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The VARIO® Chemistry-pumping units with adaptive vacuum control

SELF-OPTIMIZING VACUUM FOR
PRODUCTIVITY AND EFFICIENCY

vacuubrand

Technology for Vacuum Systems

OPTIMIZE LABORATORY PROCESSES WITH VACUUBRAND VARIO® TECHNOLOGY

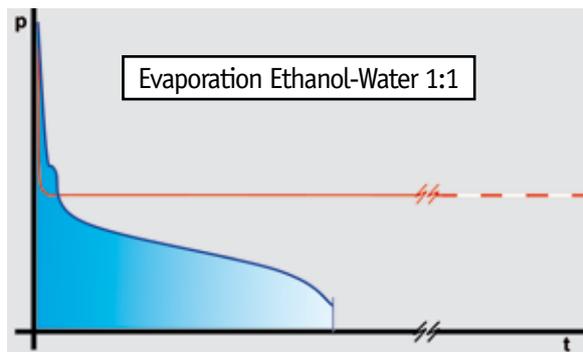
Vacuum applications in many laboratory and industrial processes benefit from electronically control by:

- avoiding sample loss by foaming and boiling over
- reducing process times for distillation and evaporation processes
- improving reproducibility in drying, reaction and evaporation processes
- reducing operating time with continuous, automated optimization
- protecting the environment by capturing waste solvent vapors

VARIO® controller provides fully automatic evaporation without parameter programming!

VARIO®-diaphragm pumps and chemistry pumping units optimize the vacuum automatically and accurately by adjusting the speed of the diaphragm pump. The CVC 3000 vacuum controller in the VARIO® pumping units detects the boiling pressure and responds automatically to provide the optimum vacuum conditions.

Fully automatic processing by the adaptive VARIO® control

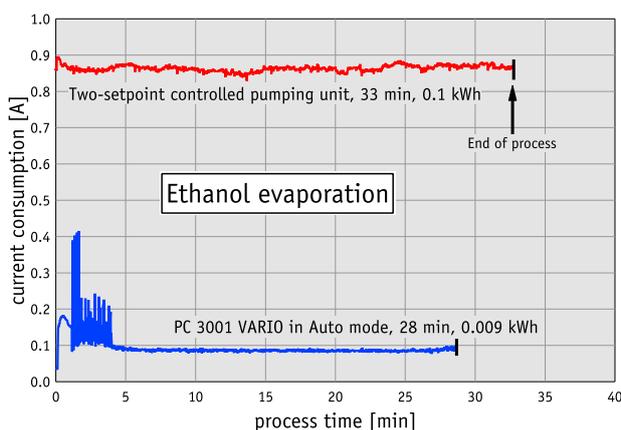


- Competitive unit in automatic mode - holds at first boiling point; evaporation stops because vacuum does not adapt to additional boiling points
- VACUUBRAND VARIO®-Control - Complete distillation within shortest process time by adaptive boiling pressure-control

Unlike some competitive pumping units, which detect the first boiling point and then hold the vacuum at that level, VACUUBRAND VARIO® control detects each boiling point and continuously adapts to optimize vacuum conditions even in complex mixtures!

- eliminates continuous oversight and manual readjustment, allowing you to focus on other research work
- avoids sample loss by eliminating bumping and foaming
- waste vapor recovery rates near 100% keep lab air clean and protect the environment
- maintenance of optimal vapor pressures even in complex mixtures reduces process times by as much as 30% compared with two-point vacuum control

Up to 90% energy savings by VARIO® control



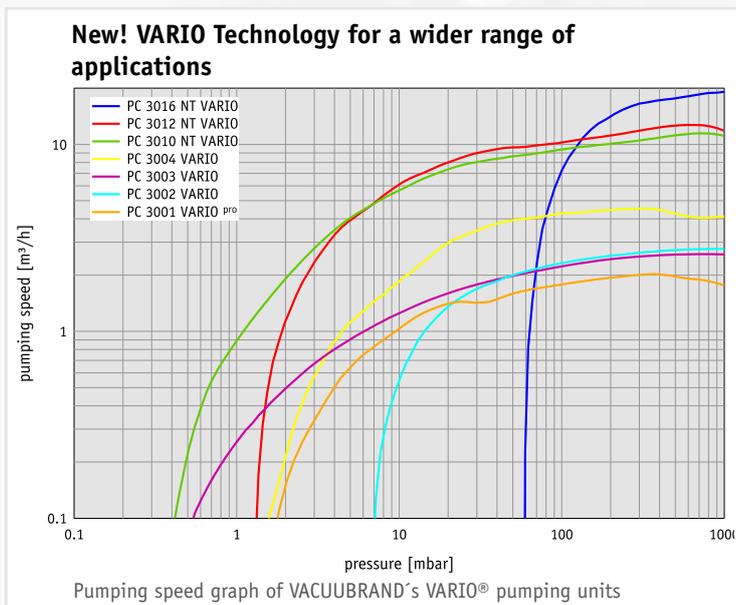
Two-point control vs. VARIO® control

In a conventional two-point control with solenoid valve, the vacuum pump runs continuously at 100% speed, opening and closing the valve as needed to achieve programmed vacuum levels. With the VACUUBRAND VARIO® control, the speed of the pump is adjusted automatically to the vacuum requirements of the process.

- this reduces power consumption and energy costs by up to 90%
- lower speeds and so fewer strokes per minute lead to significantly extended service intervals

ADVANTAGEOUS FOR MANY APPLICATIONS FROM LABORATORY TO MINI-PLANT

VACUUBRAND offers the VARIO® chemistry diaphragm pump technology for a wide range of operations. Models with pumping speeds ranging from 2 m³/h to nearly 20 m³/h support applications from individual laboratory applications such as rotary evaporators, to multi-user lab vacuum networks, to replacement of rotary vane pumps in kilo labs and pilot plants. Depending on the pump version the reachable ultimate vacuum is between 70 mbar and even up to 0.6 mbar. Select the pumping unit that's right for evaporation of your low- or high-boiling-point solvents at gentle temperatures.



VACUUBRAND WITH SAFETY

All of our VARIO® pumping units, and most of our other diaphragm pumps, as well, have no ignition sources in the internal, wetted area and are approved according to ATEX category 3. This means our pumps offer a high level of security in locations in which explosive mixtures might occur "infrequently" in a neutral environment. In installations in hazardous areas characterized by the "occasional" pumping of explosive mixtures, we continue to offer the special, ATEX-approved pumps. Thus, VACUUBRAND products are also the safety leader in lab vacuum.



You focus on your research work...

...while the PC 3001 VARIO^{pro} takes care of the evaporation!

- automatically optimizing conditions
- without operator intervention
- and with reduced process times

All while reducing emissions and saving energy.

THE PC 3001 VARIO^{PRO}

OUR BEST SELLER - NOW EVEN MORE POWERFUL!

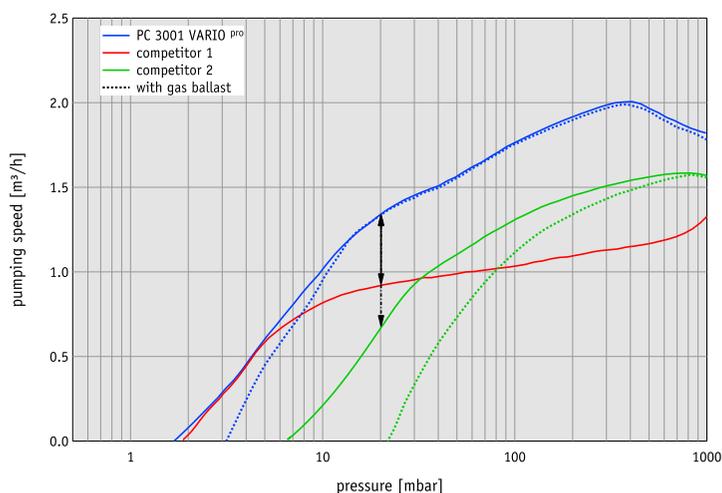
- Our most successful vacuum pumping unit is the PC 3001 VARIO. With the new PC 3001 VARIO^{PRO} model, we give this popular pumping unit even higher performance, thus expanding the range of applications. The pumping speed was increased by almost 20% to 2.0 m³/h. The PC 3001 VARIO^{PRO} gets the lab work done even faster, and supports larger processes.

The new PC 3001 VARIO^{PRO} maintains all of the performance features that made the PC 3001 VARIO pumping unit so popular:

- the fully automatic VARIO[®] adaptive processing, which lets you focus on research, not pump control
- whisper-quiet operation, for a pleasant working environment
- a small footprint and low weight for convenient operation, even in busy laboratories
- sophisticated vapor capture accessories, for efficient, near-100% capture of residual solvent vapors
- excellent ultimate vacuum, even with the gas ballast (purge) valve open continuously. This ensures the highest performance in applications with large volumes of readily condensable solvent vapors.



Up to 100% more pumping speed than competitive pumping units with speed control



Comparing pumping speed of PC 3001 VARIO^{PRO} and pumps of competitors

The PC 3001 VARIO^{PRO} at a working pressure of 20 mbar provides:

- about 50% more suction than competitor 1
- about 100% more pumping speed than competitor 2

Provides significantly better ultimate vacuum with open gas ballast (continuous purge) valve - important for stable pumping performance with condensable solvent vapors:

- Competitor 1 offers no gas ballast (purge) valve
- Competitor 2 can't reach 20 mbar with an open gas ballast valve



TECHNICAL DATA	PC 3001 VARIO ^{pro}	PC 3002 VARIO	PC 3003 VARIO	PC 3004 VARIO	PC 3010 NT VARIO	PC 3012 NT VARIO	PC 3016 NT VARIO
Vacuum controller	CVC 3000	CVC 3000	CVC 3000	CVC 3000	CVC 3000	CVC 3000	CVC 3000
Number of heads / stages	4 / 3	2 / 2	4 / 4	4 / 3	8 / 4	8 / 3	8 / 1
Max. pumping speed	m ³ /h 2.0	2.8	2.8	4.6	11.6	12.9	19.3
Ultimate vacuum (abs.)	mbar 2	7	0.6	1.5	0.6	1.5	70
Ultim. vac. (abs.) with gas ballast	mbar 4	12	2	3	1.2	3	100
Max. back pressure (abs.)	bar 1.1	1.1	1.1	1.1	1.1	1.1	1.1
Inlet connection	Hose nozzle DN 6/10 mm	Hose nozzle DN 10 mm	Hose nozzle DN 10 mm	Hose nozzle DN 10 mm	Small flange KF DN 25	Small flange KF DN 25	Small flange KF DN 25
Outlet connection	Hose nozzle DN 10 mm	Hose nozzle DN 10 mm	Hose nozzle DN 10 mm	Hose nozzle DN 10 mm	Hose nozzle DN 10 mm	Hose nozzle DN 15 mm/10 mm	Hose nozzle DN 10 mm
Coolant connection	2 x hose nozzle DN 6-8 mm	2 x hose nozzle DN 6-8 mm	2 x hose nozzle DN 6-8 mm	2 x hose nozzle DN 6-8 mm	2 x hose nozzle DN 6-8 mm	2 x hose nozzle DN 6-8 mm	2 x hose nozzle DN 6-8 mm
Max. power	kW 0.16	0.53	0.53	0.53	0.53	0.53	0.53
Degree of protection	IP 20	IP 40	IP 40				
Dimensions (L x W x H), approx.	mm 300 x 306 x 400	419 x 243 x 444	419 x 243 x 444	419 x 243 x 444	616 x 387 x 420	616 x 387 x 420	616 x 387 x 420
Weight, approx.	kg 7.7	17.4	20.6	20.6	29.7	29.7	29.7

ORDERING INFORMATION

200-230 V ~ 50-60 Hz	CEE	696700***	733500	738400	737500	744800	743800	741800
200-230 V ~ 50-60 Hz	CH,CN	696701***	733501	738401	737501	744801	743801	*
200-230 V ~ 50-60 Hz	UK	696702***	733502	738402	737502	*	*	*
100-120 V ~ 50-60 Hz	US	696703***	733503	738403	737503	**	743803	741803

Versions, which include 230 V: ATEX: II 3G IIC T3 X, Internal Atm. only

Pumping speed measured by ISO 21360

* Country specific power cable, please order separately

** On request

*** With NRTL certification for Canada and the USA

■ Rotary evaporators / reactors

The **PC 3001 VARIO^{pro}** is ideal for vacuum applications with high boiling solvents. The hysteresis-free vacuum control prevents superheating and foaming to protect valuable process samples. The controller enables automatic detection of vapor pressure and automatic adjustment of the vacuum level to the process requirements. The new 'pro' version with improved pumping speed extends the range of use. Evacuation of larger vessels and process steps with high vapor volumes can be completed more quickly. Programmed vacuum processes can be controlled by the integrated CVC 3000 controller or using the RS232C interface to your computer. The 'TE' version of the PC 3001 VARIO^{pro} uses a dry ice condenser to provide a cooling-water-free option for vapor capture if no cooling water connection is available or water conservation is critical. The PC 3001 VARIO^{pro} with the Peltronic® emission condenser works without any cooling media. For exceptionally large amounts of vapor - like from parallel evaporators without condenser - the PC 3001 VARIO^{pro} +IK with its condenser on the vacuum side is an excellent choice.

■ Drying chambers

Vacuum drying chambers are used for drying very sensitive substances and when it is necessary to guarantee excellent residual drying. They generally need a very good ultimate vacuum depending upon the degree of drying, maximum acceptable temperature and the solvents used. At certain process parameters, there are large quantities of vapors that can only be handled with pump systems of a sufficiently large volume flow rate. Our product recommendations: **PC 3003 VARIO** or **PC 3004 VARIO**.

■ Oil-free vacuum for a kilo lab

In kilo labs and pilot plants, materials are produced in quantities of a few hundred grams to several kilograms for pharmaceutical development, safety studies and early clinical trials for new drugs. Based on their extraordinary chemical resistance, our high performance chemistry diaphragm vacuum pumps **PC 3016 VARIO**, **PC 3012 VARIO** or **PC 3010 VARIO** are perfectly suited for these applications. The pumps operate without fluids such as water or oil, and thus reduce operating and maintenance costs. Variable-speed pumping systems offer unique control advantages in these applications, and are easily integrated into process control via PC or programmable logic controller.



■ Employment in a local area network VACUU·LAN®

VACUU·LAN® vacuum networks make it possible to supply high performance vacuum to several different applications from one vacuum pump (e.g., **PC 3002 VARIO**, **PC 3003 VARIO**, **PC 3004 VARIO**). This is a money- and space-saving solution when a lot of users are working with vacuum in one laboratory and avoids the numerous drawbacks of a central ("house") vacuum supply. For the vacuum outlets at workplaces, very versatile modules are available which can be easily upgraded. All of the components are available for new laboratory furnishings or for installation in existing or renovated laboratories. The modules are very resistant to chemicals and have built-in check valves to ensure that adjacent applications do not contaminate or interfere with one another.