

VACUUBRAND® Vacuum Products

VACUUBRAND® has been a pioneer in laboratory vacuum for over 40 years, and brings convenience, performance, reliability, and economy to laboratory vacuum supply. VACUUBRAND® pump-control options also offer distinct productivity advantages compared with uncontrolled pumps, central vacuum system, and competitive vacuum products.

Why choose a VACUUBRAND® pump instead of an oil-sealed pump or a competitive oil-free pump?

- **Oil-Free without Compromise.** VACUUBRAND® chemistry-design diaphragm pumps combine dry operation, fluoropolymer flowpaths, and distinctive engineering for excellent corrosion-resistance and low maintenance.
- **Whisper Quiet.** These are among the quietest diaphragm vacuum pumps available, operating at decibel levels approximately equal to a quiet conversation.
- **Lower Lifetime Cost.** The high flowrates, corrosion-resistant flowpath materials, and durability of VACUUBRAND® pumps can save thousands of dollars per pump per year in operation and maintenance costs. Visit www.brandtech.com for details.
- **High Performance.** Working vacuum flow rates of VACUUBRAND® pumps are up to 40% better than competitive dry pumps for faster evaporative applications and higher productivity.



MD1C + AK + EK
Vacuum Pump
2mbar, 0.82cfm

**Quiet. Powerful. Low Maintenance.
Unbeaten Economy.**

vacuubrand



A Comprehensive Range of Vacuum Solutions

BrandTech offers a complete range of vacuum solutions, from oil-free pumps with chemical-resistant flowpaths like the MD4C (shown), to fully integrated, electronically-controlled vacuum systems. Should your application require deeper vacuum, the VACUUBRAND® line of HYBRID and rotary vane pumps offer the same high performance and durability.

High Performance

Vacuum pumps and systems from VACUUBRAND® feature highly uniform “planar” diaphragms. These consistent diaphragms ensure tight tolerances, long service life, high-performance, and easy replacement without tedious, trial-and-error calibrations.



MD4C Vacuum Pump
2mbar, 2.1cfm

Quality Assurance

Each VACUUBRAND® pump and system must pass rigorous product testing before leaving the factory. It's your assurance of a reliable pump.

Corrosion-Resistant Materials

All parts in the vapor flowpath of our chemistry-design pumps are manufactured from PTFE, PTFE compound, or fluorinated plastic materials for superior chemical resistance to corrosive vapors and exceptionally long service life. Aluminum/FKM pumps are also available for non-evaporative and non-corrosive applications.

Durability

VACUUBRAND® vacuum pumps and systems typically have service intervals of up to 10,000–15,000 hours (that's years in most applications). Most service can be done in the lab in a matter of minutes.

The Essential Vacuum Pump

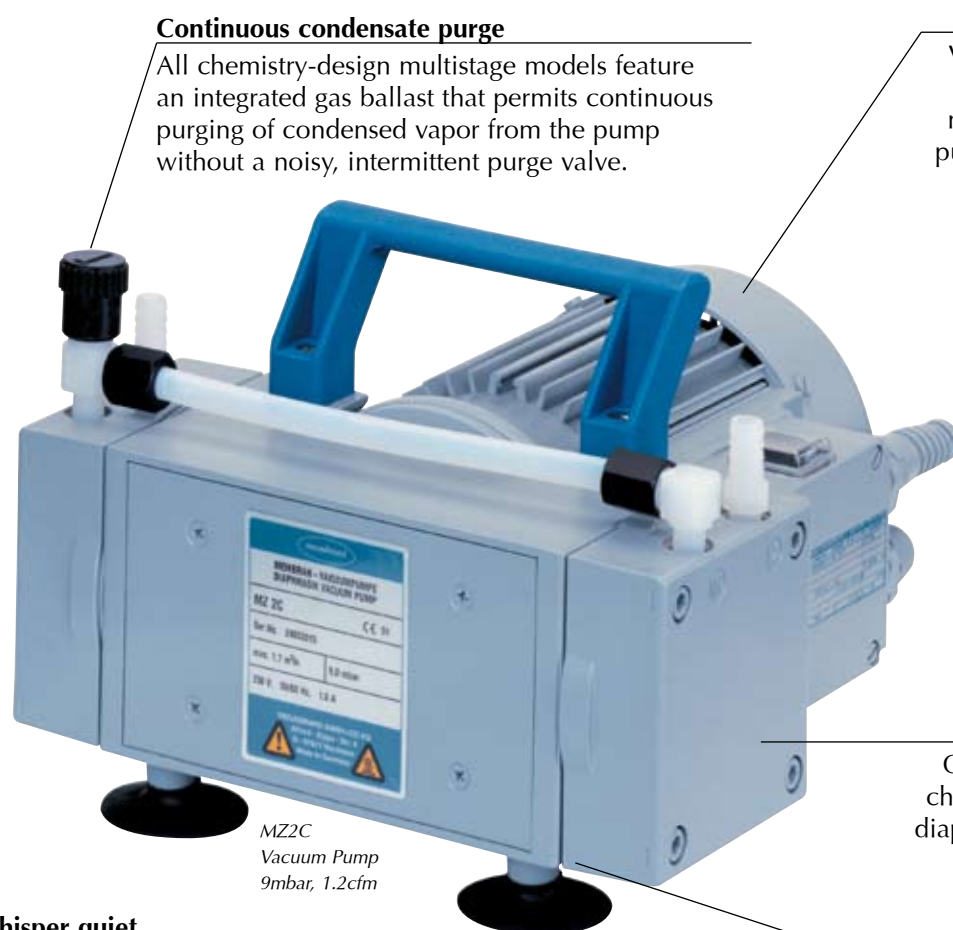
A complete range of vacuum solutions

Whether your vacuum application requires a simple pump or a fully integrated vacuum system with solvent recovery and electronic control, VACUUBRAND® has the right pump for your lab.

The essential oil-free, corrosion-resistant vacuum pump

High performance VACUUBRAND® chemistry-design diaphragm pumps provide dry vacuum levels as deep as 0.6mbar, making them an excellent choice for most applications from benchtop research to pilot plant installations. Pumps without controls are well-suited to high flow applications like vacuum ovens, or for applications in

which the control is provided by the vacuum application apparatus. Even operations that don't require solvent recovery or sophisticated control benefit from a pump designed with your applications in mind.



Continuous condensate purge

All chemistry-design multistage models feature an integrated gas ballast that permits continuous purging of condensed vapor from the pump without a noisy, intermittent purge valve.

High flow rates

VACUUBRAND® diaphragm pumps are engineered for high performance with minimal wear. Powerful motors give the pumps the torque needed to sustain high flow rates at working vacuum. Higher flow rates mean faster applications.

Extremely low maintenance

Totally dry, there's no oil to change or monitor! Typical diaphragm lifetimes are 10,000 to 15,000 hours of use—that's years in most applications, so there is very little downtime and low service costs. When it is finally time for service, precision-formed diaphragms eliminate tedious, trial-and-error stroke length recalibration.

Corrosion resistance

Chemistry-design models are made with chemically resistant fluoropolymer heads, diaphragms, and valves. Cold traps are not required for most applications!

Whisper quiet

VACUUBRAND® pumps are extremely quiet. Most laboratory models operate at about the same sound pressure level as a hushed conversation.

Small footprint

Compact pumps fit easily on benchtops or under hoods.

A complete range of vacuum solutions

Vacuum pumps with manual control

Popular VACUUBRAND® chemistry-design vacuum pumps are available with manual flow control to provide the most basic management of vacuum where electronic control is unnecessary to achieve good results.

Centrifugal concentration, gel drying, and even simple rotary evaporation applications can often be effectively managed with manual control systems.

Electronic combination Digital/Analog Gauge

Combination digital/analog gauge with ceramic capacitive pressure transducer provides absolute pressure readings for precise measurement and a pointer for trend indication. Standard on the PC301. Dial (Bourdon) relative pressure gauge supplied with PC101 and PC201.

Diaphragm Valve

A manually controlled PTFE diaphragm valve lets you balance vapor flow against pump capacity. It provides approximate control of vacuum levels that is appropriate for many simple lab-vacuum applications.

Protect your pump, your lab and your budget!

Solvent recovery glassware – a condenser and catchpots – protects the pump and your lab atmosphere from application vapors. An inlet catchpot captures condensed vapors from the vacuum line before they degrade pump performance. The condenser (cooled by tap or recirculated water) and outlet catchpot provide near 100 percent recovery of vapors that pass harmlessly through the pump's corrosion-resistant fluoropolymer flowpath, typically eliminating the need for a cold trap to protect the pump or environment. For more details on the economic benefits of eliminating cold traps, see page 71.

Depending on the temperature of your application and the vapor pressure of your solvent, you may not even need a condenser! Applications with a limited flow of condensable vapors, such as filtration operations, are often well served by a pump, like the MZ2C + 2AK, with two catchpots – inlet and outlet – but without a condenser or controls.



Model PC301
Vacuum System
2mbar, 0.82cfm

NEW! 2 mbar performance, absolute pressure measurement, flow control and solvent recovery – all in a compact package!

The new PC301 harnesses the power of the 2 mbar MD1C vacuum pump with a flow control valve, gauge, and inlet and outlet catchpots. It provides an economical solution for simple rotary evaporation applications and other tasks requiring a modest degree of vacuum control.

Vacuum Pumps with Two-Point Electronic Control

A complete range of vacuum solutions

Pumps with two-point electronic control

Many applications that require a specific vacuum level to operate properly, such as most rotary evaporation, will benefit significantly by adding electronic control to the vacuum pump. VACUUBRAND® employs a digital controller and solenoid valve to provide “two-point control.” Unlike vacuum controllers that turn the pump on and off (common in controllers integrated into evaporators and even in competitive vacuum pumps), the solenoid

alternately connects and isolates the pump from the application as needed to maintain vacuum levels while the pump keeps running. This keeps the pump warm, and minimizes the condensation in the pump that can shorten diaphragm life and impair performance. When the gas ballast is open, this control approach also permits continuous purging of condensates from the pump for high flow rate, trouble-free operation.

Controller

The mercury-free, digital CVC2" controller provides two-point vacuum control. A digital readout shows actual vacuum levels, while a digitally simulated analog indicator simplifies trend and “at-a-glance” monitoring. (See page xx for more details.)

Solenoid valve

The CVC2" controller opens and closes the solenoid valve to keep vacuum levels between pre-set tolerances as vapor flow from the application changes.



PC510
Vacuum System
9mbar, 1.2cfm

Save money with a VACUUBRAND® system

Because VACUUBRAND® pumps provide high flow-rates at working vacuum levels, they can provide cost savings, both initially, and over the life of the pump.

- **Synchro™ Multi-tasking systems** harness the power of the VACUUBRAND® pump for two applications. A unique check-valve system allows two different vacuum levels to be set for two different applications, without backflushing or cross-contamination. VACUU•LAN® systems expand on this concept to outfit a lab bench, or even an entire room, with a single pump.
- **Dry ice** costs for cold traps used with rotary vane (and sometimes recommended with lesser diaphragm pumps) can easily exceed the pump purchase price in the first year. Our PTFE flowpath and superior flow rates often eliminate the need for cold traps, and the associated costs of dry ice or liquid nitrogen.
- **Productivity savings** with the self-adjusting VARIO™ systems free you up to perform other work with minimal pump oversight. Their continually optimized vacuum levels speed evaporation by up to 30%! Service intervals are also lengthened considerably for even more operating cost savings.

Find out more details on how to save money with VACUUBRAND® vacuum pumps at www.brandtech.com.

Vacuum Pumps with Adaptive Electronic Control

A complete range of vacuum solutions

Self-regulating Electronic Control – VARIO™!

VACUUBRAND® VARIO™ vacuum systems offer users unsurpassed control of critical vacuum applications. A low maintenance chemistry-design pump is integrated with a variable speed motor and a mercury-free, digital controller. The system automatically finds and follows boiling curves, continuously optimizing the vacuum level without having to program presets. It's the ultimate productivity tool!

- **Faster.** Because the vacuum level is continuously optimized, evaporation times are up to 30% faster when compared to other electronically-controlled pumps.
- **Easier.** Just press “Start” and the VARIO™ pump begins pumping down, and finds the first boiling point. It maintains and continually optimizes vacuum levels to vapor flow — even for azeotropic mixtures!
- **Less “babysitting.”** The VARIO™ controller automatically adjusts vacuum levels, reducing the need for manual adjustment or complex pumping programs. The pump even shuts itself off at pre-set levels or when evaporation is complete.
- **Virtually no bumping.** The VARIO™ controller automatically reduces the pumping speed as each boiling point is approached so “overpumping” is substantially reduced.
- **Less maintenance.** Because the pump only operates enough to maintain optimum vacuum, wear is lessened, extending the service interval greatly.
- **GLP/GMP validation.** An integrated bidirectional RS232 port allows control and monitoring of every parameter for process validation, and the execution of complex pumping programs. Order our VACUU•CONTROL software (PC only) for easy control and monitoring.



PC2001 VARIO™
Vacuum System
2mbar, 0.94cfm



VARIO™ Control without Solvent Recovery

For applications that already have integrated solvent recovery, or that operate with a cold trap, VARIO™ control is also available as a pump/controller combination, without solvent recovery accessories.



MD4C VARIO™
Vacuum Pump
2mbar, 2.2cfm

Dual Application Vacuum Systems

A complete range of vacuum solutions

Pumps with Dual Application Control

VACUUBRAND dual application vacuum systems harness the power of the VACUUBRAND oil-free pumps to increase lab efficiency and reduce the cost of vacuum generation. Operating two different applications from a single pump saves money and lab bench space.

These vacuum systems are available with manual control, electronic control, or both. Integrated check valves

minimize interaction between applications.

All dual application systems include a high-performance 9mbar or 2mbar VACUUBRAND® vacuum pump. Select a 9mbar system (MZ2C Synchro, PC511, or PC520) for most lab applications and 2mbar systems (MD4C Synchro, PC611, PC620) for larger applications or those with higher boiling point solvents.

PC511 Vacuum System
9mbar, 1.2cfm



Manual Control

PTFE diaphragm valve provides approximate control of vacuum levels for less demanding applications.

Electronic Control

Solenoid valve, operated by a CVC2^{II} controller, provides precise two-point electronic control for important applications.

Have more than 2 applications?

Expanding on the concept of the dual-application system, VACUUBRAND® offers the VACUU•LAN® system - a modular integrated Vacuum Local Area Network for laboratories. Far more than a "small central vacuum system," VACUU•LAN® provides performance that approaches that of individual diaphragm vacuum pumps dedicated to each application, but with less bench space, noise and cost. A modular design allows for easy reconfiguration, upgrading or even relocation. VACUU•LAN® systems can be installed in new laboratories, or retrofitted into existing ones. VACUU•LAN® is also popular for lab rebuilds and science parks. For more information, contact BrandTech Scientific.

MZ2C Synchro Vacuum System
9mbar, 1.2cfm



MZ2C Synchro (9mbar) and MD4C Synchro (2mbar) vacuum systems feature two manually-controlled vacuum ports. These manual controllers regulate flow, providing approximate vacuum levels suitable for less critical applications.

PC520 Vacuum System
9mbar, 1.2cfm

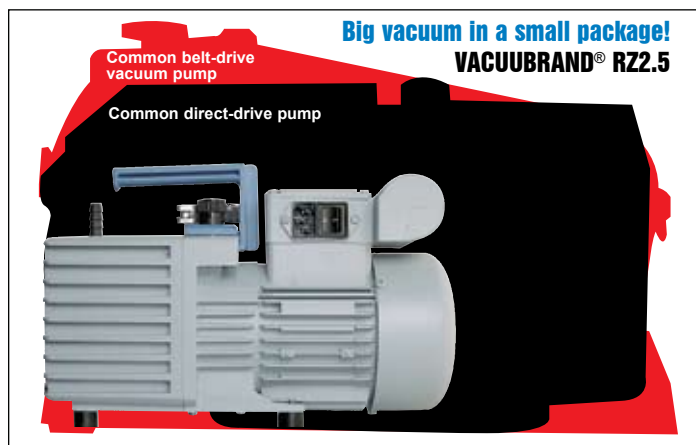


PC520 (9mbar) and PC620 (2mbar) systems have two electronically controlled vacuum ports for precise automated control of two applications running simultaneously.

A complete range of vacuum solutions

NEW! VACUUBRAND XS-Series Rotary Vane Vacuum Pumps for Fine Vacuum Applications.

- **Quiet!** XS-pumps are extremely low-noise and low vibration, even compared to earlier VACUUBRAND® rotary vane models.
- **Rugged!** The new XS series have been designed from the ground-up for service in chemistry labs. They provide exceptional water vapor tolerances with minimal impact on ultimate vacuum. Internal components have been redesigned to improve corrosion resistance, reduce wearing forces, enhance performance and simplify maintenance. Internal steel surfaces have even been nitrogen-plasma treated for chemical resistance and mechanical hardness.
- **Energy Efficient!** Pumps have very low power consumption, and generate low levels of waste heat compared to competitive models.
- **Great Value!** On top of all of these advantages, VACUUBRAND® XS-series rotary vane pumps are competitively priced with other popular pumps.



Extremely compact compared to popular pump models.

- Compared with a belt-drive pump, the RZ2.5 takes up 1/3 of the bench space, weighs half as much, and occupies less than 1/4 the volume, despite superior flowrates.
- Compared with competitive direct drive pumps, the RZ2.5 takes up half of the space and weighs half as much.

For a detailed comparison see
<http://www.brandtech.com/RVpumps2.pdf>.

Don't Forget...

Adding accessories to your rotary vane pump can extend the pump lifetime and make your workplace more pleasant:

- **Inlet Hose Barbs:** Match the pump to your vacuum hose. Inlet centering and clamping rings (and outlet, where applicable) are included.
- **Inlet Catchpot:** Collects condensates and particles from the vacuum line, where they contaminate pump oil and can reduce pump lifetime.
- **Oil Mist Filter:** Captures up to 99% of oil-mist from the outlet of your pump, keeping your lab atmosphere and bench top clean (included with RC6)
- **Pump Oil B:** For best performance, and long life, use Pump Oil B. Its special high-viscosity formula is an excellent choice for VACUUBRAND® pumps.

ORDERING INFORMATION

Accessories for your VACUUBRAND® XS series rotary vane pump and RC6	Cat. No.	2007 List Price
KF16 to 10mm (3/8") hose barb, fits RZ2.5, RZ6, and RC6 inlet, aluminum	662511	\$33.00
KF25 to 12mm (1/2") hose barb, fits RZ9 inlet and outlet, aluminum	662518	40.00
KF25 to 19mm (3/4") hose nipple, fits RZ9 inlet and outlet, aluminum	662532	45.00
Other flanges, clamping rings and centering rings available.		
Inlet catchpot for RZ2.5	698000	312.00
Inlet catchpot for RZ6 and RC6	698006	359.00
Inlet catchpot for RZ9	698007	390.00
Oil mist filter for RZ2.5 and RZ6	698003	361.00
Oil mist filter for RZ9	698017	536.00
Pump Oil B, 1 liter bottle	687010	40.00
Pump Oil B, 5 liter can	687011	133.00

Pump	Pumping Speed, 60Hz (cfm) ¹	Ultimate vacuum w/o gas ballast (mbar)	Ultimate vacuum w/ gas ballast (mbar)	Inlet Connection (flange)	Outlet Connection (hose barb or flange)	Cat. No., 120V, US plug	2007 List Price
RZ2.5	1.65	2 x 10 ⁻³	1 x 10 ⁻²	KF16	10mm	698123	\$1770.00
RZ6	4.0	2 x 10 ⁻³	1 x 10 ⁻²	KF16	10mm	698133	2,110.00
RZ9	6.0	2 x 10 ⁻³	1 x 10 ⁻²	KF25	KF25	698143	2,995.00

¹ Pumping speed at 50Hz 83% of stated value)

Ordering Information



ORDERING INFORMATION

		Solvent	Ultimate Vacuum		FlowRate at 60Hz		2007	
Model	Controller(s)	Recovery	mbar	torr	cfm	lpm	Cat. No.	List Price
Oil-Free Diaphragm Vacuum Pumps								
ME2C	No	No	< 80	< 60	1.3	37	696124	\$1,770.00
ME4C	No	No	< 80	< 60	2.4	67	696144	2,280.00
ME8C	No	No	< 80	< 60	2 x 2.4	2 x 67	696184	4,840.00
ME16C	No	No	< 80	< 60	6.8	193	696466	9,359.00
MZ2C	No	No	9	~ 6.8	1.2	35	696244	2,280.00
MZ2C+2AK	No	Yes	9	~ 6.8	1.2	35	688019	3,070.00
MD1C	No	No	2	1.5	0.88	25	696613	2,695.00
MD1C+AK+EK	No	Yes	2	1.5	0.88	25	696633	3,700.00
MD4C	No	No	2	1.5	2.1	58	696293	5,091.00
MD12C	No	No	2	1.5	5.2	148	710153	10,050.00
MV10C	No	No	9x10 ⁻¹	0.7	4.4	125	710203	10,140.00
Chemistry-HYBRID Vacuum Pumps								
RC6	No	No	2x10 ⁻³	1.5x10 ⁻³	4.1	115	698563	5,150.00
Oil-Free Single Application Vacuum Systems								
PC101	1 Manual	Yes	9	6.8	1.2	35	688105	1,113.00
PC510	1 Electronic	Yes	9	6.8	1.2	35	688001	5,440.00
PC301	1 Manual	Yes	2	1.5	0.88	25	688111	4,950.00
PC201	1 Manual	Yes	2	1.5	2.1	58	688119	5,780.00
PC610	1 Electronic	Yes	2	1.5	2.1	58	688010	8,510.00
Oil-Free Dual Application Vacuum Systems								
MZ2C Synchro	2 Manual	Yes	9	6.8	1.2	35	688025	3,900.00
PC511	1 Electronic +1 Manual	Yes	9	6.8	1.2	35	688007	5,840.00
PC520	2 Electronic	Yes	9	6.8	1.2	35	688004	7,910.00
MD4C Synchro	2 Manual	Yes	2	1.5	2.1	58	688031	6,480.00
PC611	1 Electronic +1 Manual	Yes	2	1.5	2.1	58	688016	8,910.00
PC620	2 Manual	Yes	2	1.5	2.1	58	688013	11,390.00
Oil-Free VARIO™ Adaptive Single Application Vacuum Systems								
MZ2C VARIO, 120V, 50/60Hz	Adaptive	No	9	6.8	1.5	42	683403	5,550.00
MD4C VARIO, 120V, 50/60Hz	Adaptive	No	2	1.5	2.2	63	683408	8,880.00
MV10C VARIO, 230V, 50/60Hz, CEE plug	Adaptive	No	6x10 ⁻¹	4.5x10 ⁻¹	4.8	137	710250	13,390.00
PC2001 VARIO, 120V, 50/60Hz	Adaptive	Yes	2	1.5	0.94	27	696643	6,790.00
PC2002 VARIO, 120V, 50/60Hz	Adaptive	Yes	9	6.8	1.5	42	683423	6,660.00
PC2003 VARIO, 120V, 50/60Hz	Adaptive	Yes	6x10 ⁻¹	4.5x10 ⁻¹	1.5	42	683443	1,060.00
PC2004 VARIO, 120V, 50/60Hz	Adaptive	Yes	2	1.5	2.2	63	683428	9,710.00
PC2010 VARIO, 230V, 50/60Hz, CEE plug	Adaptive	Yes	6x10 ⁻¹	4.5x10 ⁻¹	4.8	137	710350	16,410.00
PC2012, 230V, 50/60Hz, CEE plug	Adaptive	Yes	2	1.5	5.5	157	710370	15,660.00
Rotary Vane Vacuum Pumps								
RZ2.5	No	No	2x10 ⁻³	1.5x10 ⁻³	1.6	47	698123	1,770.00
RZ6	No	No	2x10 ⁻³	1.5x10 ⁻³	4	113	698133	2,110.00
RZ9	No	No	2x10 ⁻³	1.5x10 ⁻³	6.0	170	698143	2,995.00
RZ16, 230V, 50/60Hz, CEE plug	No	No	2x10 ⁻³	1.5x10 ⁻³	11.2	318	698050	3,570.00

*All pumps 120V, 60Hz unless noted

Selecting the Best Pump for Your Application

Vacuum Pump Selection Guide—Online!

Not sure which vacuum pump or system is best for your lab? Find out using the BrandTech Scientific Vacuum Pump Selection Guide!

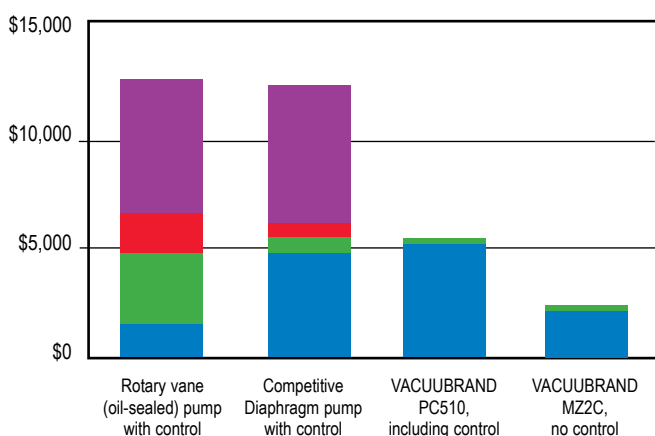
This free guide has been designed to recommend the best VACUUBRAND® vacuum pump or system for a wide variety of laboratory applications, including fluid aspiration, centrifugal concentration, rotary evaporation, and more.

Simply click the Tech Resources tab at www.brandtech.com to find the guide. Answer a few simple questions about your application. The software suggests the pump, controls, and solvent capture accessories that are right for your application. It even offers options for limited budgets or applications where control is critical.

Pump Economy

Where comparing the costs of vacuum pumps, it is important to include accessories that are needed and lifetime repair and maintenance costs. Rotary vane pumps require mist filters, catchpots, cold traps (including dry ice, liquid nitrogen or electricity costs) plus frequent oil changes. Competitive diaphragm pumps have much shorter service intervals (3,000-4,000 hours) compared with VACUUBRAND dry pumps (10,000-15,000 hours). And competitive diaphragm pumps typically recommend cold traps, adding substantially to operating costs and inconvenience.

5-Year Cost Comparison—Vacuum Pumps



Refrigerant: 5lb. dry ice per day, \$1/lb. for 250 days/yr.

Added Accessories: exhaust filter, cold trap and vacuum control

Maintenance: oil changes, filter replacements, service parts

Pump Purchase Cost

It's as easy as 1,2,3...

1. Select your application from the list located in the top left hand corner of your screen.



2. Answer a few questions about your application, and click on the "Submit" button.



3. It's that simple! A photo and description of your recommended pump will appear on the right of your screen! The software even recommends other options with more control or lower cost!



Vacuum for Filtration and SPE

Vacuum for nearly every lab application

Filtration and SPE

Fluid movement applications, such as filtration and solid phase extraction, typically don't require deep vacuum levels or high flow rates.

Normally, these applications are best served by VACUUBRAND®'s ME2C and ME4C. Users seeking additional capability or users with special circumstances, however, may want to consider VACUUBRAND®'s MZ2C+2AK or MD1C+AK+EK pumps with integrated solvent recovery.

When choosing the pump for your filtration or solid phase extraction application, consider the following factors:

How much vacuum do I need?

Vacuum filtration and solid phase extraction typically require just enough vacuum depth to generate a pressure differential between the receiving vessel and atmospheric pressure. These applications do not usually require control unless the vacuum level is too low and may cause filtrate boiling.

The ME2C vacuum pump is an excellent selection for most fluid movement applications. It is a simple, compact, stand alone pump with sufficient vacuum and flow to perform effective vacuum filtration or solid phase extraction and is powerful enough to support up to three simultaneous applications.



ME2C
Vacuum Pump
80mbar, 1.2cfm

How much flow do I need?

Labs running more than three simultaneous filtration applications may require a pump with higher flow rates to maintain sufficient vacuum at all workstations.

The ME4C vacuum pump is an excellent pump for these circumstances. Like the ME2C, it is a simple, compact stand alone pump. However, its higher flow rate ensures better results and faster process times in large-scale filtration and solid phase extraction labs.

Do I need solvent recovery?

During normal filtration and solid phase extraction applications, filtrates under vacuum in the receiving vessel can evaporate and pass through the pump into the lab, or contaminate the pump itself. This problem can be minimized by a vacuum pump with integrated solvent recovery to collect those vapors, such as the MZ2C+2AK or the MD1C+AK+EK.

The solvent recovery and higher performance of these pumps also allows them to support a broader range of applications. They are an excellent choice for labs seeking to support multiple applications with only one pump.



MZ2C + 2AK
Vacuum Pump
9mbar, 1.2cfm

ORDERING INFORMATION

		Solvent	Ultimate Vacuum		FlowRate at 60Hz		2007
Model	Controller(s)	Recovery	mbar	torr	cfm	lpm	List Price
Oil-Free Diaphragm Vacuum Pumps							
ME2C	No	No	< 80	< 60	1.3	37	696124 \$1,770.00
ME4C	No	No	< 80	< 60	2.4	67	696144 3,280.00
MZ2C+2AK	No	Yes	9	~ 6.8	1.2	35	688019 3,070.00
MD1C+AK+EK	No	Yes	2	1.5	0.88	25	696633 3,700.00

*All pumps 120V, 60Hz unless noted

Vacuum for nearly every lab application

Vacuum Oven Solutions

How much vacuum do I need?

Vacuum ovens typically require a pump with deeper vacuum levels than other heated applications because the evaporative effect of elevated temperature is often offset by the poor thermal transfer of the oven environment.

How much flow do I need?

Vacuum ovens also require higher vacuum pump flow rates than other lab applications due to the relatively large sample capacity of most vacuum ovens.

The MZ2C+2AK vacuum pump is an excellent selection for labs with smaller vacuum ovens (<1.0 cubic foot in capacity). Its performance, small footprint, and integrated solvent recovery make it a popular choice for volatile solvents. Evaporation of higher boiling point solvents,

however, may require a more powerful pump, such as the MD1C+AK+EK.

Laboratories with larger ovens (one or more cubic feet in capacity) do well with the PC201. It can generate vacuum levels for evaporation of most solvents, and its high flow rate reduces process times.

Use a Cold Trap?

Using a cold trap for solvent recovery gives users greater flexibility when selecting a pump for vacuum ovens. The cold trap reduces vapor loads, and eliminates the need for solvent capture by the pump. These applications are typically best-served by a stand alone pump such as the compact, economical MD1C vacuum pump.

Gel Dryer Vacuum Solutions

How much vacuum do I need?

The vacuum level required for gel drying applications is usually determined by the concentration of sodium dodecyl sulfate (SDS). For standard-sized gels with SDS concentrations up to 10%, select the MZ2C+2AK. It has the power to provide excellent results in most gel-drying applications and its two catchpots capture condensing vapors for clean operation.

MZ2C+2AK
Vacuum Pump
9mbar, 1.2cfm



MD1C+AK+EK
Vacuum Pump
2mbar, 0.82cfm



For SDS concentrations greater than 10%, choose the MD1C+AK+EK. Its integral pump achieves deeper vacuum levels for enhanced evaporative performance, and the catchpots and condenser protect the pump and the lab atmosphere without the cost and inconvenience of a cold trap.

ORDERING INFORMATION

Model	Controller(s)	Solvent Recovery	Ultimate Vacuum		FlowRate at 60Hz		Cat. No.	2007
			mbar	torr	cfm	lpm		List Price
Oil-Free Diaphragm Vacuum Pumps								
MZ2C+2AK	No	Yes	9	~ 6.8	1.2	35	688019	\$3,070.00
MD1C	No	No	2	1.5	0.88	25	696613	2,695.00
MD1C+AK+EK	No	Yes	2	1.5	0.88	25	696633	3,700.00
Oil-Free Single Application Vacuum Systems								
PC201	1 Manual	Yes	2	1.5	2.1	58	688119	5,780.00

*All pumps 120V, 60Hz unless noted

Rotary Evaporation Vacuum Solutions

Vacuum for nearly every lab application

Rotary Evaporation Vacuum Solutions

Vacuum pumps provide the operational muscle for your rotary evaporator. Apart from the vacuum control, your evaporator is just rotating glassware! BrandTech Scientific offers a full range of vacuum pumps and systems that help optimize your rotary evaporation application.

To find the vacuum pump or system that best meets your needs, answer the following questions.

How much vacuum do I need?

The vacuum capacity required from a pump to support a rotary evaporation application is determined by the typical application temperatures and the solvents being evaporated. Virtually all rotary evaporation applications can be accomplished with diaphragm vacuum pumps. The vacuum pump should have the ability to reach the vapor pressure of the solvent at the application temperature.

How much control do I need?

Rotary evaporation applications often require significant oversight and control because the heat and high surface area increase evaporation rates. This can lead to solvent “bumping” or boiling over.

• Adaptive Vacuum Control

The best way to prevent bumping is with a self-regulating vacuum pump. Adaptive control, an innovation exclusive to VACUUBRAND® VARIO™ pumps and systems, combines an electronic controller and speed-controlled motor to automatically perform the following tasks:

- Find and follow boiling points, even for solvent mixtures;
- Evaporate up to 30 percent faster; and
- Shut the pump off when evaporation is completed.

For most benchtop rotary evaporators, the PC2001 VARIO™ vacuum system is an excellent choice. The powerful integral pump provides a deep 2mbar ultimate vacuum – enough to evaporate DMSO at 40°C!



PC2001
VARIO™
Vacuum System
2mbar, 0.94cfm

• Electronic Control

Some rotary evaporation applications might benefit from control, but not require the precision of adaptive control. The PC510 system is an excellent choice for these applications. It is a great workhorse system for evaporation of many common solvents in rotary evaporators up to 5 liters in size. The integrated MZ2C pump evaporates solvents that are slightly less volatile than water, and the system includes a controller that allows preset or semi-automatic setting of vacuum level, with appropriate hysteresis adjustment. Solvent recovery is provided by an inlet catchpot and outlet condenser. For larger or more demanding evaporations, select the PC610, with a 2mbar pump rated to 2.1cfm. Need to run two evaporators? Consider the PC520 or PC620 (see pages 66 and 68 for description and ordering information). They'll provide different conditions to two applications at once, saving bench space and the cost of an additional pump or system.

PC510
Vacuum System
9mbar, 1.2cfm



• Manual Control

For applications that require only minimal control, select the economical PC101 vacuum system for basic evaporation and vapor capture. It includes the same 9mbar MZ2C pump as the PC510 along with a stand, inlet catchpot and outlet condenser, but substitutes a manual flow-control valve and dial gauge for economy. It's an excellent choice for basic evaporation! For vacuum to 2mbar, choose the PC201. Or support 2 evaporators with an economical, space-saving Synchro system! (see pages 66 and 68 for description and ordering information).

PC101
Vacuum System
9mbar, 1.2cfm



Vacuum for nearly every lab application

Rotary Evaporation Vacuum Solutions

Do I need solvent recovery?

Solvent vapor that makes it past the condenser in the evaporator can condense in the vacuum line. For best pump performance, condensed vapors should be kept out of the pump. Solvents that are vapors under vacuum can be captured efficiently at atmospheric pressure at the diaphragm pump outlet.

Consider the MD1C+AK+EK for labs that already have a stand-alone vacuum controller, or one integrated into their evaporator. It features the same chemistry-design pump and solvent recovery as the 2mbar PC2001 VARIO™ system, but without control. Its integrated inlet catchpot and exhaust condenser prevent condensates from entering the pump and vapors from polluting the lab.



MD1C+AK+EK
Vacuum Pump
2mbar, 0.82cfm

For applications that do not require either control or solvent recovery, consider a stand alone pump such as the MD1C. It provides superior flow rates at working vacuum to competitive pumps, with a significantly lower price and very small footprint. Integrated gas ballast provides high condensate tolerance. The MD1C is also preferred by customers who address vacuum control and solvent recovery through other methods.



MD1C
Vacuum Pump
2mbar, 0.82cfm

What about larger or multiple rotary evaporators?

BrandTech and VACUUBRAND offer the most comprehensive line of chemistry-design diaphragm vacuum pumps, including models that can operate rotary evaporators up to 100 liters or larger, with or without integrated VARIO™ adaptive control. We also offer systems that will run two different evaporation applications simultaneously without interference! Still not sure? Contact BrandTech Scientific for more information.

Not sure what pump is right for your needs?

See our Vacuum Pump Selection Guide software on page 69.

ORDERING INFORMATION

Model	Controller(s)	Solvent Recovery	Ultimate Vacuum		FlowRate at 60Hz		Cat. No.	2007 List Price
			mbar	torr	cfm	lpm		
Oil-Free Diaphragm Vacuum Pumps								
MZ2C	No	No	9	~ 6.8	1.2	35	696244	\$2,280.00
MZ2C+2AK	No	Yes	9	~ 6.8	1.2	35	688019	2,070.00
MD1C	No	No	2	1.5	0.88	25	696613	2,695.00
MD1C+AK+EK	No	Yes	2	1.5	0.88	25	696633	3,700.00
MD4C	No	No	2	1.5	2.1	58	696293	5,091.00
Oil-Free Single Application Vacuum Systems								
PC101	1 Manual	Yes	9	6.8	1.2	35	688105	3,180.00
PC510	1 Electronic	Yes	9	6.8	1.2	35	688001	5,440.00
PC301	1 Manual	Yes	2	1.5	0.88	25	688111	4,950.00
PC201	1 Manual	Yes	2	1.5	2.1	58	688119	5,780.00
PC610	1 Electronic	Yes	2	1.5	2.1	58	688010	8,510.00
Oil-Free VARIO™ Adaptive Single Application Vacuum Systems								
PC2001 VARIO, 120V, 50/60Hz	Adaptive	Yes	2	1.5	0.94	27	696643	6,790.00
PC2002 VARIO, 120V, 50/60Hz	Adaptive	Yes	9	6.8	1.5	42	683423	6,660.00
PC2003 VARIO, 120V, 50/60Hz	Adaptive	Yes	6x10 ⁻¹	4.5x10 ⁻¹	1.5	42	683443	10,060.00
PC2004 VARIO, 120V, 50/60Hz	Adaptive	Yes	2	1.5	2.2	63	683428	9,170.00

*All pumps 120V, 60Hz unless noted

Centrifugal Concentration Vacuum Solutions

Vacuum for nearly every lab application

Centrifugal Concentration Vacuum Solutions

The high performance and convenience of VACUUBRAND® pumps and systems makes them an excellent choice for most centrifugal concentration applications. VACUUBRAND® offers a wide variety of pumps for excellent, reproducible results. When selecting the best pump for your lab, consider the following issues.

How much vacuum do I need?

Centrifugal concentration generally requires greater pump capacity than other evaporative applications because it is usually performed at room temperature. Fortunately, VACUUBRAND® diaphragm pumps are available with enough power to evaporate at room temperature solvents with boiling points as high as that of DMF.

The performance demands of most tabletop concentrators are often well served with one of VACUUBRAND's 2mbar vacuum pumps, the MD1C or MD4C. Both of these pumps are powerful enough to evaporate DMF. Select the MD1C for supporting smaller concentrators and the MD4C with its higher flow rate for larger benchtop concentrators.

For very high boiling point solvents at room temperature such as DMSO or ethylene glycol, rotary vane technology may be required. We suggest the unique RC6 Chemistry-HYBRID pump for deeper vacuum with maximum convenience.

Do I need solvent recovery?

Large centrifugal concentrators often come with cold traps, reducing the need for integrated solvent recovery with the pump. Concentrators without cold traps should have solvent recovery integrated with the pump to prevent pump contamination and pollution of the laboratory.

When using a small concentrator without a cold trap, choose the MD1C+AK+EK. It provides excellent flow rates at working vacuum to effectively operate a smaller concentrator without a cold trap – something not possible with competitive pumps – and captures solvent vapors itself.

Are my samples prone to bumping?

When samples often bump in a centrifugal concentrator, control may be necessary to prevent cross-contamination. Depending on the volatility, flow control – as in our PC101 or PC201—may be sufficient. For more volatile solvents, use our VARIO™ systems that adjust vacuum levels automatically.

What about larger concentrators?

Recently there have been several “mega” sized concentrators developed for combinatorial chemistry and the drug discovery marketplace. Please contact BrandTech Scientific for assistance in selecting the best pump for these applications.

ORDERING INFORMATION

Model	Controller(s)	Solvent Recovery	Ultimate Vacuum		FlowRate at 60Hz		Cat. No.	2007
			mbar	torr	cfm	lpm		List Price
Oil-Free Diaphragm Vacuum Pumps								
MD1C	No	No	2	1.5	0.88	25	696613	\$2,695.00
MD1C+AK+EK	No	Yes	2	1.5	0.88	25	696633	3,700.00
MD4C	No	No	2	1.5	2.1	58	696293	5,091.00
Chemistry-HYBRID Vacuum Pumps								
RC6	No	No	2x10 ⁻³	1.5x10 ⁻³	4.1	115	698563	5,150.00
Oil-Free Single Application Vacuum Systems								
PC101	1 Manual	Yes	9	6.8	1.2	35	688105	3,180.00
PC201	1 Manual	Yes	2	1.5	2.1	58	688119	5,780.00
Oil-Free VARIO™ Adaptive Single Application Vacuum Systems								
PC2001 VARIO, 120V, 50/60Hz	Adaptive	Yes	2	1.5	0.94	27	696643	6,790.00
PC2002 VARIO, 120V, 50/60Hz	Adaptive	Yes	9	6.8	1.5	42	683423	6,660.00
PC2003 VARIO, 120V, 50/60Hz	Adaptive	Yes	6x10 ⁻¹	4.5x10 ⁻¹	1.5	42	683443	10,060.00
PC2004 VARIO, 120V, 50/60Hz	Adaptive	Yes	2	1.5	2.2	63	683428	9,710.00

*All pumps 120V, 60Hz unless noted

Vacuum for nearly every lab application

Freeze Drying Vacuum Solutions

Lyophilization is a demanding vacuum application that requires a deeper vacuum than can be achieved with diaphragm technology alone. It is usually best-served by VACUUBRAND's innovative RC6 Chemistry-HYBRID pump.

How much vacuum do I need?

Lyophilization applications typically require vacuum levels as deep as 10^{-3} mbar. Traditionally, this requirement has been provided by oil-sealed rotary vane pumps, protected by a dry ice or liquid nitrogen cold trap.

To help users combat the high costs and contamination of rotary vane pumps, VACUUBRAND developed the new RC6 Chemistry-HYBRID pump. The RC6 combines a rotary vane pump for vacuum capacity with a chemistry-design diaphragm pump that continuously distills solvents from the pump oil. This design reduces oil changes and maintenance costs by up to 90 percent**. The RC6 is suitable for freeze dryers with condensers up to six liters. It is available as a pump, or integrated with an outlet condenser as the PC8/RC6.



RC6 Chemistry-HYBRID
Vacuum Pump
 4×10^{-4} mbar, 4 cfm

What about larger applications?

Freeze dryers with condensers larger than six liters will require an oil-sealed rotary vane pump. VACUUBRAND offers a full line of rotary vane pumps with the power to easily meet the demands of larger applications and the innovative design and quality assurance of VACUUBRAND pumps.



RZ16
Vacuum Pump
 2×10^{-3} mbar,

For freeze dryers between twelve and twenty-five liters, we suggest the VACUUBRAND® RZ16 rotary vane vacuum pump. For applications larger than twenty-five liters, contact BrandTech Scientific.

Rotary Vane options?

BrandTech Scientific recommends that you should "Never use an oil pump when an oil-free pump will do the job." Sometimes, however, certain applications require deeper vacuum levels than oil-free pumps can provide.

When these situations arise, consider the RC6 Chemistry-HYBRID pump or a VACUUBRAND® rotary vane vacuum pump such as the RZ2.5, RZ6, RZ9, or RZ16. These pumps feature the same high performance, innovative design, and quality assurance as VACUUBRAND's oil-free vacuum pumps and systems. See page 62 for more information.

ORDERING INFORMATION

Model	Controller(s)	Solvent Recovery	Ultimate Vacuum mbar	Ultimate Vacuum torr	FlowRate at 60Hz cfm	FlowRate at 60Hz lpm	Cat. No.	2007 List Price
Chemistry-HYBRID Pumps								
RC6	No	No	2×10^{-3}	1.4×10^{-3}	4.1	115	698563	\$5,150.00
Rotary Vane Vacuum Pumps								
RZ2.5	No	No	5×10^{-3}	3.8×10^{-3}	1.65	47	698123	1,770.00
RZ6	No	No	2×10^{-3}	1.5×10^{-3}	4.0	113	698133	2,110.00
RZ9	No	No	2×10^{-3}	1.5×10^{-3}	6.0	165	698143	2,995.00
RZ16, 230V, 50/60Hz	No	No	2×10^{-3}	1.5×10^{-3}	11.2	318	698050	3,570.00

*All pumps 120V, 60Hz unless noted

**The RC6 Chemistry-HYBRID pump, like other oil-sealed pumps, should always be operated with a cold trap.

Aluminum-FKM Diaphragm

VACUUBRAND® Aluminum-FKM (e.g., Viton®) vacuum pumps are intended specifically for non-corrosive, non-evaporative applications. They are excellent for laboratory and process-plant applications including gas transfer, backing Turbopumps, and vacuum filtration. All wetted parts of these pumps are made of aluminum, FKM, and polyethylene. Aluminum-FKM pumps should not be used with organic solvents, corrosives, or vapors inconsistent with the materials of construction.

- **Eliminates Oil Changes:** These pumps utilize diaphragm vacuum technology for totally dry operation. There is no oil to change or monitor!
- **Reduces Maintenance:** Diaphragms withstand up to 10,000 to 15,000 hours of use before replacement – that's years in most applications, minimizing downtime and service costs. When it is finally time for service, their unique design eliminates tedious, trial-and-error stroke length recalibration.
- **Improves Productivity:** These pumps feature specially engineered pump heads for high flow rates at working vacuum. Higher flow rates mean reduced process times and higher throughput.
- **Ensures Reliable Use:** All VACUUBRAND® pumps and systems must pass rigorous product testing before leaving the factory. It's your assurance of a reliable pump.



*Model ME2 Vacuum Pump
80mbar, 1.3cfm*

Powerful, Reliable, Vacuum Generation from VACUUBRAND®.



Vacuum Pumps

Quiet Operation

Aluminum-FKM pumps operate very quietly, at about the same volume as a conversation.



Model MD12 Vacuum Pump
2mbar, 6.1cfm

Excellent Durability

BrandTech Scientific's Aluminum-FKM pumps from VACUUBRAND® typically have service intervals up to 10,000 – 15,000 hours (that's years in most applications). Most service can be done in the lab in a matter of minutes.

FKM Double Diaphragm

FKM double planar diaphragm for high performance and increased reliability.

Broad Product Range

Vacuum as deep as 0.6mbar with flow rates as high as 215lpm!

ORDERING INFORMATION

Model	Ultimate Vacuum		FlowRate at 60Hz		Cat. No.	2007 List Price
	mbar	torr	cfm	lpm		
Aluminum-FKM Diaphragm Vacuum Pumps for non-corrosive applications						
ME2	< 80	< 60	1.3	37	696123	\$1,150.00
ME4	< 80	< 60	2.4	67	696143	1,620.00
ME8	< 80	< 60	4.6	130	696183	2,990.00
ME16	< 80	< 60	7.6	215	696426	5,650.00
MZ2	9	~ 6.8	1.3	37	696243	1,620.00
MD1	1.5	1.1	0.82	23	696073	1,810.00
MD4	1.5	1.1	2.2	63	696291	3,354.00
MD12	2	1.5	6.1	173	710003	5,490.00
MV2	6x10 ⁻¹	4.5x10 ⁻¹	1.3	37	696351	3,640.00
MV10	6x10 ⁻¹	4.5x10 ⁻¹	5.2	147	710053	5,850.00

Vacuum Gauges & Controls

VACUUBRAND® vacuum gauges and controllers enable you to monitor and control vacuum generation for most laboratory vacuum applications. Gauges are compatible with most laboratory vacuum pumps and house vacuum, and feature both analog and digital displays. They help to rid laboratories of toxic, harmful mercury by replacing McLeod gauges and other manometers.

- **Meets the Requirements of Most Vacuum Applications:** VACUUBRAND® vacuum gauges cover the range from atmospheric pressure to 1×10^{-3} torr/mbar/hPa. They are easy to read and feature a digital readout and analog indicator to simplify both data recording and trend-monitoring.
- **Rugged Operation:** Gauges and controllers are manufactured without fragile springs or glass tubes and feature corrosion-resistant transducers to ensure rugged, reliable operation.
- **Displays Results in Your Units:** Vacuum gauges provide results in millibar, torr, or hectoPascal. The CVC2^{II} vacuum controller can be used in torr, mbar, or hPa.
- **Provides Complete Process Control:** The CVC2^{II} vacuum controller, in conjunction with a 24V solenoid valve, provides two-point vacuum control in the range from atmospheric pressure to 1mbar/torr/hPa. It allows easy adjustment of vacuum setpoints as well as both automatic and manual hysteresis programming.



Model DVR2 Vacuum Gauge

Mercury-free, Digital/Analog Vacuum Instruments.



Vacuum Gauges & Controllers



Model DVR2 Vacuum Gauge



Model DVR5 Vacuum Gauge



Model VAP5 Vacuum Gauge



Model CVC2^{II} Vacuum Controller

DVR2 Vacuum Gauge

Eliminate fragile glass and mercury and inaccurate, corrosion-prone dial gauges in your lab! Analog and digital display for easy monitoring of most lab applications. A transducer of corrosion-resistant ceramic for durability measures absolute pressures from atmosphere to 1 mbar/torr/hPa with user-selectable units. Battery power with adjustable sleep timer for long battery life.

DVR5 Vacuum Gauge

Accurate, mercury-free absolute pressure measurement into the fine vacuum range! A direct measuring capacitance gauge with ceramic transducer and innovative electronics that measures from atmosphere to 0.1 mbar/torr/hPa with user-selectable units. Both analog and digital displays for precise monitoring and trend indication. Equipped with an RS232 interface for process validation.

VAP5 Gauge

A mercury-free gauge that measures throughout the fine vacuum range! The VAP5 uses the Pirani principle of thermal conductivity to provide reproducible measurement from atmospheric pressure to 10^{-3} mbar/torr/hPa. Replaces fragile, toxic McLeod gauges for freeze-drying and other applications. Analog and digital display. Separate gauge head allows convenient display placement.

CVC2^{II} Vacuum Controller

An easy-to-use vacuum controller for use with rotary evaporators or other applications. Compatible with all diaphragm pumps. Controls from atmospheric pressure to 1 mbar/torr/hPa in conjunction with 24V solenoid valve (VV6C, #674091). Manual or semi-automatic adjustment, with automatic hysteresis with override. Integrated vent valve. Standard on PC5xx and PC6xx systems.

Vacuum Gauge & Vacuum Controller Specifications

		DVR2 Vacuum Gauge	DVR5 Vacuum Gauge	VAP5 Vacuum Gauge	CVC2 ^{II} VacuumController
Measuring Range*:	mbar	1–1080	0.1–1100	1×10^{-3} –1000	1–1300
	torr	1–812	0.1–825	1×10^{-3} –750	1–975
	hPa	1–1080	0.1–1100	1×10^{-3} –1000	1–1300
Accuracy:		< +/- 1 mbar (0.75 Torr) +/- 1 digit	< +/- 1 mbar (0.75 Torr) +/- 1 digit	± 10% of indicated value from 10^{-2} to 100mbar.	± 0.5% of range

ORDERING INFORMATION

Model	2007 Cat. No.	List Price
DVR2 Vacuum Gauge, battery (9V, Lithium) operated	682902	\$754.00
DVR5 Vacuum Gauge, 100–120V, 50–60Hz	682913	1,380.00
VAP5 Vacuum Gauge, 100–120V, 50–60Hz	682859	1,325.00
Bourdon (dial) vacuum gauge for use with Synchro systems	677100	255.00
CVC2 ^{II} Vacuum Controller, 100–120V, 50–60Hz (requires VV6C solenoid valve below)	683153	1,825.00
VV6C Solenoid Valve	674091	730.00

* Do not exceed atmospheric pressure.