than 2 mTorr from 1 to 2000 mTorr and less than 2 Torr from 2 Torr to atmosphere. To prevent relay chatter hysteresis is adjustable to as high as 5% of full range.

Maximum Pressure without Calibration Change: 2300 Torr (30 PSIG)

Maximum Gauge Tube Temperature: 100 °C (212 °F) maximum bake out of gauge tubes in air or vacuum. Automatic compensation 0 to 35°C.

Display: 3 1/2 digit, Green LED character height 11 mm (.47 in.) 2 ranges: 1 mTorr to 1999 mTorr and 1 Torr to 777 Torr.

Analog Outputs: Convection Gauge has 3 simultaneous outputs:

1 mTorr to 2000 mTorr:	1 mV per mTorr	(0 to 2 VDC Linear)
2 Torr to 20 Torr:	100 mV per Torr	(0.2 to 2 VDC Linear)
20 Torr to 800 Torr:	1 mV per Torr	(.020 to .800 VDC Linear)

Gauge Tube Orientation: Axis of tube must be horizontal.

Line Power: 95 to 125 VAC, 50/60 Hz; 220 VAC optional, no extra cost.

Wattage: 5 watts with both relays energized.

Line Cord: 3 wire 1.7 meter (65 inch) attached.

Gauge Tube Cable: Standard length is 3 m (10 ft.) attached to cabinet. Use up to 150 m (500 ft.) without affecting calibration.

Mounting: 1/4 DIN enclosure suitable for panel or bench mounting. Panel mounting jack screws included. Carry handle also available.

Weight with Gauge Tube: Net: 1 lb. 2 oz. (0.5 kg); Ship: 3 lbs. (1.4 kg.)

Optional Set Points and Relays: 2 independent set points with front panel LED indicators and 2 SPDT relays 3 amp @ 115 VAC, non-inductive. Adjustable from front panel over 100% of range.

Nitrogen, Argon and Other Gases

As a general purpose instrument for monitoring the pump down of systems vented to air or nitrogen, the convection gauge is an excellent choice. The convection gauge can be provided to read directly for argon or other gases. But, if your system uses a variety of gases, or if accuracy between 2 Torr and 800 Torr is critical in your process, then our diaphragm manometer instruments may be a better selection.

Ordering Information; Digital Convection Gauges

Buy Now! Go to www.vacuumresearch.com to order online

Digital Dual Set Point Convection Gauge Controller

Two adjustable set points plus 3 linear analog outputs. 1/4 DIN enclosure with jack screws for panel mounting. Standard power 95 to 125 VAC 50/60 Hz, 220 VAC optional at no extra cost. Built to CSA standards. All cables are included but gauge tube is not. Use angle or inline style.

1 mTorr to atmosphere, P/N: 902171	.....\$722.
.001 mbar to atmosphere, P/N: 902176-mbar	.....\$722.
0.1 Pa to atmosphere, P/N: 902177-Pascal	.....\$722.

Digital Convection Gauge Indicator 1 mTorr to Atmosphere

Three linear analog outputs, no serial I/O or setpoints. 1/4 DIN enclosure with jack screws for panel mounting. Standard power 95 to 125 VAC 50/60 Hz, 220 VAC optional at no extra cost. Built to CSA standards. All cables are included but gauge tube is not. Use angle or inline style.

1 mTorr to atmosphere, P/N: 902178	.....\$498.
.001 mbar to atmosphere, P/N: 902179-mbar	.....\$498.
0.1 Pa to atmosphere, P/N: 902180-Pascal	.....\$498.

Angle Style Convection Gauge Tubes (Interchangeable with Inline)

Gauge Tube body and all wetted parts are 304 SS. Connector pins are nickel plated Kovar.

With 1/8 inch NPT and 1/2 inch OD Tube, P/N: 912161	.....\$119.
With NW-16 Flange, P/N: 912162 • NW-25 Flange, P/N: 912201	.....\$164.
With 15 mm OD Tube, P/N: 912167	.....\$164.
With 1.33 in. OD Conflat® (rotatable), P/N: 912163	.....\$164.
With 2.75 in. OD Conflat® (rotatable), P/N: 912164	.....\$164.
With VCR-8 FEM, P/N: 912165	.....\$189.
With VCR-4 FEM, P/N: 912166	.....\$189.

All Stainless Steel Gauge Tubes for outdoor applications. All wetted parts as well as all external parts and connector pins are 304 SS.

Add SS suffix to tube P/N and to tube price:	.....add \$48.
3 Position Gauge Tube Selector, P/N: 902027	.....\$397.
Calibrators for Digital Convection Gauge Indicator or Controller	
P/N: 912170	.....\$535.



Indicator in standard enclosure shown on the left, controller with dual set points and 1/4 DIN enclosure shown on the right.

- 30 Inches Hg Vacuum to 150.0 PSIG Pressure
- ± 0.1 Inches Hg and 0.1 PSIG Resolution
- Easy To Read 3 1/2 Digit Backlit Display
- Dual Set Point Controller With 2 Relays
- Analog Output Scaled In PSI and Inches Hg
- Change Cable Length Without Re-calibrating
- Fits Hastings, Varian, TeleVac Panel Cut-Outs

These are compact vacuum/pressure measurement and control instruments that offer the precision and high resolution of digital electronics at the same price as analog instruments. These instruments utilize a rugged silicon diaphragm transducer with a 1/8 inch NPT connection in a stainless steel housing. Transducers with stainless steel diaphragm and stainless steel housing are also available. The meter display reads from -30.0 to +100.0, with the minus sign indicating vacuum in inches of mercury, and the positive sign indicating pressure in PSIG.

The dual set point controller operates two independently-set control relays. Set point values are easily adjusted from the front panel and displayed on the meter with push-to-set switches. Each relay has 3 Amp contacts, form C. Screw terminals for the relay outputs are provided on the rear panel.

Both the indicator and the controller instruments are available in either 1/4 DIN or 2.75 inch diameter standard enclosures. The 2.75 inch diameter standard enclosure fits the same panel cut out as Hastings, Varian, Televac and other analog meters. Mounting hardware is included with both styles.

Specifications

Pressure Range: 30 in. Hg vacuum to 150.0 PSIG pressure. Transducer can withstand overpressure to 200 PSIG.

Calibration: Air or nitrogen.

Accuracy: 2% of full scale.

Display: 3 1/2 Digit Green Backlit LCD.

Analog Output: Minus 300 millivolts to 0.0 Volts at atmosphere; 0 to 1.50 Volts D.C. from atmosphere to 150 PSIG. 4 to 20 mA and 0 to 10 VDC output in addition to 0 to 1.50 Volt D.C. available for instruments in 1/4 DIN enclosure.

Transducers: Silicon diaphragm with 1/8 NPT male thread port standard. Optional is 316 SS stainless steel diaphragm with 1/4 NPT male port.

Set Point Range: Full Scale, 30 in. Hg to 150.0 PSIG.

Set Point Repeatability: ± 0.2 in. Hg; ± 0.2 PSIG.

Line Power: 115 VAC, 50/60 Hz; 230 VAC optional at no additional cost.

Line Regulation: ± 20% change in line voltage produces less than 1% change in reading.

Wattage: Less than 1 Watt for indicator, 2 Watts for controller.

Temperature Effects: Changes in ambient temperature between 0 °C and 50 °C change the reading less than 0.33% per °C.

Bakeout Temperature: Transducer can be baked to 100 °C (212 °F) in air or vacuum.

Dimensions: DIN enclosure: 92 X 92 mm panel cutout, 122 mm F to B.. Standard enclosure : 2.75 in. diameter panel cutout, 4 X 8 in. F to B..

Mounting: Panel mount hardware is standard. Bench mount and portable cabinets are also available, see page 43.

Transducer Cables: 10 ft. (3m) attached.

Transducer Extension Cables: Change transducer cable length without recalibration. Extensions to 500 ft. (150 m) can be used, see page 43.

Line Cord: 3 wire, 65 inch (170 cm) attached.

Net Weight: Indicator: 1 lb., 2 oz. (0.5 kg); Controller: 1 lb., 6 oz. (0.6 kg)

Shipping Wt.: Indicator: 2 lbs., 8 oz. (1.1 kg); Controller: 3 lbs. (1.3 kg)

Ordering Information Specify 115 or 230 V 50/60 Hz or 24 VDC

Dual Set Point Controller With Digital Display in standard enclosure. Transducer not included. P/N: 904001\$737.

Dual Set Point Controller With Digital Display in 1/4 DIN enclosure. Built to CSA standards. Transducer not included. P/N: 904008 ...\$782.

Digital Indicator only in standard enclosure. Transducer not included. P/N: 904002\$498.

Digital Indicator only in 1/4 DIN enclosure. Built to CSA standards. Transducer not included. P/N: 904007\$542.

4 to 20 mA or 0 to 10 VDC Output in addition to the standard analog output. Only available for instruments in 1/4 DIN enclosure. P/N: V801082add \$243.

Calibrator for 30" Hg - 150.0 PSIG Instruments
See page 45 for a complete description of the calibrator.
P/N: 912021\$264.

Buy Now! Go to www.vacuumresearch.com to order online

Standard Silicon Diaphragm Transducer for 30 Inches Hg to 150.0 PSIG. Transducer body is 304 SS, connector pins are nickel plated Kovar. 1/8 in. NPT male thread. P/N: 912065\$277.

Silicon Diaphragm Transducers with All Stainless External Parts for outdoor applications or wherever the use of 304 SS is appropriate. All external parts and connector pins are 304 SS. Add SS suffix to tube P/N and to tube price:add \$48.

Standard Stainless Steel Diaphragm Transducer for 30 In. Hg to 150 PSIG instruments. Diaphragm and all wetted parts are 316 SS, all other parts are 304 SS. 1/4 in. NPT male thread. P/N: 912093\$434.

Gauge tube baffles and trapssee complete Gauge Catalog.

Quick connect couplings, waterproof vacuum sensors, gauge tube selector switch, bench mount cabinets, extension cable, and explosion-proof gaugessee pages 38 and 43.



Photo shows the dual set point controller with standard enclosure on the left, and indicator in the 1/4 DIN enclosure on the right.

- 1 to 2000 mTorr Range (~ 0 to 2 mm Hg)
- Available in .001 to 2.000 mbar or .1 to 200.0 Pa
- ± 1 mT Resolution Over Entire Range
- Easy To Read 3 1/2 Digit Backlit Display
- Dual Set Point Controller With 2 Relays
- Linear 0 to 2.0 VDC Output; 4-20 mA Optional
- Change Cable Length Without Re-calibrating
- Fits Hastings, Varian, TeleVac Panel Cut-Outs

These compact vacuum measurement and control instruments offer the precision and high resolution of digital electronics at the same price as analog instruments. Our extremely rugged sensor is constructed with a solid, inert, noble metal that maintains its calibration over long periods. Because no gold is used, these gauges are compatible with both mercury and oil pumps. The low 125 °C operating temperatures in our Pirani type gauge tube (half that of thermopile gauges), enhances stability as does a unique temperature compensation network. Gauge tubes are matched and can be replaced without recalibration, and they can withstand working pressures to 300 psi, tested to 1200 psi.

Specifications

Pressure Range: 1 to 2000 milli Torr (~ 0 to 2 mmHg.)
Calibration: Air or Nitrogen.
Accuracy: Better than 5% of value or ± 3 mTorr, whichever is larger.
Response Time: 0.3 second time constant.
Display: 3 1/2 Digit Green Backlit LCD
Analog Output: 0 to 2.000 Volts into 2000 Ohm load or higher. 2 pin connector included. 4 to 20 mA and 0 to 10 VDC output in addition to 0 to 2.000 Volt D.C. available for instruments in 1/4 DIN enclosure.
Gauge Tube: Standard gauge tubes have a 1/8 NPT male thread or fit into quick connects sized for 1/8 inch pipe (0.405" dia.) NW, VCR and Mini Conflat® available. **Internal Volume:** 0.79 cc (1/8 NPT).
Set Point Range: Full Scale, 1 to 2000 mTorr; Repeatability: ± 2 mTorr.
Line Power: 115 VAC, 50/60 Hz; 230 VAC optional at no additional cost.
Line Regulation: ± 20% change in line voltage produces less than 1% change in reading.

Ordering Information Specify 115 or 230 V 50/60 Hz or 24 VDC

Dual Set Point Controller With Digital Display in standard enclosure. Gauge tube not included. P/N: 902001 \$652.
Dual Set Point Controller With Digital Display in 1/4 DIN enclosure. Built to CSA standards. Gauge tube not included. P/N: 902100 ... \$696.
Digital Indicator only in standard enclosure. Gauge tube not included. P/N: 902002 \$445.
Digital Indicator only in 1/4 DIN enclosure. Built to CSA standards. Gauge tube not included. P/N: 902099 \$491.
4 to 20 mA or 0 to 10 VDC Output in addition to 0 to 2.000 VDC analog output. Only available for instruments in 1/4 DIN enclosure. P/N: V801082 add \$243.
Calibrator for 2000 mTorr Instruments
 See page 45 for a complete description of the calibrator. P/N: 912008 \$264.
Gauge and gauge tube accessories see pages 43.

The Vacuum Research Dual Set Point Controller operates two control relays. Set point values are adjusted from the front panel and displayed on the meter. Push-to-set switches simplify display of set point pressures. Relays have 3 Amp contacts, form C, and have screw terminal connectors on the rear of the instruments.

Both the indicator and the controller instruments are available in either 1/4 DIN or 2.75 inch diameter standard enclosures. The 2.75 inch diameter standard enclosure fits the same panel cut out as Hastings, Varian, Televac and other analog meters. Mounting hardware is included with both styles.

Wattage: Less than 1 Watt for indicator, 2 Watts for controller.
Temperature Effects: Changes in ambient temperature between 0 °C and 50 °C change the reading less than 0.2 mT per °C at 50 mT; less than 4 mT per °C at 900 mT.
Bakeout Temperature: Standard gauge tube can be baked to 100 °C (212 °F) in air or vacuum. 250 °C. (482 °F) bakeout, see Gauge Catalog.
Dimensions: DIN enclosure: 92 X 92 mm panel cutout, 122 mm F to B. Standard enclosure: 2.75 in. diameter panel cutout, 4.8 in. F to B.
Mounting: Panel mounting is standard. Bench mount and portable cabinets are also available, see page 43 for complete specifications.
Gauge Tube Cables: 10 ft. (3 m) attached.
Extension Cables: Change gauge tube cable length without recalibration. Extensions to 500 ft. (150 m) can be used. See page 43.
Line Cord: 3 wire, 65 inch (170 cm) attached.
Net Weight: Indicator: 1 lbs., 2 oz. (0.5 kg); Controller: 1 lb, 6 oz. (0.6 kg)
Shipping Wt.: Indicator: 2 lbs., 8 oz. (1.1 kg); Controller: 3 lbs. (1.4 kg)

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Standard Gauge Tube For 1 to 2000 mT Instruments
 Gauge tube body is 304 SS, connector pins are nickel plated Kovar.
With 1/8 in. NPT Male Thread, P/N: 912001 \$91.
With 1/4 in. NPT Male Thread, P/N: 912303 \$109.
With 1/4 in. SAE 45° Flare, Male, P/N: 912284 \$134.
With NW-16 Flange, P/N: 912005 • **NW-25 Flange**, P/N: 912202 \$134.
With NW-40 Flange, P/N: 912270 \$143.
With 1.33 in. Conflat® Flange, non-rotatable, P/N: 912067 \$134.
With VCR-4 FEM Fitting, P/N: 912068 \$172.
With 15 mm Diameter Tube, P/N: 912102 \$126.
All Stainless Steel Gauge Tubes For Outdoor Applications Or Wherever The Use Of 304 SS Is Appropriate. All wetted parts as well as all external parts and connector pins are 304 SS. 1/8 in. NPT, NW-16, Conflat®, VCR-4 and special flanges can be provided. Add "SS" suffix to any tube P/N and to standard tube price: add \$48.



Photo shows the dual set point controller with standard enclosure on the left, and indicator in the 1/4 DIN enclosure on the right.

- **0.01 to 20 Torr Range**
- **± 0.01 Torr Resolution Over Entire Range**
- **Available in .01 to 20.00 mbar and 1 to 2000 Pa**
- **Easy To Read Backlit 3 1/2 Digit Display**
- **Dual Set Point Controller With 2 Relays**
- **Linear 0 to 2.0 VDC Output; 4-20 mA Optional**
- **Change Cable Length Without Re-calibrating**
- **Fits Hastings, Varian, TeleVac Panel Cut-Outs**

These compact vacuum measurement and control instruments offer the precision and high resolution of digital electronics at the same price as analog instruments. Our extremely rugged sensor is constructed with a solid, inert, noble metal that maintains its calibration over long periods. Because no gold is used, these gauges are compatible with both mercury and oil pumps. The low 125 °C operating temperatures in our Pirani type gauge tube (half that of thermopile gauges), enhances stability as does a unique temperature compensation network. Gauge tubes are matched and can be replaced without recalibration, and they can withstand working pressures to 300 psi, tested to 1200 psi.

The Dual Set Point Controller operates two control relays. Set point values are adjusted from the front panel and displayed on the meter. Push-to-set switches simplify display of the set point pressures. Relays have 3 Amp contacts, form C, and have screw terminal connectors on the rear of the instruments.

Both the indicator and the controller instruments are available in either 1/4 DIN or 2.75 inch diameter standard enclosures. The 2.75 inch diameter standard enclosure fits the same panel cut out as Hastings, Varian, Televac and other analog meters. Mounting hardware is included with both styles.

Specifications

Pressure Range: 0.01 to 20 Torr.
Calibration: Air or Nitrogen.
Accuracy: Better than 5% of value or ± 0.03 Torr, whichever is larger.
Response Time: 0.3 second time constant.
Analog Output: 0 to 2.000 Volts = 0 to 20 Torr into 2000 Ohm load or higher. 2 pin connector included. 4 to 20 mA & 0 to 10 VDC out in addition to 0 to 2.000 Volt D.C. available for instruments in 1/4 DIN enclosure.
Display: 3 1/2 Digit Green Backlit LCD.
Gauge Tube: Standard gauge tubes have 1/8 NPT male thread or fit into quick connects sized for 1/8 inch pipe (0.405" dia.) NW, VCR and Mini Conflat® available. **Internal Volume:** 0.79 cc (1/8 NPT).
Set Point Range: Full Scale, 0.01 to 20 Torr. Repeatability: ±0.02 Torr.
Line Power: 115 VAC, 50/60 Hz; 230 VAC optional at no additional cost.
Line Regulation: ± 20% change in line voltage produces less than 1% change in reading.

Wattage: Less than 1 Watt for indicator, 2 Watts for controller.
Temperature Effects: Changes in ambient temperature between 0 °C and 50 °C change the reading less than 0.01 Torr per °C.
Bakeout Temperature: Gauge tube can be baked to 100 °C (212 °F) in air or vacuum.
Dimensions: DIN enclosure: 92 X 92 mm panel cutout, 122 mm F to B. Standard enclosure: 2.75 in. diameter panel cutout, 4.8 in. F to B.
Mounting: Panel mounting hardware is standard. Bench mount cabinets are also available, see page 38 for complete specifications.
Gauge Tube Cables: 10 ft. (3m) attached.
Extension Cables: Change gauge tube cable length without recalibration. Extensions to 500 ft. (150 m) can be used. See page 43.
Line Cord: 3 wire, 65 inch (170 cm) attached.
Net Weight: Indicator: 1 lb., 2 oz. (0.5 kg); Controller: 1 lb., 6 oz. (0.6 kg)
Shipping Wt: Indicator: 2 lbs., 8 oz. (1.1 kg); Controller: 3 lbs. (1.3 kg)

Ordering Information Specify 115 or 230 V 50/60 Hz or 24 VDC

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Dual Set Point Controller With Digital Display in standard enclosure. Gauge tube not included. P/N: 902015 \$708.
Dual Set Point Controller With Digital Display in 1/4 DIN enclosure. Built to CSA standards. Gauge tube not included. P/N: 902098 . . . \$753.
Digital Indicator only in standard enclosure. Gauge tube not included. P/N: 902016 \$509.
Digital Indicator only in 1/4 DIN enclosure. Built to CSA standards. Gauge tube not included. P/N: 902097 \$548.
4 to 20 mA or 0 to 10 VDC Output in addition to 0 to 2.000 VDC analog output. Only available for instruments in 1/4 DIN enclosure. P/N: V801082 add \$243.
Calibrator for 20 Torr Instruments
 See page 45 for a complete description of the calibrator.
 P/N: 912009 \$264.
Gauge tube baffles and traps see complete Gauge Catalog.

Standard Gauge Tube For .01 to 20 Torr Instruments
 Gauge tube body is 304 SS, connector pins are nickel plated Kovar.
With 1/8 in. NPT Male Thread, P/N: 912011 \$95.
With 1/4 in. SAE 45° Flare, Male, P/N: 912285 \$139.
With NW-16 Flange, P/N: 912072 • **NW-25 Flange,** P/N: 912204 \$139.
With 1.33 in. Conflat® Flange, non-rotatable, P/N: 912073 \$139.
With VCR-4 FEM Fitting, P/N: 912074 \$176.
With 15 mm Diameter Tube, P/N: 912103 \$123.
All Stainless Steel Gauge Tubes For Outdoor Applications Or Wherever The Use Of 304 SS Is Appropriate. All wetted parts as well as all external parts and connector pins are 304 SS. 1/8 in. NPT, NW-16, Conflat®, VCR-4 and special flanges can be provided. Add "SS" suffix to any tube P/N and to standard tube price: add \$48.
Quick connect couplings, tube selector switch, extension cable, and other accessories see page 43.



24 Volt Gauges and Transmitters, Absolute Pressure



Available in 5 ranges from 10^{-5} Torr to 1500 Torr. Pirani and Stainless Steel Diaphragm Sensors.

Specifications

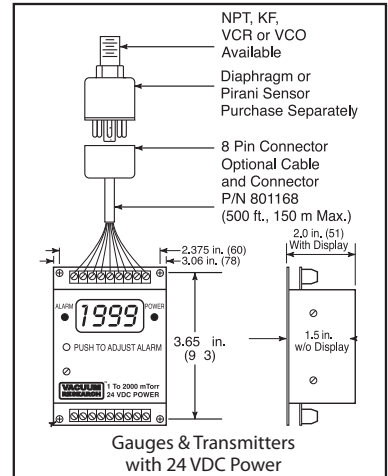
Power: Gauges operate from 12 to 35 VDC power, 150 mA. for all ranges except .01 to 20 Torr which requires 300 mA.

Response time: With Vacuum Research Pirani; 0.3 sec time constant. With Vacuum Research Diaphragm tubes; less than 400 milliseconds.

Accuracy: Pirani Gauges better than 5% of value or ± 3 mTorr, whichever is larger. Diaphragm Gauges 1% of reading or ± 2 Torr whichever is larger.

Display (Optional): 3 1/2 place LCD.

Relay: SPDT contacts rated for 5A @ 115 VAC, non-inductive.



Ordering Information

Sensors For 24 Volt Gauges & Transmitters

Buy Now! Go to www.vacuumresearch.com to order online

<p>10⁻⁵ to 10⁻¹ Torr • Pirani Sensor (.01 X 10⁻³ to 100 X 10⁻³ mbar & .001 to 13.3 Pa also available) Gauge with Digital Display, Linear 0-1 V output and adjustable setpoint with relay. P/N 902219\$484. Transmitter (No Display), Non Linear 0-5 V output, setpoint and relay included. P/N 902167\$236. Bare Circuit Board, Non-Linear, 0-5 V output no enclosure. P/N V801240\$188.</p> <p>1 to 2000 mTorr • Pirani Sensor (10⁻³ to 2 mbar & 0.1 to 200 Pascal also available) Gauge with Digital Display, Linear 0-2 V output and adjustable setpoint with relay. P/N 902217\$424. Transmitter (No Display), Non Linear 0-5 V output, setpoint and relay included. P/N 902169\$236. Bare Circuit Board Non-Linear, 0-5 V output no enclosure. P/N V801159\$172.</p> <p>.01 to 20 Torr • Pirani Sensor (.01 to 20 mbar & 1 to 2000 Pascal also available) Gauge with Digital Display, Linear 0-2 V output and adjustable setpoint with relay. P/N 902218\$424. Transmitter (No Display), Non Linear 0-5 V output, setpoint and relay included. P/N 902170\$236. Bare Circuit Board Non-Linear, 0-5 V output no enclosure. P/N V801181\$183.</p> <p>1 to 1500 Torr • Diaphragm Sensor (1 to 2000 mbar & 0.1 to 200.0 kPa also available) Gauge with Digital Display, Linear 0-1.5 V output and adjustable setpoint with relay. P/N 902216\$437. Transmitter (No Display), Linear 0-1.5 V output, setpoint with relay included. P/N 902172\$247. Bare Circuit Board, Linear, 0-1.5 V output, no enclosure. P/N V801170\$194.</p> <p>30 Inch Hg to Atmosphere (Gauge Pressure) • Diaphragm Sensor Gauge with Digital Display, Linear 0-300 mV output and adjustable setpoint with relay. P/N 902213\$424. Transmitter (No Enclosure), Linear 0-300 mV output and adjustable setpoint with relay included. P/N 902173\$236. Bare Circuit Board, Linear, 0-300 mV output, no enclosure. P/N V801187\$183.</p>	<p>Standard Pirani Gauge Tube For 0.01 to 100 mTorr Instruments With Smooth 3/4 In. O.D. Tubulation, P/N: 912018\$138. With 1/8 NPT, P/N: 912125\$182. With NW-16 Flange, P/N: 912037 • NW-25 Flange, P/N: 912113 ..\$182. With 1.33 Conflat® Tapped holes P/N: 912179\$182. With 1.33 Conflat® Through holes P/N: 912160\$182. (More styles in complete Vacuum Gauge Catalog)</p> <p>Standard Pirani Gauge Tube For 1 to 2000 mT Instruments With 1/8 in. NPT Male Thread, P/N: 912001\$91. With NW-16 Flange, P/N: 912005 • NW-25 Flange, P/N: 912202 ..\$134. With 1.33 Conflat® P/N: 912067 ..\$134. VCR-4 FEM P/N: 912068 \$172. With 15 mm O.D., P/N: 912102\$126. (More styles on Page 30)</p> <p>Standard Gauge Tube For .01 to 20 Torr Instruments With 1/8 in. NPT Male Thread, P/N: 912011\$95. With NW-16 Flange, P/N: 912072 • NW-25 Flange, P/N: 912204 ..\$139. With 1.33 Conflat® P/N: 912073 ..\$139. VCR-4 FEM P/N: 912074..\$176. With 15 mm O.D., P/N: 912103\$123. (More flange styles on Page 31)</p> <p>Transducer with Stainless Steel Diaphragm 1/4 in. NPT P/N: 912022\$441. 1/8 in. NPT P/N: 912129 \$498. Stainless Steel Diaphragm With NW-16 Flange, P/N: 912151 ..\$498. With NW-25 Flange, P/N: 912117\$498. With 1.33 Conflat® P/N: 912191 \$498. VCR-4 FEM P/N: 912219 \$560. (More flange styles in complete Vacuum Gauge Catalog)</p> <p>Transducer With Standard Stainless Steel Diaphragm for 30 In. Hg Diaphragm and wetted parts are 316 SS 1/4 in. NPT P/N: 912093\$434. Silicon Diaphragm in Stainless Steel Housing, 1/8 In. NPT P/N: 912065\$277. (More flange styles on Page 29)</p>
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Cable Assembly includes a connector for the sensor on one end and stripped and tinned leads on the other end to connect to the terminal strip. Connector on only one end allows the cable to be pulled through conduit or to more easily enter your cabinet. Specify length.
P/N 801168- xxx feet\$23. plus \$2./Ft.

Power Supply 100 to 240 V, 50-60 Hz input, 15 VDC @ 1.0 A output. Wallmount style with adapter plugs for US, UK, Europe, Australia.
P/N: V104124\$58. each

Electronic Calibrators Absolute pressure gauges can be adjusted to factory specifications using our compact electronic calibrators. No electronics training is required to operate these calibrators which allow you to adjust zero and full scale without using a vacuum system. See page 45 for P/Ns and prices for each of the ranges listed above.

Rack for Bare PCBs
Rack to hold 6 Bare PCBs. 3 X 7 X 3 inch F to B. Tabs for surface mount included. P/N V801186\$199.



Active Pirani; 1 to 2000 mT, 2000 Microns, 2.000 mbar, 200.0 Pa



The instrument on the left shows the optional digital display. All models provide both 0 - 10 V and 4 - 20 mA linear outputs for your PLC.

- Sensor and Gauge in One Compact Package
- 12 to 35 Volt DC Power; Less Than 100 mA
- Linear Outputs for PLC or Data System
- 0 to 10 VDC and 4-20 mA Standard Outputs
- Optional Outputs to Match Any T/C Gauge
- Optional 3 1/2 Digit Liquid Crystal Display
- Stem, Flanges, Enclosure All Stainless Steel

Specifications For Active Pirani

Pressure Ranges: 1 to 2000 mTorr, 1 to 2000 Microns (select one) .001 to 2.000 mbar, 0.1 to 200.0 Pa

Pressure: Tested to 150 PSIG (10 kg/cm²).

Power & Analog Output Connector: RJ-45 Female.

Power: 12 to 35 VDC, less than 100 mA.

Analog Outputs: Linear 0 to 10 VDC and 4 - 20 mA.

Accuracy: Better than 5% of value or ± 3 mTorr, whichever is larger.

Response Time: 0.3 second time constant.

Optional Display: 3 1/2 Digit LCD.

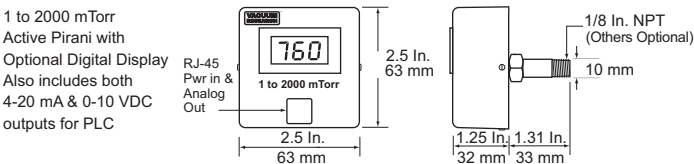
Connection to System: Standard gauge has a 1/8 NPT male thread or fit into quick connects sized for 1/8 inch pipe (0.405" dia.) NW, VCR and Mini Conflat® available.

Temperature Effects: Changes in ambient temperature between 0 °C and 50 °C change the reading less than 0.2 mT per °C at 50 mT; less than 4 mT per °C at 900 mT.

Bakeout Temperature: Active Pirani tube can be baked to 50 °C (120 °F) in air or vacuum.

Mounting: Flange for system connection supports the gauge.

Net Wt.: 6 Ounces (180 grams). **Shipping Wt.:** Approx. 1lb. (.45 kg).



Display and Power Up To 7 Gauges

7 position switch and digital LED display provides power and continuous 4-20 mA output from each gauge. Seven RJ-45 female connectors on rear panel, plus a DB-15 connector for the seven 4-20 mA linear outputs. Cables with RJ-45 connectors must be ordered separately. 1/4 DIN panel mountable. Power required is 100 to 240 V, 50/60 Hz.

7 Channel Display and Power Supply,

P/N: 902394 (cables not included) \$456.

DB-15 Connector with cable for 4-20mA linear outputs from the rear panel (to connect to your PLC or Data Acquisition System)

P/N: V801328 - XX feet \$50. plus \$2.00 per ft.

Buy Now! Go to www.vacuumresearch.com to order online

Ordering Information, 12 to 35 VDC Power Required

Active Pirani Indicator & Transmitter, 3 1/2 digit display, 1-2000 mTorr plus 4-20 mA and 0-10 VDC output

With 1/8 Inch NPT Male Thread, P/N: 902383 \$375.

With 1/4 Inch 45° SAE Flare, Male, P/N: 902373 \$385.

With NW-16 Flange, P/N: 902384 • NW-25 Flange, P/N: 902385 .. \$385.

With 1.33 Inch Conflat® Flange, P/N: 902386 \$385.

With VCR-4 FEM, P/N: 902387 \$430.

With 15 mm O. D. Tube, P/N: 902388 \$410.

With 1/2 Inch O. D. Tube, P/N: 902389 \$415.

Active Pirani Transmitter only, No display, 1-2000 mTorr

plus 4-20 mA and 0-10 VDC outputs

With 1/8 Inch NPT Male Thread, P/N: 902376 \$299.

With 1/4 Inch 45° SAE Flare, Male, P/N: 902374 \$340.

With NW-16 Flange, P/N: 902377 • NW-25 Flange, P/N: 902378 .. \$340.

With 1.33 Inch Conflat® Flange, P/N: 902379 \$340.

With VCR-4 FEM, P/N: 902380 \$375.

With 15 mm O. D. Tube, P/N: 902381 \$330.

With 1/2 Inch O. D. Tube, P/N: 902382 \$340.

mTorr is the standard but there is no charge for calibration in microns, mbar or Pa. Add micron, mbar, or Pa to P/N.

Cable Options (Not Included in Gauge Price):

RJ-45 male one end. Stripped and tinned conductors on the other end. Lengths up to 500 feet (150 m) available.

P/N: V801318 -XX (Length in feet) \$12. plus \$2.00 per ft.

RJ-45 male one end 25 feet, standard color gray. (black, blue, green, red, orange, purple, white, yellow avail.)

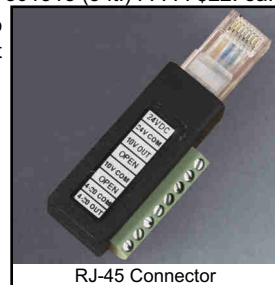
P/N: V801318-color (1 RJ45) \$36. ea.

RJ-45 male both ends 25 feet, standard color gray. (black, blue, green, red, orange, purple, white, yellow avail.) P/N: V801318-color (2 RJ45) . \$38. ea.

Cable 5 Ft. with RJ-45 male both ends. P/N: V801318 (5 ft.) \$22. ea.

Power Supply with RJ-45 Connector 100 to 240 V, 50-60 Hz input, 15 VDC @ 1.0 A output with adapter plugs for US, UK, Europe, Australia. 6 ft. cord. Screw terminals for connection of 0-10 VDC and 4-20 mA output. P/N: V801330 \$79. each

RJ-45 Connector Adapter (shown at right) with screw terminals for 24V power in and 4-20 mA, 0-10 VDC outputs. P/N: V801324 \$28. each



RJ-45 Connector



Thermocouple Gauges; 1 to 1000 mTorr, DV-6 Tube



Panel Mount Indicator on left
1/4 DIN Dual Set Point Controller on right



Inset photo shows Bench Mount Cabinet
with optional carry handle and 3 position
gauge tube selector switch.

- **Reliable T/C Gauge 1 to 1000 mTorr (Microns)**
- **Indicator Only or Indicator with 2 Set Points**
- **Stainless Tubes & Special Flanges Available**
- **Stem and Flanges 300 Series Stainless Steel**
- **Operates With Power From 90 to 240 V, 50/60 Hz**
- **0 to 5 Volt Output For Computer I/O or Control**
- **Fits Same Cutout As Hastings, Televac & Varian**
- **Use With VRC-6 or Hastings DV-6 Gauge Tubes**

Vacuum Research's thermocouple vacuum gauge is a simple and low cost instrument for vacuum measurement in the popular 1 to 1000 mTorr range (microns). It operates with any line voltage from 90 to 240V at 50 or 60 Hz, and can be used with our VRC-6 or Hastings DV-6 gauge tubes. A 0 to 5 VDC analog output is standard on both the indicator and dual set point controller models.

Ordering Information

Buy Now! Go to www.vacuumresearch.com to order online

Dual Set Point Controller

Thermocouple gauge, 1 to 1000 mTorr range with 0 to 5 VDC analog output plus 2 adjustable set points each with its own SPDT relay contacts rated 3 Amps up to 220 VAC non-inductive. Operates from any line power between 90 and 240 volts, 50 or 60 Hz. 1/4 DIN enclosure with panel mounting jack screws included. Gauge tube not included. P/N 902109 \$513.

Indicator; 1 to 1000 mTorr Meter

Thermocouple gauge, 1 to 1000 mTorr range with 0 to 5 VDC analog output, operates with any line power between 90 and 240 volts, 50 or 60 Hz. Gauge tube not included. See Gauge catalog for dimensions. P/N 902111 \$259.

Bench Mount Stand with Carrying Handle

5.3 in. wide X 4 in. F to B X 4.7 in. High (6.7 in. handle extended)
(134 X 100 X 120 mm) P/N: 902112 \$55.

3 Position Thermocouple Gauge Indicator; 1 to 1000 mTorr Meter

Includes 3 cables 10 ft. (3 m) long and 3 connectors, bench mount stand and carry handle, gauge tubes not included. Cable length up to 500 ft; (60 m) available. P/N: 902113 \$414.

5 position Thermocouple Gauge Indicator 1 to 1000 mTorr Similar to above 3 position indicator P/N 902181 \$469.

Standard T/C Gauge Tubes Interchangeable with Teledyne-Hastings DV-6M & DV-6R. All parts in contact with the process are stainless steel: cup, stem, and flange. The connector pins are nickel plated Kovar.

- VRC-6M 1/8" NPT Stainless Steel Body, P/N: 912086. \$63.
- VRC-6M 1/4" SAE 45° Flare, Male S.S. Body, P/N: 912302 \$115.
- VRC-6M NW-16 Stainless Steel Body, P/N: 912096. \$115.
- VRC-6M NW-25 Stainless Steel Body, P/N: 912203. \$115.
- VRC-6M VCR-4 FEM Stainless Steel Body, P/N: 912082 \$132.
- VRC-6M 1.33" Conflat® Stainless Steel Body, P/N: 912083. \$115.
- VRC-6M 1/2" OD Smooth Flange SS Body, P/N: 912085 \$63.
- VRC-6M 2.75 Conflat® Stainless Steel Body, P/N: 912178 \$168.
- VRC-6M VCR-8 FEM Stainless Steel Body, P/N: 912079 \$138.

Thermocouple Gauge Tubes with Stainless Steel Connector Pins

- For outdoor use or applications that require frequent unplugging of the gauge tube connector. All parts are stainless steel: cup, stem, flange, and connector pins.
- VRC-6R 1/8" NPT Stainless Steel Pins & Body, P/N: 912087 \$118.
 - VRC-6R 1/4" SAE 45° Flare, Male S.S. Body, P/N: 912302SS \$165.
 - VRC-6R NW-16 Stainless Steel Pins & Body, P/N: 912098. \$165.
 - VRC-6R VCR-4 FEM Stainless Steel Pins & Body, P/N: 912099. \$183.
 - VRC-6R 1.33" Conflat® S.S. Pins & Body, P/N: 912084. \$165.
 - VRC-6R 2.75 Conflat® Stainless Steel Pins & Body, P/N: 912213. \$183.

Thermocouple Gauge Tubes

The VRC-6M and 6R are direct plug-in replacements for the Teledyne-Hastings DV-6M and DV-6R gauge tubes. No adjustment to your instrument is required; just plug them in. These T/C gauge tubes are tested to 1200 PSIG for operation up to 300 PSIG without damage There is no fragile plastic header, and no easy-to-break plastic key. The result of 30 years of vacuum gauge experience, all tubes have stainless steel bodies with heavy plated metal key and connector pins. For outdoor applications select our 'R' version which has stainless steel connector pins as well as our standard all stainless steel body.

Specifications

Pressure Range: 1 to 1000 milliTorr (1 to 1000 Microns). Air/N₂

Accuracy: Better than ± 1 mTorr from 1 to 20 mTorr. Better than 5% from 20 to 1000 mTorr.

Response Time: 1 mTorr up to atmosphere: less than 1 sec.

Analog Output: 0 to 5 VDC into 10 K ohms minimum.

Gauge Tube: Gauge tubes available with 1/8 inch NPT, NW-16, VCR-4, 1.33 O.D. Conflat® flanges and all stainless steel bodies. This instrument also operates with Hastings DV-6 thermocouple gauge tubes.

Bakeout Temperature: 100 °C (212 °F) in air or vacuum.

Operating Temperature: 4 to 60 °C (39 to 140 °F).

Temperature Coefficient: ± (1% of reading +0.2 mTorr)/°C.

Power: Any voltage from 90 to 240 V, 50 / 60 Hz under 2 watts.

Line Regulation: Reading changes less than ±0.3% for line voltage change from 90 to 240 Volts.

Relays on Controller Model: Separate relays for each set point. Form C, SPDT, contacts rated 3 amps non-inductive at voltages up to 250 VAC.

Mounting

Indicator Dimensions: See gauge catalog.

Controller: 1/4 DIN panel mount is std. Jack screws included.

Cables: 10 ft. (3 m) cable with connector and 6 ft. line cord provided. Extension cables up to 200 ft. (60 m) available.

Net Weight: Indicator: 0.5 lbs. (0.2 kg); Controller: 1.4 lbs. (0.6 kg).

Ship Weight: Indicator: 2 lbs. (0.9 kg); Controller: 3 lb. (1.4 kg).



Panel Mount Indicator on left
1/4 DIN Dual Set Point Controller on right



Inset photo shows Bench Mount Cabinet with optional carry handle and 3 position gauge tube selector switch.

- **Reliable T/C Gauge 1 to 2000 mTorr (Microns)**
- **Use With VRC-531 or Varian 531 Gauge Tubes**
- **Indicator Only or Indicator with 2 Set Points**
- **Stainless Tubes & Special Flanges Available**
- **Gauge Tube Cables Up to 500 Feet (150 m)**
- **0 to 5 Volt Output For Computer I/O or Control**
- **Fits Same Cutout As Hastings, Televac & Varian**

Vacuum Research's thermocouple vacuum gauge is a simple and low cost instrument for vacuum measurement in the popular 1 to 2000 mTorr range (microns). A 0 to 5 VDC analog output is standard on both the indicator and dual set point controller models. Operates with the gauge tubes listed below or any Varian 531 or 536 tube.

Ordering Information

Buy Now! Go to www.vacuumresearch.com to order online

Thermocouple Gauge Tubes

The VRC-531 tubes are direct plug-in replacements for the Varian 531 & 536 gauge tubes. No adjustment to your instrument is required; just plug them in. There is no fragile plastic header, and no easy-to-break plastic key. The result of 30 years of vacuum gauge experience, all tubes have stainless steel bodies with metal key and connector pins. For outdoor applications select our 'SS' version which has stainless steel connector pins as well as our standard all stainless steel body.

Specifications

- Pressure Range:** 1 to 2000 milliTorr (1 to 2000 Microns). Air/N₂
- Accuracy:** Better than ± 2 mTorr from 1 to 20 mTorr. Better than 5% from 20 to 2000 mTorr.
- Response Time:** Less than 1 sec. from 1 mTorr up to 2000 mTorr.
- Analog Output:** 0 to 5 VDC into 10 K ohms minimum.
- T/C Fail:** Indicates gauge tube disconnected.
- Gauge Tube:** Gauge tubes available with 1/8 inch NPT, NW-16, VCR-4, 1.33 O.D. Conflat® flanges and all stainless steel bodies. This instrument also operates with Varian 531 or 536 thermocouple gauge tubes.
- Bakeout Temperature:** 100 °C (212 °F) in air or vacuum.
- Power:** For controller, specify 100 to 120 volts or 200 to 240 volts, 50/60 Hz. For indicator, any voltage from 90 to 240 volts, 50/60 Hz.
- Relays on Controller Model:** Separate relays for each set point. Form C, SPDT, contacts rated 3 amps non-inductive at voltages up to 250 VAC. Not available on indicator models.
- Indicator Mounting Dimensions:** See Gauge catalog.
- Controller:** 1/4 DIN panel mount is standard. Jack screws included.
- Cables:** 10 ft. (3 m) gauge tube cable with connector and 6 ft. line cord provided. Extension cables available.
- Extension Cables:** No change in calibration with up to 500 ft. (150 m) of 18 gauge wire or up to 50 ft (15 m) of 24 gauge wire.
- Net Weight:** Indicator: 0.5 lbs. (0.2 kg); Controller: 1.4 lbs. (0.6 kg).
- Ship Weight:** Indicator: 2 lbs. (0.9 kg); Controller: 3 lb. (1.4 kg).

Dual Set Point Controller; 1 to 2000 mTorr

Thermocouple gauge, 1 to 2000 mTorr range with 0 to 5 VDC analog output plus 2 adjustable set points each with its own SPDT relay. Contacts are rated 3 Amps at up to 220 VAC non-inductive. 1/4 DIN enclosure with panel mounting jack screws included. Gauge tube not included.
 P/N 8810-2CONT-115V (for operation on 100 to 120V, 50/60 Hz) \$513.
 P/N 8810-2CONT-220V (for operation on 200 to 240V, 50/60 Hz) \$513.

Indicator; 1 to 2000 mTorr

Thermocouple gauge, 1 to 2000 mTorr range with 0 to 5 VDC analog output, operates with any line power between 90 and 240 volts, 50 or 60 Hz. Gauge tube not included. See drawing in Gauge catalog for dimensions.
 P/N 8801-INDIC-90-240V (for 90 to 240 V 50/60 Hz. operation) \$259.

Bench Mount Stand with Carrying Handle for Indicator

5.3 in. wide X 4 in. F to B X 4.7 in. High (6.7 in. H with handle extended) (134 X 100 X 120 mm) P/N: 902112 \$55.

3 Position Thermocouple Gauge Indicator; 1 to 2000 mTorr

Includes 3 cables 10 ft. (3m) long bench mount stand and carry handle. Gauge tubes not included cable length to 500 ft. (60 m) available.
 P/N: 902293 \$414.

5 Position Thermocouple Gauge Indicator; 1 to 2000 mTorr similar to

above 3 position indicator. P/N 902294 \$469.

VRC Thermocouple Gauge Tubes are interchangeable with Varian 531 & 536. All parts in contact with the process are stainless steel: cup, stem, and flange. The connector pins are nickel plated Kovar.

- VRC-531 1/8" NPT Stainless Steel Body, P/N: 531 SS304 1/8NPT \$76.
- VRC-531 NW 16 Stainless Steel Body, P/N: 531 SS304 NW16. \$127.
- VRC-531 NW-25 Stainless Steel Body, P/N: 531 SS304 NW25. \$127.
- VRC-531 VCR-4 Female, SS Body, P/N: 531 SS304 VCR4F \$144.
- VRC-531 1.33" O.D. Conflat® SS Body, P/N: 531 SS304 1.33CF \$127.
- VRC-531 1/2" OD Stem, SS Body, P/N: 531 SS304 1/2OD \$76.
- VRC-531 2.75 Conflat® SS Body, P/N: 531 SS304 2.75CF \$133.
- VRC-531 VCR-8 Female, SS Body, P/N: 531 SS304 VCR8F \$133.

All Stainless Steel Gauge Tubes For Outdoor Applications Or Wherever The Use Of 304 SS Is Appropriate. All wetted parts as well as all external parts and connector pins are 304 SS. 3/4 in. OD, NW-16, Conflat®, and special flanges can be provided. Add "SS" suffix to any tube P/N and to standard tube price: add \$48.



Photo shows sensors with 1/8 inch NPT and NW-16 flanges to the left of portable gauge model with optional bumpers and handle for easy transport.

- 1 to 20,000 Microns; Rough and High Vacuum
- Bright and Easy to Read Green LED Display
- Handle and Protective Bumpers Included
- Also Available with Panel Mounting Kit
- Fast Response Time, 0.3 Sec. Time Constant
- Perfect For Refrigeration and Leak Detection
- Also Available as 1 to 20,000 milli Torr
- Optional Scale; .001 to 20.00 millibar

This precision vacuum gauge indicates vacuum from 1 to 2000 Microns with a 3 1/2 digit green display, then extends its range to 20,000 Microns with pressure levels indicated by an easy to read, brightly lit LED bar graph. These solid state displays can withstand shock and vibration much better than analog meters, so the gauge can be mounted directly on pump stands or used in the field without damage. A breakthrough in thermal sensor design permits this gauge to outperform conventional instruments by a wide margin. The sensor is constructed with a solid, inert metal that maintains its calibration over long periods. It withstands fluorine, mercury vapor, oxidizers, and other corrosives extremely well. The gauge tubes withstand working pressures to 300 PSI, tested to 1200 PSI, and the tube's outer shell is so rugged you can stand on it.

Specifications

Pressure Range: Digital display: 1 to 2000 Microns; Bar Graph Segments: 3,000 - 5,000 - 10,000 - 15,000 - 20,000 Microns.
Calibration: Air or Nitrogen.
Accuracy: Better than 5% of pressure or ±5 Microns, whichever is larger.
Sensitivity: 1 Micron on 1 to 2000 Micron range.
Response Time: 0.3 second time constant.
Gauge Tube: (purchase separately) Standard gauge tubes have 1/8 NPT male thread or fit into quick connects sized for 1/8 inch pipe (0.405" dia.), NW, VCR and Conflat® flanges are also available.
Gauge Tube Internal Volume: 0.79 cc (1/8 NPT).
Line Power: 115 VAC, 50/60 Hz; 230 VAC optional at no additional cost.
Line Regulation: ± 20% change in voltage from 95 to 130V or 200 to 250V produces less than 1% change in reading.
Power Consumption: Approximately 4 Watts.
Line Cord: 3 wire, 65 inch (170 cm) attached.

Ordering Information Specify 115 or 230 V 50/60 Hz or 24 VDC

Portable Gauge, 1 to 20,000 Microns with carry handle and urethane bumpers
 (order gauge tube separately) P/N: 902426\$408.
Panel or Bench Mount Gauge, 1 to 20,000 Microns, panel mounting hardware included
 (order gauge tube separately) P/N: 902425\$375.
Urethane Bumpers, pair, P/N: V805001\$48.
Carry Handle installed on instrument, P/N: V805005\$20.
Calibrator for Dual Range Instruments
 See page 45 for a complete description of the calibrator.
 P/N: 912010\$264.
Quick connect couplings, tube selector switch, extension cable, and other accessories . . . see page 43 and complete Gauge Catalog
Gauge tube baffles and trapssee complete Gauge Catalog

This instrument is perfect for applications such as refrigeration where a typical pump down cycle will show water boiling off starting at 20,000 Microns, yet also requires high resolution in the high vacuum range for finish pressures. Now, this single instrument can cover the entire range while providing sensitivities of 1 Micron from 1 to 2000 Microns. The high sensitivity of this gauge also makes it extremely useful for detecting leaks.

Two standard configurations are available. The portable gauge includes a steel reinforced handle and heavy duty urethane bumpers for protection from bumps. The panel mount version comes complete with the hardware needed for mounting in a panel cutout 3.62 inches wide by 1.81 inches high.

Temperature Effects: Changes in ambient temperature between 32 °F (0 °C) and 120 °F (50 °C) change the reading less than 0.1 Micron per °F at 50 Microns; less than 2 Microns per °F at 900 Microns.
Bakeout Temperature: Gauge tube can be baked to 212 °F (100 °C) in air or vacuum.
Dimensions: Without bumpers or handle, 3.5" wide X 1.84" high X 7.4" front to back (89 X 47 X 188 mm).
 With bumpers and handle, 4.325" wide X 2.575" high (4.5" high with handle extended) X 7.9" front to back (110 X 65 X 200 mm).
Gauge Tube Cables: 10 ft. (3m) attached.
Extension Cables: Change gauge tube cable length without recalibration. Extensions to 500 ft. (150m) can be used. See page 43.
Weight: Net: 1 lb., 2 oz. (0.5 kg); Shipping: 2 lbs., 8 oz. (1.1 kg)

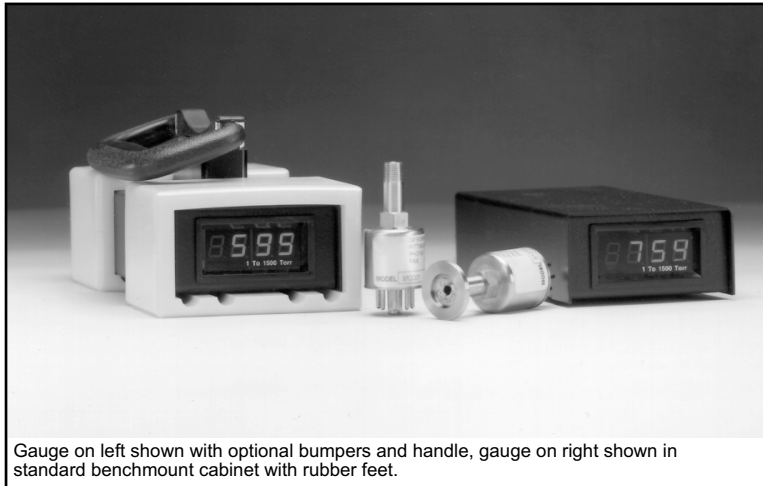
Buy Now! Go to www.vacuumresearch.com to order online

Standard Gauge Tube For 1 to 20,000 Micron Instruments
 Gauge tube body is 304 SS, connector pins are nickel plated Kovar.
With 1/8 in. NPT Male Thread, P/N: 912057\$95.
With 1/4 in. SAE 45° Flare, Male, P/N: 912283\$139.
With NW-16 Flange, P/N: 912066 • NW-25 Flange, P/N: 912205 \$139.
With 1.33 in. Conflat® Flange, non-rotatable, P/N: 912076\$139.
With VCR-4 FEM Fitting, P/N: 912077\$176.
With 15 mm Diameter Tube, P/N: 912127\$127.

All Stainless Steel Gauge Tubes For Outdoor Applications or Wherever the Use of 304 SS is Appropriate. All wetted parts as well as all external parts and connector pins are 304 SS. 1/8 inch NPT, NW-16, Conflat®, VCR-4 and special flanges can be provided.
 Add "SS" suffix to any tube P/N and to standard tube price: . . .add \$48.



Low Cost Digital Vacuum Gauges



Gauge on left shown with optional bumpers and handle, gauge on right shown in standard benchmount cabinet with rubber feet.

3 Popular Ranges

- 0.01 to 50 Torr Pirani Gauges
- 1 to 1500 Torr Diaphragm
- 30 Inches Hg to 150 PSIG

Standard Features

- NW-16, 1/8" NPT or Conflat® Flanges
- Bright, Easy to Read Green LED Display
- Bench Mount Cabinet with Rubber Feet
- Bracket Included For 1/8 DIN Panel Mount

.01 to 50 Torr Digital Pirani Gauge

1 to 1500 Torr Digital Diaphragm Gauge

30 Inches Hg to 150 PSIG Digital Diaphragm Gauge

Buy Now! Go to www.vacuumresearch.com to order online

Benchmount cabinet with rubber feet. Clip for mounting in 1/8 DIN panel cutout included. Sensor cable 10 ft (3m) long. Gauge operates from 15 to 24 VDC, less than 200 mA. An external wall mount supply is included with each instrument. 90 to 240V. 50/60 Hz input and 15 VDC output.

3.5" Wide X 7.4" F to B X 1.84" H.
90 mm W X 188 mm F-B X 46 mm H.
Sensor not included.
P/N: 902142\$444.

Sensor, 1/8" NPT, all wetted parts stainless steel.
P/N: 912011\$95.

Sensor NW-16, all wetted parts stainless steel. P/N: 912072\$139.

Sensor 1.33" OD Conflat®, non-rotatable, all wetted parts stainless steel. P/N: 912073\$139.

Sensor VCR-4 FEM, all wetted parts stainless steel. P/N: 912074 ..\$176.

Benchmount cabinet with rubber feet. Clip for mounting in 1/8 DIN panel cutout included. Sensor cable 10 ft (3m) long. Gauge operates from 15 to 24 VDC, less than 200 mA. An external wall mount supply is included with each instrument. 90 to 240V. 50/60 Hz input and 15 VDC output.

3.5" Wide X 7.4" F to B X 1.84" H.
90 mm W X 188 mm F-B X 46 mm H.
Sensor not included.
P/N: 902143\$476.

Sensor 1/8" NPT, Silicon Diaphragm P/N: 912091\$277.

Sensor NW-16, Silicon Diaphragm P/N: 912023\$321.

Sensor with 1.33" OD Conflat® flange, non-rotatable, and Silicon Diaphragm. P/N: 912026\$321.

Sensor with Stainless Steel Diaphragm 1/4" NPT P/N: 912022\$441.

See page 11 in the complete Gauge Catalog for more flange options.

Benchmount cabinet with rubber feet. Clip for mounting in 1/8 DIN panel cutout included. Sensor cable 10 ft (3m) long. Gauge operates from 15 to 24 VDC, less than 200 mA. An external wall mount supply is included with each instrument. 90 to 240V. 50/60 Hz input and 15 VDC output.

3.5" Wide X 7.4" F to B X 1.84" H.
90 mm W X 188 mm F-B X 46 mm H.
Sensor not included.
P/N: 902144\$505.

Sensor 1/8" NPT, Silicon Diaphragm P/N: 912149\$277.

All Stainless Steel Gauge Tubes For Outdoor Applications or Wherever The Use Of 304 SS Is Appropriate.

All wetted parts as well as all external parts and connector pins are 304 SS. 1/8 in. NPT, NW-16, Conflat®, VCR-4 and special flanges can be provided. Add "SS" suffix to any tube P/N and to standard tube price:add \$48.



3 & 5 Position Vacuum Gauges

Ordering Information

Vacuum gauge & switch built into a 1/4 DIN enclosure suitable for bench or panel mounting. Standard sensor cables are each 10 ft. long. Cables up to 500 feet are available.

.01 to 50 Torr, 5 Position P/N: 902255 ..\$718.
.01 to 50 Torr, 3 Position P/N: 902267 ..\$660.

1 to 1500 Torr, 5 Position P/N: 902256 ..\$741.
1 to 1500 Torr, 3 Position P/N: 902268 ..\$683.

30" Hg to 150 PSIG, 5 Pos. P/N: 902257 \$828.
30" Hg to 150 PSIG, 3 Pos. P/N: 902269 \$770.

Urethane bumpers, pair,
P/N: V805001\$48.
Carry handle installed on instrument,
P/N: V805005\$20.

Power Supply for all 3 Ranges

100 to 240 V, 50-60 Hz input, 15 VDC @ 1.0 A output. Wallmount style with adapter plugs for US, UK, Europe, Australia. P/N: V104124\$58.

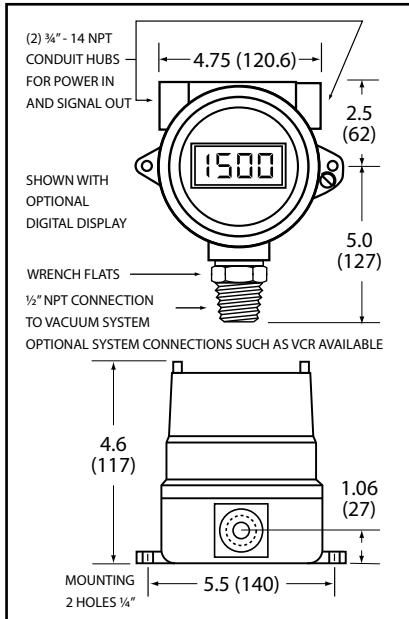
Power Supplies for instruments shipped in 2005 and before.

115 V 50/60 Hz input, 12 VAC @ 800 mA output. P/N: V104098 ..\$15.
220 V 50/60 Hz input, 12 VAC @ 800 mA output. P/N: V104123\$79.



Sensor and gauge with & without optional digital display. Both provide 4 - 20 mA and 0-10 VDC output. Enclosures meet ATEX 95 equipment directive 94/9/EC requirements for Apparatus Group II, Categories 2G/2D: II 2 G EEx e II T3-T4; II 2 G EEx D IIC T3-T4; II 2 D IP66 TI 10°C - T140°C.

VRC offers two approaches to measuring high vacuum in hazardous areas. The first is with the sensor, gauge and optional display built into a Killark enclosure approved by UL, CSA and FM. ATEX certificate is provided with all gauges. All gauges provide both 4-20 mA and 0-10 VDC linear outputs. The alternate approach described at the bottom of this page is to have only the sensor located in the hazardous area with the gauge and display located in a non-hazardous area that can be up to 500 feet away. Power required is 15 to 35 VDC.



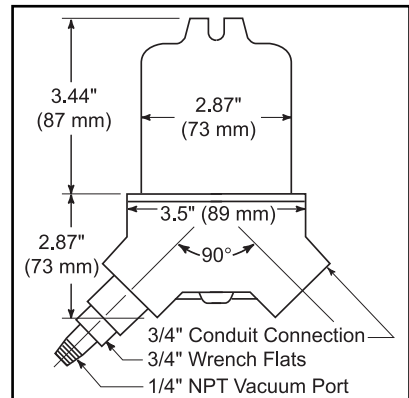
Ordering Information: Gauge, Sensor and Optional Display

Measurement Range, Sensor Type	Maximum Working Pressure	Performance Specifications See Gauge Catalog Page	Gauge & Sensor with Display & 4-20, 0-10 V Analog Output		Gauge & Sensor with 4-20, 0-10 V Output but No Display		Replacement Sensor Only	
			Part No.	Price	Part No.	Price	Part No.	Price
0.01 to 100 mTorr; Pirani	300 PSIG	14, 24	913050	\$1298.	913056	\$1049.	902049	\$182.
1 to 2000 mTorr; Pirani	300 PSIG	15, 17, 24	913051	\$1209.	913057	\$955.	902077XP	\$139.
0.01 to 20.00 Torr; Pirani	300 PSIG	16, 17, 24	913052	\$1209.	913058	\$955.	902089	\$139.
1 to 1500 Torr; 316L Diaph.	30 PSIG	9, 17, 24	913053	\$1308.	913059	\$1059.	902079XP	\$498.
-30" Hg to 150 PSIG; 316L Diaph.	150 PSIG	10, 17, 24	913054	\$1308.	913060	\$1059.	902086	\$498.
0.1 to 200 PSIG; 316L Diaph.	300 PSIG	11	913055	\$1308.	913061	\$1059.	902088	\$498.

Sensors for Hazardous Areas



These explosion proof Diaphragm and Pirani sensors can be used with any of the indicators and controllers described in this catalog. These sensors are complete and ready to install in any Class 1, Group C or D, Div. 1 area. Simply select the range that fits your application from the table below. Like standard Vacuum Research sensors, these explosion-proof sensors are unaffected by lead length and can be located up to 500 feet (150 m) from the display unit.



Ordering Information		Performance Specifications See Gauge Catalog Page	Maximum Working Pressure	Complete Enclosure with Sensor: 1/4" NPT standard, 1/2" NPT optional		Replacement Sensor Only	
Measurement Range	Sensor Type			Part No.	Price	Part No.	Price
1 to 2000 mTorr	Pirani	15, 17, 24	300 PSIG	913006	\$636.	902077XP	\$139.
.01 to 20 Torr	Pirani	16, 17, 24	300 PSIG	913007	\$636.	902089	\$139.
1 to 1500 Torr	316L Diaph.	9, 17, 24	30 PSIG	913001	\$895.	902079XP	\$498.
-30" Hg to 150 PSIG	316L Diaph.	10, 17	150 PSIG	913003	\$895.	902086	\$498.
0.1 to 200 PSIG	316L Diaph.	11	300 PSIG	913005	\$895.	902088	\$498.



Water & Dust Proof IP-65 High Vacuum Transmitters



Available in 3 Ranges

- 1 to 1500 Torr Stainless Steel Diaphragm
- 1 to 2000 mTorr & .01 to 20 Torr Pirani Gauges
- Linear 0 to 10 VDC and 4-20 mA Outputs
- Power Required 12 to 35 Volt DC, 200 mA
- Dust and Water Proof Enclosure Rated IP-65

SS Diaphragm Gauge

1 to 1500 Torr
1 to 2000 mbar
0.1 to 200 kPa

Specifications

Measurement Range: 1 to 1500 Torr (1 to 2000 mbar and 0.1 to 200 kPa).

Calibration: Any gas.

Resolution: ± 1 Torr.

Response Time: Less than 1 sec. for 90% of an increase in pressure. ≈ 1.5 sec. for decrease from atmosphere to 1 Torr.

Power: 12 to 35 volt DC; less than 100 mA.

Analog Output: Linear 0 to 10 V and 4 to 20 mA standard.

Temperature Effects: Automatic compensation from 0° to 35 °C.

Bake Out Temperature: Gauge can be baked to 100 °C (212 °F) in air or vacuum.

Vacuum Connection: 1/4 NPT male. Others such as NW, VCR and 1/2" O.D. tube available.

Materials: All wetted parts 300 series S.S.

SS Sensor Max. Pressure w/o Damage: 4,500 Torr, burst 6,000 Torr.

Dimensions: Enclosure 3 X 3 X 2 In. 1/4 In. NPT vacuum connection is 1 5/8 In. (41 mm) long.

Mounting: Gauge can be supported by the vacuum connection and oriented in any plane.

Net Wt.: 0.75 lb. (0.3 kg) **Ship:** 1 lb. (0.45 kg)

Pirani Gauge

1 to 2000 milliTorr
0.001 to 2.000 mbar
0.1 to 200.0 Pa

Specifications

Measurement Range: 1 to 2000 milliTorr (.001 to 2 mbar, and 0.1 to 200 Pa)

Calibration: Air or Nitrogen.

Accuracy: Better than 5% of value or ± 3 mTorr, whichever is larger.

Response Time: 0.3 second time constant.

Power: 12 to 35 volt DC; less than 200 mA.

Analog Output: Linear 0 to 10 VDC & 4 to 20 mA standard.

Temperature Effects: Changes in ambient temperature between 0 °C and 50 °C change the reading less than 0.2 mT per °C at 50 mT; less than 4 mT per °C at 900 mT.

Bakeout Temperature: Gauge can be baked to 100 °C (212 °F) in air or vacuum.

Vacuum Connection: 1/4 NPT male. Others such as NW, VCR and 1/2" O.D. tube available.

Dimensions: Enclosure 3 X 3 X 2 In. (76 X 76 X 50 mm) 1/4 In. NPT vacuum connection is 1 5/8 In. (41 mm) long.

Mounting: Gauge can be supported by the vacuum connection and oriented in any plane.

Net Wt.: 0.75 lb. (0.3 kg) **Ship:** 1 lb. (0.45 kg)

Pirani Gauge

.01 to 20 Torr
0.01 to 20.00 mbar
1.0 to 2000 Pa

Specifications

Measurement Range: 0.01 to 20 Torr (.01 to 20 mbar, and 1 to 2000 Pa)

Calibration: Air or Nitrogen.

Accuracy: Better than 5% of value or ± 0.03 Torr, whichever is larger.

Response Time: 0.3 second time constant.

Power: 12 to 35 volt DC; less than 200 mA.

Analog Output: 0 to 10 VDC, non-linear standard. Linear 0-10 V & 4-20 mA optional.

Temperature Effects: Changes in ambient temperature between 0 °C and 50 °C change the reading less than 0.01 Torr per °C.

Bakeout Temperature: Gauge tube can be baked to 100 °C (212 °F) in air or vacuum.

Vacuum Connection: 1/4 NPT male. Others such as NW, VCR and 1/2" O.D. tube are available.

Dimensions: Enclosure 3 X 3 X 2 In. (76 X 76 X 50 mm) 1/4 In. NPT vacuum connection is 1 5/8 In. (41 mm) long.

Mounting: Gauge can be supported by the vacuum connection and oriented in any plane.

Net Wt.: 0.75 lb. (0.3 kg) **Ship:** 1 lb. (0.45 kg)

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Ordering Information

1 to 1500 Torr Stainless Steel Diaphragm Vacuum Transducer. 12 to 35 VDC power. IP-65 dust & water proof enclosure. 1/4 In. NPT Vacuum Connection. Others such as NW, VCR and 1/2 In. O.D. tube available. Linear 0 to 10 VDC and 4 to 20 mA output.

P/N: 912384-Torr (1 to 1500 Torr) \$648.

P/N: 912384-mbar (1 to 2000 mbar) \$648.

P/N: 912384-Pa (0.1 to 200.0 kPa) \$648.

Ordering Information

1 to 2000 mTorr Vacuum Transducer. 12 to 35 VDC power IP-65 dust & water proof enclosure. 1/4 In. NPT Vacuum Connection. Others such as NW, VCR and 1/2 In. O.D. tube available. Linear outputs of 0 to 10 VDC and 4 to 20 mA.

P/N: 912365-mTorr (1 to 2000 mTorr) \$466.

P/N: 912365-mbar (0.001 to 2000 mbar) . . \$466.

P/N: 912365-Pa (0.1 to 200.0 Pa) \$466.

Ordering Information

0.01 to 20 Torr Vacuum Transducer. 12 to 35 VDC power IP-65 dust & water proof enclosure. 1/4 In. NPT Vacuum Connection. Others such as NW, VCR and 1/2 In. O.D. tube available. Linear outputs of 0 to 10 VDC and 4 to 20 mA.

P/N: 912367-Torr (0.01 to 20 Torr) \$466.

P/N: 912367-mbar (0.01 to 20.00 mbar) . . \$466.

P/N: 912367-Pa (1 to 2000 Pa) \$466.

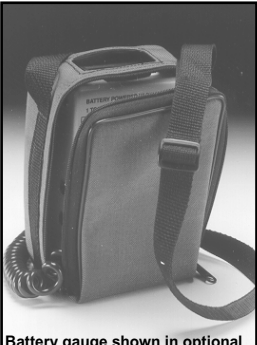


Display is visible with optional water-resistant carry case fully closed.

- **4 Models of Diaphragm and Pirani Gauges**
 - 1 to 1500 Torr Diaphragm**
 - 30 in. Hg To 200 PSI Gauge**
 - 1 to 2000 mTorr Pirani**
 - .01 to 20.00 Torr Pirani**
- **Available in Torr, Microns, Pascal, in. Hg, or mbar**
- **2000 mTorr Pirani Also Reads DV-6 Tubes**
- **Rugged Digital Display; No Fragile Meters!**
- **Long Life Batteries and Built-in Charger**
- **Water Resistant Case; Neck Strap & Belt Loops**
- **Read & Operate Gauge With Case Fully Closed**

These battery powered Pirani and diaphragm gauges were designed for reliable vacuum measurement on applications such as over-the-road cryogenic trailers. The easy to read digital display eliminates the fragile meter movements used in old style instruments. Our gauge tube stem and cup are all stainless steel and are strong enough to stand on and resist the corrosive effects of rain and road salt.

Lower operating temperatures in our Pirani gauge tubes are half that of thermopile gauges. This enhances stability as does a unique temperature compensation network. Gauge tubes are matched so they can be replaced without recalibration and they can withstand working pressures to 300 psi, tested to 1200 psi. Gauge tubes are available with 1/8 NPT male thread (fit into quick connects sized for 1/8 inch pipe (0.405" dia.). NW flanges, VCR-4 fittings, 15 mm diameter tube, and Mini Conflat® flanges are also available.



Battery gauge shown in optional carry case.

Optional Water Resistant Carry Case
 Heavy duty canvas carry case includes neck strap and belt loops, inside of case has soft lining. The battery powered gauge can be fully operated without removing it from the case. On/off button can be pressed through case material, plastic viewing window is located on the top of case for easy reading of the display. The coiled gauge tube cable attaches to Velcro loop on the carry case when not in use. P/N: 912028\$61.

Gauge Pressure vs. Absolute Pressure

Most of the instruments in this catalog are built to measure pressure in "Absolute" units such as Torr, Microns, and mbar. But "Gauge" pressure units such as inches Hg are also available. "Gauge" pressure means that atmospheric pressure is used as the reference for zero and 29.92 in. Hg (or some other unit of measure) designates high vacuum. "Gauge" pressure measurement can be useful in certain applications such as determining if a vacuum chamber is actually at atmospheric pressure so that the door can be opened safely. But, because the zero of "Gauge" measurements changes with atmospheric pressure the entire scale also changes. For example, if you are reading 28.00 inches Hg and the next day your instrument reads 28.39 inches Hg it may be that your pump is working better or it may be that a storm moved into your area and atmospheric pressure dropped. Changes in altitude also affect the readings of "Gauge" pressure instruments. There is a difference of 5 in. Hg (127 Torr) between sea level and Denver, Colorado.

For most vacuum measurements we recommend "Absolute" measurement systems, but if "Gauge" pressure is preferred add the suffix "Gauge" and the unit of measure to the part number. For most units of measure there is no additional charge.

Common Specifications

Battery Life: Approximately 150 readings of 1 minute each can be made without recharging. Gauge automatically turns off after 1 minute.

Battery Charger: Built-in and completely regulated against over-charge. 115VAC is standard. 230 VAC available at extra cost.

Battery Recharge Time: Approximately 10 hours. **Recharge Power:** Less than 5 Watts. **Display:** Easy to read 3 1/2 digit LCD

Line Voltage for Recharger Power Supply: 115 VAC, 50/60 Hz is standard; 230 VAC, 50 Hz optional for an additional cost.

Dimensions: 4.25 in. W x 6.5 in. H x 2.5 in. D (108 mm W x 165 mm H x 63 mm D)

Gauge Tube Cable: 5 ft. coil cord (1.5M) attached. **Line Cord For Recharger:** 3 wire, 65 inch (170 cm), socket provided.

Net Weight Including Case: 1 lb., 2 oz. (0.5 kg) **Shipping Weight Including Case:** 2 lbs., 8 oz. (1.1 kg)

Model Specifications

Diaphragm Gauge; 1 to 1500 Torr	Pirani Gauge; 1 to 2000 mT	Pirani Gauge; .01 to 20 Torr
<p>Pressure Range: 1 to 1500 Torr; ± 1 Torr (± 0.1 Torr resolution available at extra cost).</p> <p>Alternate Range: 30" Hg to 200 PSI Gauge.</p> <p>Calibration: Any gas, liquid or vacuum compatible with sensor materials.</p> <p>Accuracy: 1% of reading or 2 Torr.</p> <p>Response Time: Less than 400 msec. for response to a step change.</p> <p>Linearity: $\pm 0.15\%$ Full Scale. Sensitivity: ± 1 Torr.</p> <p>Transducer: See "ordering Information" below.</p> <p>Materials: Parts in contact with process are 316, 304 SS, silicone & silicon.</p> <p>Sensor Internal Volume: 1.25 ml for SS; 0.5 ml for Silicon.</p> <p>Temperature Effects: When changes occur in ambient temperature between 0 °C and 50 °C, reading will change no more than $\pm 0.02\%$ per °C.</p> <p>Bakeout Temperature: Gauge tube can be baked to 100 °C (212 °F) in air or vacuum.</p>	<p>Pressure Range: 1 to 2000 milli Torr.</p> <p>Calibration: Air or Nitrogen.</p> <p>Accuracy: Better than 5% of value or ± 0.03 Torr, whichever is larger.</p> <p>Response Time: 0.3 second time constant.</p> <p>Gauge Tube: Standard gauge tubes have a 1/8 NPT male thread or fit into quick connects sized for 1/8 inch pipe (0.405" dia.) NW, VCR and Mini Conflat® available.</p> <p>Tube Internal Volume: 0.79 cc (1/8 NPT).</p> <p>Materials: Parts in contact with the process are 304 SS platinum alloy or Ni plated Kovar.</p> <p>Temperature Effects: Changes in ambient temperature between 0 °C and 50 °C change the reading less than 0.2 mT per °C at 50 mT; less than 4 mT per °C at 900 mT.</p> <p>Bakeout Temperature: Standard tube can be baked to 100 °C (212 °F) in air or vacuum. Tubes for 250 °C (482 °F) bakeout available.</p>	<p>Pressure Range: 0.01 to 20 Torr.</p> <p>Calibration: Air or Nitrogen.</p> <p>Accuracy: Better than 5% of value or ± 0.03 Torr, whichever is larger.</p> <p>Response Time: 0.3 second time constant.</p> <p>Gauge Tube: Standard gauge tubes have 1/8 NPT male thread or fit into quick connects sized for 1/8 inch pipe (0.405" dia.) NW, VCR and Mini Conflat® available.</p> <p>Tube Internal Volume: 0.79 cc (1/8 NPT).</p> <p>Materials: Parts in contact with the process are 304 SS platinum alloy or Ni plated Kovar.</p> <p>Temperature Effects: Changes in ambient temperature between 0 °C and 50 °C change the reading less than 0.01 Torr per °C.</p> <p>Bakeout Temperature: Gauge tube can be baked to 100 °C (212 °F) in air or vacuum. Tubes for 250 °C (482 °F) bakeout available.</p>

Ordering Information Specify 115 or 230 V, 50/60 Hz Power for Battery Charger When Ordering

Buy Now! Go to www.vacuumresearch.com to order online

1 to 1500 Torr Battery Powered

Portable Digital Indicator; Reads 1 to 1500 Torr with Vacuum Research gauge tubes. Gauge tubes and carry case must be ordered separately. Battery charger for 115V 50/60 Hz included. Charger for 220V, 50/60 Hz must be purchased separately. P/N: 902014 \$597.

Transducer with Stainless Steel Diaphragm wetted parts 316 SS. Max. bake-out temp. 125 °C.
 1/4 in. NPT, P/N: 912022 \$441.
VCR-8 FEM, P/N: 902050 \$560.
VCR-4 FEM, P/N: 912219 \$560.
NW-16 Flange, P/N: 912151 \$498.
NW-25 Flange, P/N: 912117 \$498.
1.33 in. Conflat®, P/N: 912191 \$498.
1/2 in. OD Tube, P/N: 912210 \$498.

Transducer with Silicon Diaphragm body is 304 SS, connector pins are nickel plated Kovar. Maximum bake-out temperature 125 °C.
 1/8 in. NPT Male Thread, P/N: 912091 . . . \$277.
 1/2 in. OD Tube, P/N: 912211 \$321.
NW-16 Flange, P/N: 912023 \$321.
NW-25 Flange, P/N: 912119 \$321.
1.33 in. Conflat® Flange, non-rotatable, P/N: 912026 \$321.
VCR-4 Fitting, P/N: 912025 \$359.

Diaphragm Transducers with All Stainless External Parts for outdoor applications or wherever the use of 304 SS is appropriate. All external parts and connector pins are 304 SS. Add SS suffix to tube P/N and to standard tube price add \$48.

Gauge and gauge tube accessories. See page 43 and complete Gauge Catalog
Calibrator for 1500 T instruments, See page 45.
Dust Baffles see complete Gauge Catalog.
Spare battery charger 100 to 240 V, 50-60 Hz input, 15 VDC @ 1.0 A output. Wallmount style with adapter plugs for US, UK, Europe, Australia. P/N: V104124 \$58.

1 to 2000 mTorr Battery Powered

Portable Digital Indicator, Reads 1 to 2000 mTorr with VRC Pirani gauge tubes, and 1 to 200 mTorr with Teledyne-Hastings DV6R, KJL-6000 and VRC-6 T/C tubes. Gauge tubes and carry case must be ordered separately. Battery charger for 115V 50/60 Hz included. Charger for 220V, 50/60 Hz must be purchased separately. P/N: 902017. \$624.

Standard Gauge Tube For 1 to 2000 mT Instruments Gauge tube body is 304 SS, connector pins are nickel plated Kovar.
 1/8 in. NPT Male Thread, P/N: 912001 . . \$91.
 1/4" SAE 45° Flare, Male, P/N: 912284 . \$134.
NW-16 Flange, P/N: 912005 \$134.
NW-25 Flange, P/N: 912202 \$134.
1.33 in. Conflat® Flange, non-rotatable, P/N: 912067 \$134.
VCR-4 FEM Fitting, P/N: 912068 \$172.
15 mm Diameter Tube, P/N: 912102 . . \$126.

All Stainless Steel Gauge Tubes For Outdoor Applications Or Wherever The Use Of 304 SS Is Appropriate. All wetted parts as well as all external parts and connector pins are 304 SS. 1/8 in. NPT, NW-16, Conflat®, VCR-4 and special flanges can be provided. Add "SS" suffix to any tube P/N and to standard tube price: add \$48.

Gauge and gauge tube accessories for the 2000 mT & 20 Torr Pirani Gauges. See complete Vacuum Gauge Catalog.
Calibrators see page 45.
Dust Baffles see complete Gauge Catalog
Spare battery charger 100 to 240 V, 50-60 Hz input, 15 VDC @ 1.0 A output. Wallmount style with adapter plugs for US, UK, Europe, Australia. P/N: V104124 \$58.

.01 to 20 Torr Battery Powered

Portable Digital Indicator Reads .01 to 20 Torr with Vacuum Research gauge tubes. Gauge tubes and carry case must be ordered separately. Battery charger for 115V 50/60 Hz included. Charger for 220V, 50/60 Hz must be purchased separately. P/N: 902011 \$597.

Standard Gauge Tube For .01 to 20 Torr Instruments Gauge tube body is 304 SS, connector pins are nickel plated Kovar.
 1/8 in. NPT Male Thread, P/N: 912011 . . . \$95.
 1/4" SAE 45° Flare, Male, P/N: 912285 . . \$134.



New! 1/4 inch SAE 45° Flare tube available for mTorr, Torr and micron Pirani gauges

NW-16 Flange, P/N: 912072 \$139.
NW-25 Flange, P/N: 912204 \$139.
1.33 in. Conflat® Flange, non-rotatable, P/N: 912073 \$139.
VCR-4 FEM Fitting, P/N: 912074 \$176.
15 mm Diameter Tube, P/N: 912103 . . . \$123.
All Stainless Steel Gauge Tubes For Outdoor Applications Or Wherever The Use Of 304 SS Is Appropriate. All wetted parts as well as all external parts and connector pins are 304 SS. 1/8 in. NPT, NW-16, Conflat®, VCR-4 and special flanges can be provided. Add "SS" suffix to any tube P/N and to standard tube price: . . . add \$48.



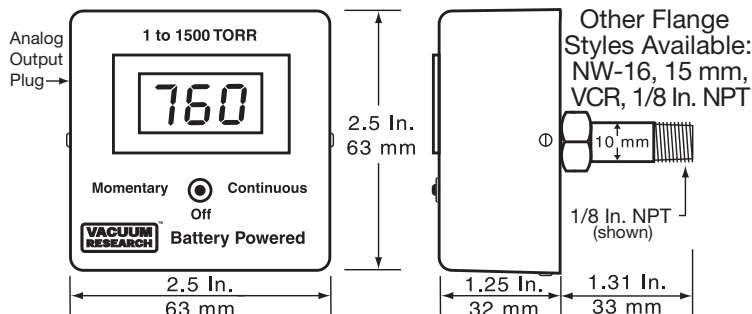
Battery Powered Integral Gauge

Powered by a standard 9 volt alkaline battery, these Vacuum Research Integral Sensor Diaphragm Manometers are compact vacuum measurement instruments with silicon or Stainless Steel diaphragms that can measure liquid or gas pressure as well as vacuum. Response time is less than 400 milliseconds for full scale and instruments are available with a variety of flanges including 15 mm, VCR, and NW-16. These instruments offer the precision and high resolution of digital electronics at very competitive prices. Output of 1 mV per Torr is standard.

Specifications

- Pressure Range:** 1 to 1500 Torr \pm 1 Torr or differential with zero at atmosphere. (1 - 2000 mbar & 0.1 - 200 kPa available)
- Calibration:** Any gas or vacuum compatible with sensor materials.
- Accuracy:** 1% of reading or 2 Torr.
- Response Time:** Less than 400 msec. for response to a step change.
- Linearity:** \pm 0.15% Full Scale.
- Sensitivity:** \pm 1 Torr.
- Vacuum Connection:** 1/8 NPT male thread or fits into quick connects sized for 1/8 inch pipe (0.405" dia.). NW, VCR and Mini Conflat® available.
- Analog Output:** 0 to 1.5 VDC (1 mV/Torr) 6 X 6 modular jack with 7 foot (2 m) cable with spade lugs. Extensions may be added up to 10,000 ohms.
- Materials:** Parts in contact with process are 316, 304 SS silicone & silicon.
- Sensor Internal Volume:** Approximately 0.5 ml.
- Power:** Powered by standard 9 volt alkaline battery.
- Battery Life:** In continuous display position battery operates up to 80 hours.
- Momentary Display:** Push switch to display reading for approx. 100 secs.
- Continuous Display:** Displays continuously until switch is turned Off.
- Operating Temperature:** 0 to 50 °C (32 to 120 °F).
- Temperature Effects:** When changes occur in ambient temperature between 0° and 50 °C, reading will change no more than \pm 0.05% per °C.
- Dimensions:** 2.5 x 2.5 x 1.25 inches (63 x 63 x 32 mm).
- Mounting:** Sensor and display in one integrated package. Mount directly on your vacuum system.
- Transducer Cables:** None required.
- Weight:** Approximately 6 ounces (170 grams.)

- Sensor and Display in One Compact Package
- 9V Battery Gives 2,000 Readings or 80 Hours
- Rugged Digital Display; No Fragile Meters!
- Variety of Flanges Available: NW-16, VCR, 15 mm
- Momentary or Continuous Easy to Read Display



Ordering Information; Silicon Diaphragm

Buy Now! Go to www.vacuumresearch.com to order online

Differential Gauge Pressure Instrument with Sensor and display integrated into one package. Linear analog output included as standard. (Zero at atmosphere.) 9V Battery Powered.

- 0 to \pm 20 In. H₂O, 1/8 Inch NPT P/N: 902261 \$338.
- 0 to \pm 20 In. H₂O, with 1/2 Inch O.D. Tube P/N: 902262 . . . \$380.
- 0 to \pm 20 mmHg, 1/8 Inch NPT P/N: 902258 \$338.
- 0 to \pm 20 mmHg, with 1/2 Inch O.D. Tube P/N: 902263 . . . \$380.
- 0 to \pm 15 PSI with 1/8 Inch NPT P/N: 902264 \$338.
- 0 to \pm 15 PSI with 1/2 Inch O.D. Tube P/N: 902265 \$416.

Absolute Pressure Diaphragm Gauge

1 to 1500 Torr Digital Display and sensor integrated into one package. 0 to 1.5 VDC linear analog output included as standard. 9V battery powered. Sensor and display integrated into one package

- Vacuum Connection 1/8 Inch NPT, P/N: 902159 \$324.
- Vacuum Connection NW-16, P/N: 902160 \$365.
- Vacuum Connection 1/2 Inch, P/N: 902161 \$365.
- Vacuum Connection 1.33 cf, P/N: 902162 \$365.

Ordering Information, 316L SS Diaphragm

Buy Now! Go to www.vacuumresearch.com to order online

Absolute pressure, 1 to 1500 Torr (mbar & Pa available) 1 to 1500 Torr digital display and sensor integrated into one package. 0 to 1.5 volt linear output is standard. 9V battery is included.

- Vacuum Connection 1/8 Inch NPT, P/N: 902334 \$489.
- Vacuum Connection NW-16, P/N: 902331 \$528.
- Vacuum Connection NW-25, P/N: 902333 \$528.
- Vacuum Connection 1/2 Inch O.D., P/N: 902338 \$489.
- Vacuum Connection 15 mm O.D., P/N: 902332 \$528.
- Vacuum Connection 1.33 CF, P/N: 902335 \$528.
- Vacuum Connection 2.75 CF, P/N: 902336 \$528.
- Vacuum Connection VCR-8 FEM., P/N: 902337 \$555.
- Vacuum Connection VCR-4 FEM., P/N: 902339 \$555.

Rebuild Integral Sensor Battery Diaphragm Gauge

Use original P/N plus "RBLD" suffix, e.g.; 902159-RBLD. Return old gauge to factory or local distributor with purchase order.

- Silicon Diaphragm. \$140.
- 316L SS Diaphragm. \$336.
- Spare Analog Output Cable (7 ft. or 2 M) P/N: V801152 \$7.



Airborne Sensors

Our Pirani sensor technology uses an extremely low mass filament (less than .08 mg). The resulting low inertia and reduced fatigue contribute to long life and high shock & vibration resistance. The enclosure is optimized for the vehicle. In some cases the sensor enclosure is fabricated by our customer and shipped to us for sensor installation and calibration. A no charge license and schematic for sensor power is available.



Gauge Tube Selector Switch

The gauge tube selector allows any VRC gauge to display the output of up to 5 gauge tubes just by turning the switch. Each gauge tube selector includes 3 or 5 gauge tube cables 10 ft. (3 m) long and one 12 inch (30 cm) cable to connect to your vacuum gauge. See below if longer cables are required.

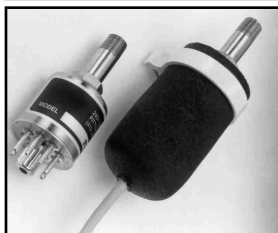
- 3 Position Switch for Pirani, Diaphragm, Convection Gauges, P/N: 902027** \$397.
- 5 Position Switch for Pirani, Diaphragm, Convection Gauges, P/N: 902026** \$536.
- 3 Position Switch for Wide Range Diaphragm Manometers, P/N: 902156** \$452.



Quick Connect Couplings

Reliable brass quick connect adapters give a leak tight seal without the use of tools. The quick connect seals on the unthreaded (.404 inch diameter) portion of our standard 1/8" NPT gauge tubes. For the permanent connection to your system select either 1/8" NPT or 15 mm diameter.

- Brass QC .404 X 1/8" NPT P/N: 912108** \$126. **Brass QC .404 X 15mm P/N: 912109** \$113.
- For Stainless Steel Body (Brass Nut) Add "SS" suffix to part number and to the price** add \$73.



Waterproof Vacuum Sensors

Totally waterproof boot that fits all VRC gauge tubes. With this option, sensors can be installed in wet and high humidity areas. Even 100% RH with condensation occurring is acceptable because with this boot in place the only parts exposed to the moisture are the 300 series stainless steel stem and cup used on all VRC vacuum sensors and gauge tubes.

- Waterproof Boot for Gauge Tubes P/N: 902416** \$38.
- Vinyl Cap for Gauge Tube Connector Pins P/N: 912124** \$2.



LED Displays

Many VRC instruments are built with backlighted liquid crystal displays (BLLCDs). However, in some places where vacuum gauges are used light level is low and a light emitting diode (LED) display may be a better choice. Green LED displays are available on all gauges and can be retrofitted to existing gauges.

- LED instead of LCD installed at time of original purchase**
- 3 1/2 place P/N: V801300: \$94. 4 1/2 place P/N: V801301 \$239.
- LED Retrofit Kit in existing gauges 3 1/2 place** ... \$118. 4 1/2 place \$263.



Bench Mount Cabinets

Bench mount cabinets can accept one or two standard enclosure gauges, or one gauge and a gauge tube selector switch. When the optional handle is purchased, your instrument can be easily transported. Rubber feet are included on all cabinets to protect your bench tops. Handle can also be installed directly to the top of either 1/4 DIN or standard enclosures.

- Single Cabinet P/N: V805002** \$120. **Double Cabinet P/N: V805003** \$135.
- Handle Installed on Cabinet or Instrument P/N: V805005** \$20.



Gauge Tube Extension Cables

Extension Cable for Wide Range Diaphragm Manometer Transducers
Up to 75 Meter (250 ft.) max. with 2 connectors P/N: 902080 \$51. plus \$2.00 per foot.

Extension Cable for Pirani, Thermocouple, Convection, & Diaphragm Gauge Tubes
Up to 150 Meter (500 ft.) max. with 2 connectors.
Standard PVC jacket P/N: 912063 \$29. plus \$2.00 per foot.

Abrasion resistant urethane jacket P/N: 912401 \$28. plus \$7.00 per foot.

Cable Only without Connectors In one piece or installed as extra length on new gauges.
Standard PVC jacket P/N: V122195 \$2.00 per foot.
Abrasion resistant urethane jacket P/N: V122178 \$6.00 per foot.

Connector Assemblies for Pirani, Thermocouple, Convection, and Diaphragm Gauges
Socket, Boot and Strain Relief included on both Male and Female Connector Assemblies.
Male P/N: V805008 \$25. each Female P/N: V805009 \$25. each

All extension cables are shipped ready to use with connectors at both ends. Two jacket types are now available: PVC or abrasion resistant urethane.



NIST Traceable Certification of VRC Vacuum Gauges

All Vacuum Research gauges are carefully calibrated before they are shipped. However, in certain very critical applications your customer or your own Quality or Meteorology department may require written assurance of traceability of calibration. For such situations we can provide a certificate for any of our gauges. Our calibration quality system complies with ANSI/NC SL Z540-1-1994.

All you have to do is contact our customer service department for an "RGA" number and ship your instrument and sensor to us. We'll adjust the zero and full scale of your instrument to agree with our NIST calibration standards. We'll also compare your instrument to these standards throughout the entire range, and certify the actual readings.

This certification can be provided on new instruments or on older instruments whenever you require it. Price is FOB our plant. Shipping costs to and from our plant are not included. Usual time required for certification is seven to 10 days after we receive your instrument.

Ordering Information

Pirani, Convection, or Diaphragm Gauges

Certificates after repair or adjustment only P/N: 912900 \$203.

Certificates for as received plus after repair or adjustment P/N: 912901 \$330.

100 mTorr Pirani Gauges

Certificates after repair or adjustment only P/N: 912911 \$310.

Certificates for as received plus after repair or adjustment P/N: 912912 \$410.

Wide Range Diaphragm Manometers

Certificates after repair or adjustment only P/N: 912902 \$306.

Certificates for as received plus after repair or adjustment P/N: 912903 \$481.

NIST Traceable Vacuum Gauge Calibration Certificate

We certify that the "Calibration Standards" used in this test are traceable to NIST calibration standards, that the data presented below are true and correct and that the instrument tested met all of manufacturer's performance specifications at the time of this test.

Calibration Quality System complies with ANSI/NC SL Z540-1-1994.

This Test performed by: _____ John F. Hartnett,
 Signature _____ Date _____ President
 Name _____ Vacuum Research Corp.

Customer Name _____ Customer Asset No. _____

Address _____

VRC Device Being Certified: _____ Date of This Certification _____ SO # _____

Instrument P/N:	Calibration Standard	Device As Received	Device As Calibrated	Limit Allowed		4 to 20 mA Output
				Min.	Max.	
S/N: _____	0 mTorr	_____	_____	0	0	_____
Transducer P/N: _____	5 mTorr	_____	_____	2	8	_____
S/N: _____	10 mTorr	_____	_____	7	13	_____
Calibration Standard Used (Primary):	25 mTorr	_____	_____	22	28	_____
Instrument Model: _____	50 mTorr	_____	_____	47	53	_____
S/N: _____	75 mTorr	_____	_____	71	78	_____
Transducer Model: _____	100 mTorr	_____	_____	95	105	_____
S/N: _____	250 mTorr	_____	_____	237	262	_____
Accuracy of Standard: _____	500 mTorr	_____	_____	475	525	_____
Standard's Calib. Date: _____	750 mTorr	_____	_____	712	787	_____
Calibration Standard Used (2nd if Needed):	900 mTorr	_____	_____	855	945	_____
Instrument Model: _____	1000 mTorr	_____	_____	950	1050	_____
S/N: _____	1250 mTorr	_____	_____	1187	1312	_____
Transducer Model: _____	Ambient Conditions During Test:	_____	_____	_____	_____	_____
S/N: _____	Temp.: _____ °F % RH: _____	_____	_____	1500 mTorr	1425	1575
Accuracy of Standard: _____	Was Calibration Adjusted Prior To As Received Test? <input type="checkbox"/> Yes <input type="checkbox"/> No	_____	_____	1750 mTorr	1662	1837
Standard's Calib. Date: _____	Were Repairs Required? <input type="checkbox"/> Yes <input type="checkbox"/> No	_____	_____	2000 mTorr	1900	2100
Ambient Conditions During Test:	Remarks: _____	_____	_____	_____	_____	_____

Vacuum Research Corporation • 100 Chapel Harbor Dr. #4 • Pittsburgh, PA 15238 USA
 Phone: (800) 426-9340 • (412) 261-7630 • FAX: (412) 261-7220 • e-mail: VRC@vacuumresearch.com
 Revised 8/28/2015

Pressures Used for NIST Calibrations at Vacuum Research

Wide Range Gauge Calib. Points	100 mTorr Pirani Gauge Calib. Points	2000 mTorr Pirani Gauge Calib. Points	20 Torr Pirani Gauge Calib. Points	50 Torr Pirani Gauge Calib. Points	Convection Gauge Calib. Points	1500 Torr Gauge Calib. Points
000 mT	0.00 mT	0 mT	0.00 mT	0.00 Torr	000 mT	0 Torr
10 mT 2 Torr	.10 mT	5 mT	.50 mT	.10 Torr	10 mT	5 Torr
50 mT 5 Torr	1.00 mT	10 mT	100 mT	.25 Torr	25 mT	10 Torr
100 mT 10 Torr	2.50 mT	25 mT	250 mT	.50 Torr	50 mT	25 Torr
250 mT 50 Torr	5.00 mT	50 mT	500 mT	1.00 Torr	75 mT	50 Torr
500 mT 100 Torr	7.50 mT	75 mT	750 mT	2.50 Torr	100 mT	75 Torr
750 mT 200 Torr	10.00 mT	100 mT	1000 mT	5.00 Torr	250 mT	100 Torr
900 mT 300 Torr	12.50 mT	250 mT	2.50 Torr	9.25 Torr	500 mT	200 Torr
1000 mT 400 Torr	15.00 mT	500 mT	5.00 Torr	10.00 Torr	750 mT	250 Torr
1250 mT 500 Torr	17.50 mT	750 mT	7.50 Torr	12.50 Torr	1000 mT	300 Torr
1500 mT 600 Torr	20.00 mT	900 mT	9.25 Torr	15.00 Torr	5 Torr	400 Torr
1750 mT ATM	30.00 mT	1000 mT	10.00 Torr	17.50 Torr	10 Torr	500 Torr
	40.00 mT	1250 mT	12.50 Torr	20.00 Torr	20 Torr	600 Torr
	50.00 mT	1500 mT	15.00 Torr	30.00 Torr	30 Torr	700 Torr
	75.00 mT	1750 mT	17.50 Torr	50.00 Torr	50 Torr	ATM
	100 mT	2000 mT	20.00 Torr			



Easy To Use, No Electronics Training Needed

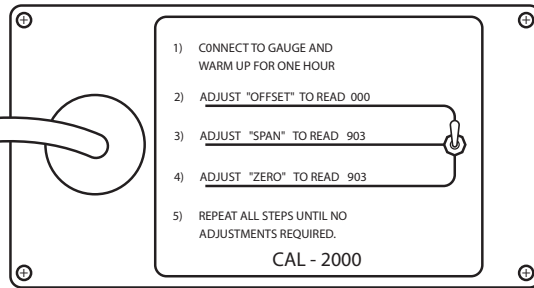
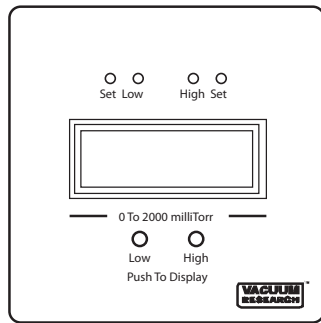
These compact and easy to use electronic calibrators allow you to adjust both zero and full scale of any Vacuum Research gauge without the use of a vacuum system, and without any electronics training. Just follow the step by step procedure on the calibrator front panel to insure performance the same as a new gauge.

Making sure that your vacuum gauges are working properly has never been easier. These calibrators do not require any electronics training yet they allow you to adjust your Vacuum Research Gauge exactly to like new factory specification.

The procedure is simple. You begin by unplugging the vacuum gauge sensor cable from the gauge tube and plugging it into the calibrator. After allowing one hour for warm up you adjust the offset on the rear of your gauge to read "000".

You then adjust the "span" to the specified value. Repeat the procedure two or three times until no adjustment is needed and the job is done. Your gauge calibration is now the same as it was when leaving the factory.

After calibrating the electronic portion of your vacuum gauge you may want to install a factory fresh gauge tube. Because the tube is exposed to pump fluid vapors and other dirt from your process it may become contaminated and give erroneous readings. It is good practice to compare on a regular basis the readings with your "working" gauge tube and a brand new tube or one that is known to be clean.



NIST Traceable Certification of Vacuum Gauge Calibrators

All Calibrators are tested to strict standards prior to shipment. In addition to this you need certification of the testing, it is available for new and existing calibrators. For recertification of your existing calibrators, please contact the factory for an "RGA" number, and return the calibrator freight prepaid with your purchase order. Time required for certification is 5 to 7 days.

Certificate of NIST Traceable Calibration both as received and after repair and adjustment

- For Wide Range and Convection Gauge Calibrators
P/N: 912904\$332.
- For Pirani, Diaphragm and Thermocouple Gauge Calibrators
P/N: 912905\$168.

Certificate of NIST Traceable Calibration after repair or adjustment only

- For Wide Range and Convection Gauge Calibrators
P/N: 912906\$212.
- For Pirani, Diaphragm and Thermocouple Gauge Calibrators
P/N: 912907\$109.

Buy Now! Go to www.vacuumresearch.com to order online

Ordering Information

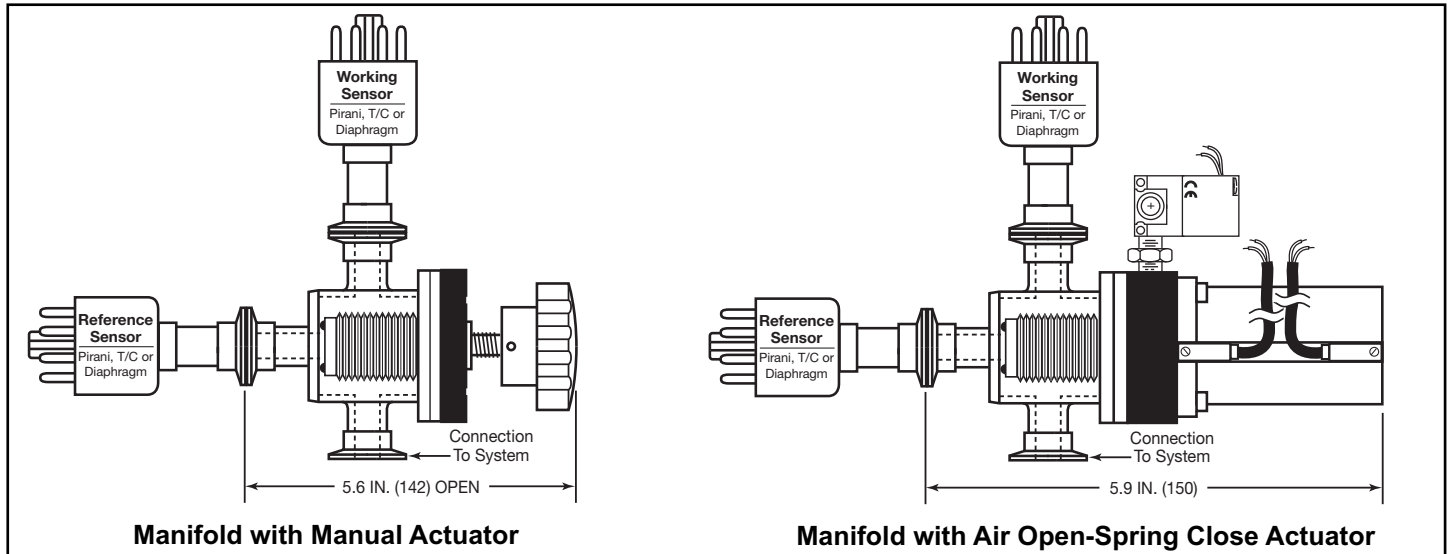
- 0.5 - 1200 Torr Manometer Calibrator KitP/N: 912300.....\$392.
- Wide Range Manometer Calibrator Kit.....P/N: 912110.....\$602.
- Calibrator for Digital Convection GaugeP/N: 912170.....\$535.
- Calibrator for Analog Convection GaugeP/N: 912183.....\$264.
- 100 mTorr Pirani Gauge CalibratorP/N: 912019.....\$264.
- 2000 mTorr Pirani Gauge CalibratorP/N: 912008.....\$264.
- 20 Torr & 50 Torr Pirani Gauge CalibratorP/N: 912009.....\$255.
- Dual Range Pirani Gauge CalibratorP/N: 912010.....\$264.
- 1500 Torr Diaphragm Gauge Calibrator.....P/N: 912027.....\$264.
- 30" Hg to 150.0 PSIG Gauge Calibrator.....P/N: 912021.....\$264.
- Thermocouple Gauge CalibratorP/N: 902114.....\$264.
- 0.1 to 20 PSIG CalibratorP/N: 912039.....\$264.
- 0.1 to 200 PSIG CalibratorP/N: 912040.....\$264.
- 1 to 1000 PSIG CalibratorP/N: 912041.....\$264.



Photo shows manual manifold with NW-6 ports

- Verify complete system; sensor and display
- Easily confirm vacuum gauge calibration
- Satisfy ISO-9000 auditors and inspectors
- Choose Manual or Electro-pneumatic actuator
- Use with any brand or type of vacuum gauge

With ever increasing needs to verify vacuum gauge accuracy many gauge manufacturers, including Vacuum Research, now offer electronic calibrators or "reference tubes." Although such devices are helpful they only deal with the control or display part of the gauge and do nothing to evaluate the sensor. This is unfortunate because in the real world most vacuum gauge errors involve the sensor. Vacuum Research developed these manifolds to make it easy to compare your working gauge with a reference gauge or a certified standard gauge. Burned out filaments and ruptured diaphragms are easy to diagnose but the most typical failure mode of a vacuum gauge is a gradual shift in calibration due to pump fluid and dirt on the sensor. Such changes can be easily detected with these manifolds because the two sensors are only inches apart.



Manifold with Manual Actuator

Manifold with Air Open-Spring Close Actuator

Ordering Information

Buy Now! Go to www.vacuumresearch.com to order online

Our standard manifolds have 300 series stainless steel bodies and NW-16 ports for sensor and system connection. Other flanges such as NW-25 are available as are compression type quick connects for 1/8 inch NPT, 1/2 inch O.D. and 0.75 inch O.D. All manifolds use a welded bellows stem seal.

NW-16 Calibration Manifold, Manual Actuator

Stainless steel manifold body with welded bellows. All 3 ports NW-16. P/N: 912274. \$420.

NW-16 Calibration Manifold, Air Open - Spring Close

Stainless steel manifold body with welded bellows. All 3 ports NW-16. (Solenoid and Position Indicators not included.) P/N: 912275. \$440.

3 Way Solenoid for Air Open-Spring Close Manifold Add suffix to manifold P/N: SOL-120 VAC, SOL-230 VAC or SOL-24 VDC To manifold cost. Add \$131.

Position Indicators

Air open-spring close manifolds can be equipped with a pair of SPST switches to indicate valve open and closed. These unpowered switches have contacts rated for 1 amp @ 300V, non-inductive. Add the suffix 'PI' to P/N & to price of manifold. Add \$112./pair

Additional Port for Roughing

Add an additional NW-16 port for connection of a roughing pump to the reference tube side of the manifold. Add suffix 'RP' to P/N & to price of manifold. Add \$103.

Call or visit our website www.vacuumresearch.com for our complete Vacuum Gauge Catalog



Vacuum Gauges

Explosion Proof



Active Pirani Gauges & Transmitters 1 to 2000 milli Torr, 24 VDC Power



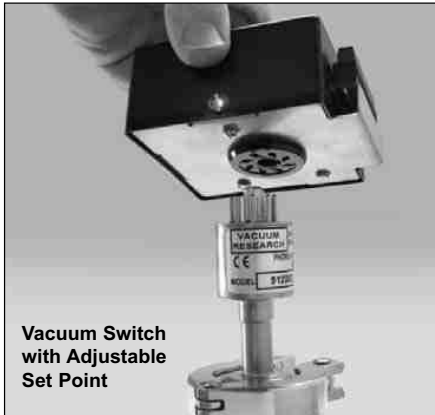
Pirani, Thermocouple, Diaphragm, and Convection Gauges



Wide Range Diaphragm Manometer
10⁻⁵ to 1500 Torr



Vacuum Switch
with Adjustable
Set Point



Display and Power Up To 7 Gauges,
Linear Outputs for PLC or Data Systems



Complete specifications and prices

www.vacuumresearch.com

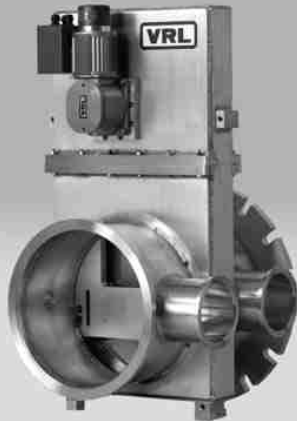
or call 800-426-9340 and talk to a real person

Call or visit our website www.vacuumresearch.com for our High Vacuum Valve Catalog



Vacuum Valves

Valves with Electric Motor, Pneumatic, or Manual Operator



Stainless Steel and Aluminum Vacuum Valves



Custom Aluminum Chambers and Piping



Aluminum Valves with Conflat® Flanges; Less Outgassing than Stainless Steel



Throttle Valves from 50 to 600 mm, 2 to 24 inch



Rectangular Port Valves, Sizes to Fit Any Wafer or Solar Substrate



Complete specifications and prices

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or call 800-426-9340 and talk to a real person