

VACUUBRAND®



## Local vacuum networks VACUU·LAN®

Vacuum supply for multiple workstations in the laboratory:  
powerful, efficient, safe, modular.

[www.vacuubrand.com](http://www.vacuubrand.com)

A future-proof solution for new laboratory buildings and renovations

# Laboratory-specific requirements



Every laboratory has its own goals and constraints. Modular vacuum systems, tailored to the specific laboratory type and user needs, can improve performance, safety, and efficiency. If these requirements are considered early on by laboratory planners, architects, and furniture manufacturers, an optimally designed vacuum supply becomes a key factor for success.

## Research laboratory

- High demands on different work techniques
- Modular design and precise vacuum control down to 2 mbar for high-boiling solvents

## Practical laboratory

- Numerous consistent working techniques
- Efficient and stable vacuum with low energy consumption



## Industrial laboratory

- Consistent work techniques
- Space- and time-saving vacuum supply with high-performance pumps
- Precise vacuum control

## Cell biology laboratory

- Safe vacuum with disinfection options and prevention of cross-contamination
- Precise vacuum control even at 200 - 400 mbar

# Typical vacuum systems

## Overview

There are various solutions for vacuum supply in the laboratory. The right choice depends on your specific requirements. Let's look at the three most common systems:

- Local vacuum supply VACUU-LAN® as the optimal balance – several workstations share a local pump in close proximity.
- Single workstation supply with individual pumps directly at the workplace.
- Central vacuum supply via a building-wide system with long pipelines.

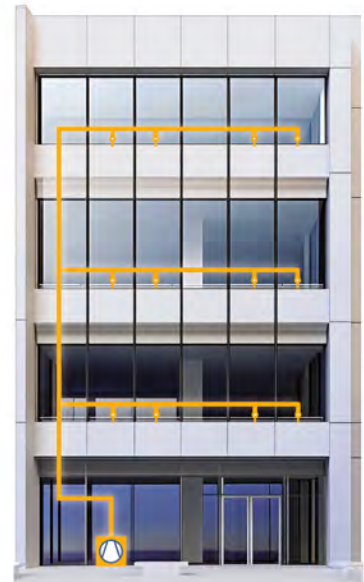
Local vacuum supply



Single workstation vacuum supply



Central vacuum supply



Vacuum supply options in the laboratory

# Typical vacuum systems in the laboratory

## Comparing alternatives



### Vacuum network VACUU·LAN® – efficient and modular

While a single workstation solution offers optimal performance including automation, and a central vacuum system may be suitable for large-scale facilities, a local vacuum network represents the ideal balance between performance, efficiency, safety, and flexibility for many laboratories. In this setup, one vacuum pump supplies several workstations in a room or area with vacuum, thereby saving costs and space. The individual connections are secured by integrated check valves. In addition, maintenance effort, energy consumption, and noise emissions are reduced, as significantly fewer pumps are required.

A laboratory can use multiple local vacuum networks, e.g. for distillations, filtrations, or rotary evaporation, each operating several processes simultaneously yet safely with a single pump.

Two options are available for precise electronic vacuum control: This can be done via an integrated controller on the network pump in VACUU·LAN mode. Alternatively, even more precise control is possible directly at the workstation via an additional controller with two-point control.

### Single workstation supply – individual

If each workstation is equipped with its own vacuum pump, the vacuum can be precisely tailored to the respective application. Speed-controlled VARIO® pumps can also be integrated into automation systems.

Single workstation supply offers the benefit of maximum flexibility, but does typically come with higher acquisition

and operating costs. In addition, it may need more frequent maintenance effort increases and more space is required – which may be an important factor, especially in confined laboratory spaces. The vacuum pump is usually placed on the bench next to the application or in a base cabinet.

### Central vacuum supply – building-wide

An extensive piping system runs throughout the entire building. This is typically over-sized, because the piping is not specifically installed where vacuum is actually needed at the workstations. The result can be an over-specified system with high investment and energy costs. In addition,

the commonly used metal pipes usually are not chemically resistant and do not achieve ideal vacuum levels of down to 2 mbar. Furthermore, mutual interference and contamination from backflowing gases are difficult to avoid. Also, subsequent expansions are often complex and costly.

# Local vacuum networks VACUU·LAN®

## Tailor-made and future-proof

VACUU·LAN® combines performance, efficiency, safety, and modularity in a modular system – consisting entirely of chemically resistant components: vacuum pump, piping, outlets, and vacuum controller.

This system can be seamlessly integrated into new and existing laboratory infrastructures, saving time, costs, and resources in the long term. The proven system has been replacing central vacuum systems and water jet pumps around the world for decades.

In times of rising energy costs and growing environmental awareness, VACUU·LAN® sets new standards for sustainable laboratory management. Demand-based vacuum control not only reduces energy consumption but also significantly extends the lifespan of the components.

VACUU·LAN® supports versatile applications such as fluid aspiration, filtration, evaporation, and distillation. Thanks to its adaptability, it represents a future-proof investment that grows with the evolving needs of your laboratory.



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"VACUU·LAN is one of the many success stories of our university modernization. The decentralized vacuum network runs efficiently and flawlessly for all our processes."  
(Dr. Valentin Köhler, Research Associate at the University of Basel)

# Local vacuum networks VACUU·LAN®

## Benefits at a glance

### Powerful

- Ultimate vacuum down to 2 mbar – even lower with optimal system design
- One vacuum pump for multiple applications
- Individual pumping speed and vacuum for each workstation (only in combination with workstation controller)
- Low-maintenance and durable

### Safe

- Stable and precise vacuum for each workstation
- High chemical resistance through fluoropolymers and perfluoroelastomers
- Check valves to prevent cross-contamination
- Access control in the network via user management on the vacuum controller of the pump
- Oil-free technology to avoid contamination risks
- High process safety



### Efficient

- Reduced acquisition, maintenance, and energy costs
- Optimized energy efficiency through demand-based vacuum supply
- Space savings and noise reduction
- Efficient solvent recovery
- Sustainable laboratory equipment
- Automatic standby mode instead of continuous operation when no vacuum is required (only in combination with VARIO® pumps)

### Modular

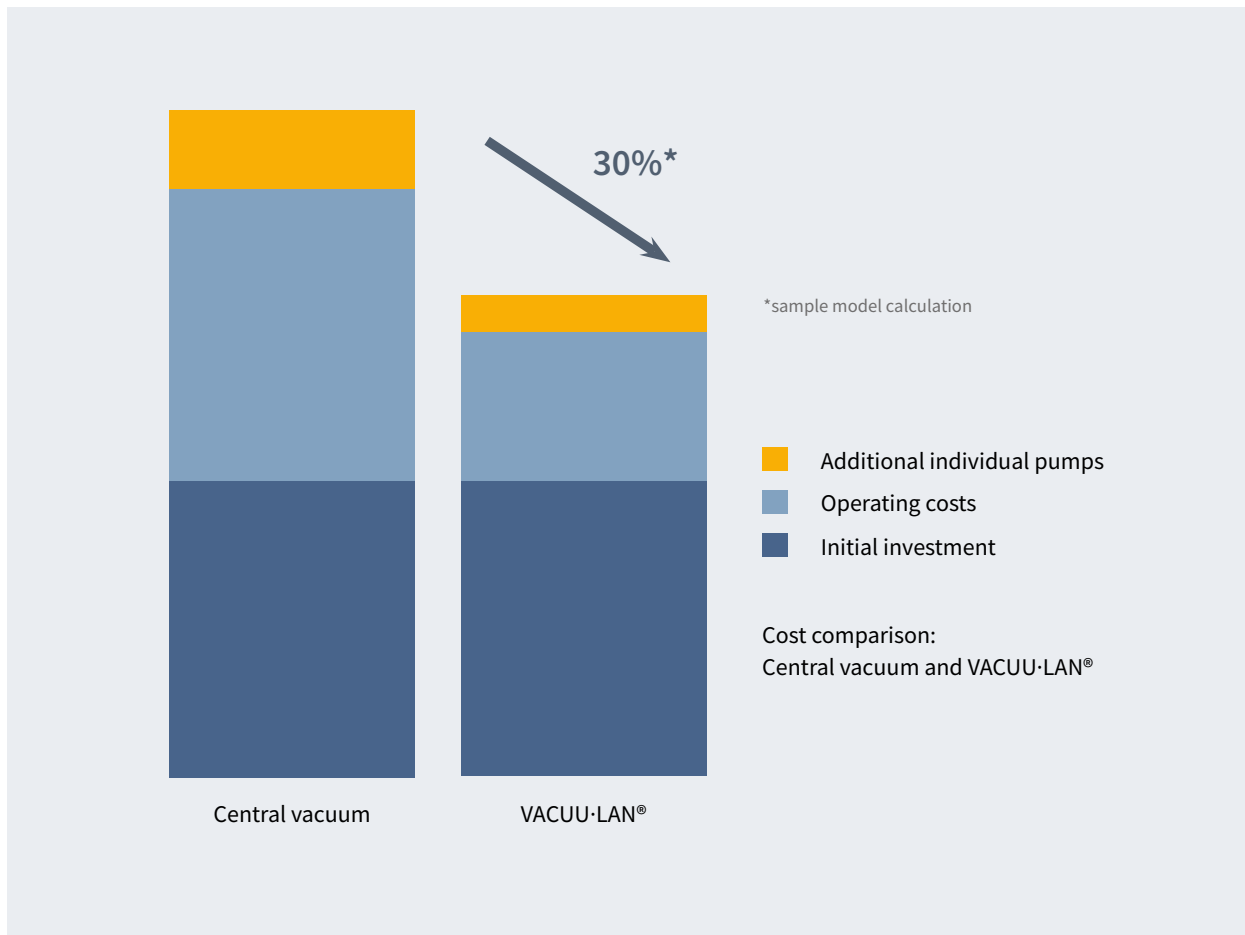
- Wide selection of components for individual requirements
- Easy expandability
- Integration into new and existing laboratory facilities (surface or concealed wall mounting)
- Digital workstation controller for regulated vacuum outlet (integrated into laboratory furniture)
- Adaptable to changing laboratory tasks

# Local vacuum networks VACUU·LAN®

## Optimized total cost of ownership

How can you reduce the total cost of ownership of your laboratory vacuum supply in the long term? Our sample calculation (fig. below) shows it clearly: Overall, VACUU·LAN® networks are overall approximately 30% more cost-effective than central vacuum systems. An exact calculation of the figures may lead to different values depending on the region. Compare the options and find out how VACUU·LAN® helps you use your resources wisely.

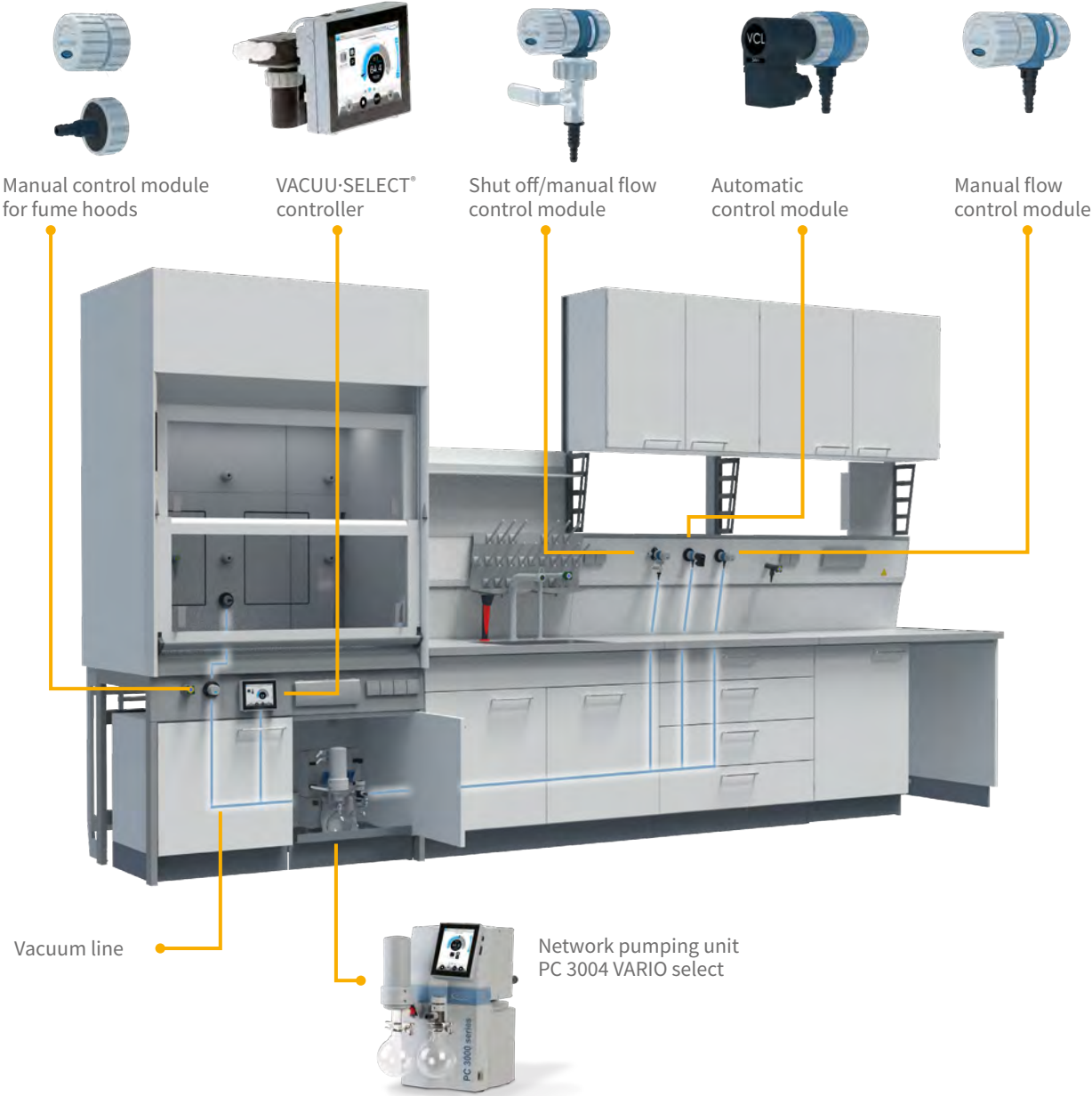
While the initial investment is comparable, the decisive advantages arise in ongoing operating costs – through efficient energy consumption, reduced maintenance expenses, and demand-based operation. Especially in times of rising energy prices, this difference becomes increasingly significant.



Customer example of reduced energy costs

# Selection of VACUU·LAN® components

Overview based on a laboratory bench



See VACUU·LAN in action

# Selection of VACUU·LAN® components

## Local network vacuum pumps



As the heart of our classic VACUU·LAN® systems, we use oil-free chemistry diaphragm pumps. These network pumps support multiple applications and users with an ultimate vacuum down to 2 mbar (even lower with optimal system design). They can be installed seamlessly and space-savingly in laboratory or fume hood base cabinets. On request, smaller networks down to  $10^{-3}$  mbar are also available with other pump technologies.

### Chemistry diaphragm pumps:

- Oil-free technology for lower operating costs and avoidance of contamination risks
- Excellent chemical resistance thanks to fluoropolymer and perfluoroelastomer materials against aggressive chemicals and solvents
- Environmentally friendly through recommended emission condenser for recovery of solvent vapors, also available as electronic PELTRONIC version without external cooling media for simplified installation and maintenance
- Low maintenance with service intervals of typically 15,000 operating hours or more
- Whisper-quiet and low-vibration operation for a comfortable working environment

# Selection of VACUU·LAN® components

## Local network vacuum pumps

### Intelligent VARIO® pumping units with electronic vacuum control

What makes our modern VARIO® pumping units special? They not only feature a separator (AK) for protection against particles and condensates and an emission condenser (EK) for recovery of solvent vapors, but also a speed-controlled chemistry diaphragm pump. This means that the motor speed is automatically adjusted to the amount of gas and vapor produced. This way, the pump generates precise vacuum and only runs when needed. Control is provided by a network controller such as the VACUU·SELECT with touch display. This can be flexibly installed separately from the pumping unit in laboratory furniture and connected via VACUU·BUS® cable.

- Automatic adjustment of network vacuum via speed-controlled pump as well as cooling water or Peltronic® according to actual demand
- Energy savings of up to 90% and sustainable operation through demand-based vacuum control
- Increased lifespan of diaphragms and valves as well as reduced total running time thanks to speed reduction at ultimate pressure and standby function
- Special life science mode with vacuum lower limit



Vacuum control explained in detail

# Selection of VACUU·LAN® components

## Local network vacuum pumps

### VACUU·LAN® mode for VARIO® pumping units

- Tailor-made adaptation to vacuum networks
- In the life science sector, also to avoid excessively deep vacuum, e.g. during liquid aspiration or filtration
- Optimized for reduced energy consumption and extended pump service life
- Automatic standby mode instead of continuous operation when no vacuum is required

### Recommended network pumps

For your VACUU·LAN® network, we offer a range of powerful chemistry diaphragm pumps that are optimally matched to the size and requirements of your laboratory. Make your choice based on your specific application depending on the vacuum range down to 2 mbar in the network and pumping speed up to 20 m<sup>3</sup>/h. Planning tip: The ideal vacuum supply is 1 m<sup>3</sup>/h per outlet and at least 0.5 m<sup>3</sup>/h.

#### Examples of network pumps:

##### PC 3002 VARIO select

- For small networks with few outlets
- Meets vacuum requirements for most solvents

##### PC 3004 VARIO select

- For small and medium-sized networks
- Also meets vacuum requirements for high-boiling solvents

##### PC 3012 NT VARIO select

- For large networks with up to 30 outlets
- Also meets vacuum requirements for high-boiling solvents



# Selection of VACUU·LAN® components

## Chemically resistant modules and piping

### Modular installation

- Installation in existing laboratory environments (front-side wall mounting) or integration into new laboratory furniture
- Subsequent expansion through well-designed modular system

### Modules for your needs

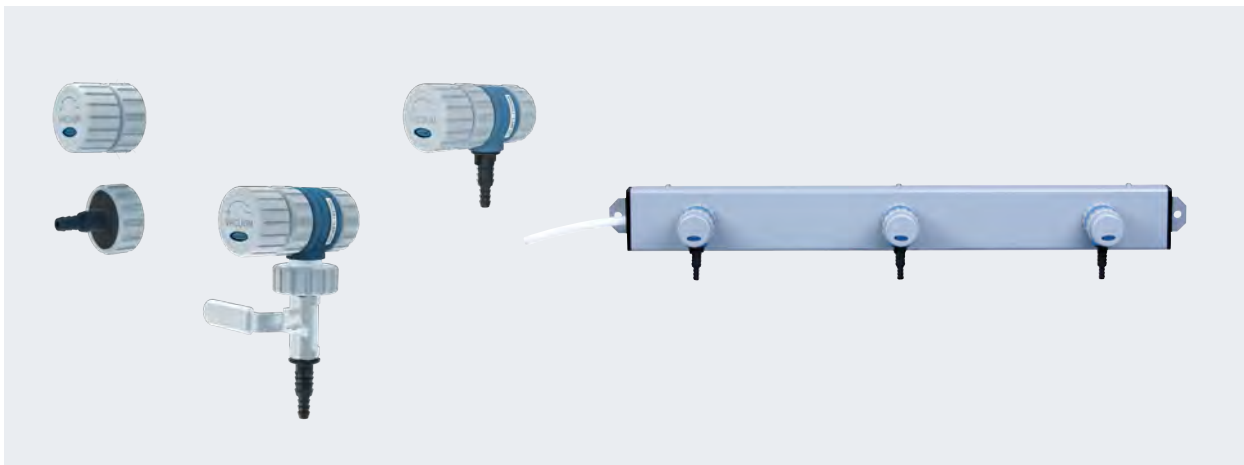
- Chemically resistant modules for vacuum extraction and control
- Individual operating function for each workstation
- Choice between manual and electronic control
- Integrated check valves for protection against cross-contamination
- Easy-to-clean surfaces
- Upgrade option for growing requirements

### Reliable vacuum line

- Chemically resistant PTFE tubing (10 mm outer/8 mm inner diameter)
- Flexible and easy installation front-side or integrated
- Secure connection through well-sealing elbow and T-fittings
- Quick assembly of the vacuum system

### VACUU·LAN® mini network – the instant solution

- Space-saving system with three VACUU·LAN® connections for immediate readiness
- Mounting on the wall or on a laboratory stand
- Easy connection of the vacuum pump using vacuum tubing
- Equipped with manual flow control valves as standard, optionally upgradable with ball valves or electronic control
- Uncomplicated upgrade to electronic control possible
- Powerful pumps can even supply two or more mini networks simultaneously



Modules for vacuum extraction and control (left) and mini network with three pre-installed connections (right)

# Selection of VACUU·LAN® components

## Vacuum controller for the workstation



Our digital compact controller VACUU-SELECT serves as a single workstation controller for more comfort and flexibility in your daily laboratory work. It provides a regulated vacuum outlet directly at the workstation. Process-precise vacuum adjustment is achieved via two-point control using a built-in valve. VACUU-SELECT protects your samples by reducing foaming and bumping. Thanks to automatic boiling point detection, the optimal vacuum setting can be found quickly and easily, even with unknown mixtures and solvent vapor pressures.

### Intuitive operation

- Touch display in 15 languages with easy navigation
- Reliably operable, even with laboratory gloves
- Integrated contextual help function with application-specific tips

### Intelligent process control

- Predefined common laboratory applications
- Individual applications thanks to intuitive editor
- Time savings and reproducible processes

### Classic two-point control

- Valve control in combination with external suction line valve: The workstation controller finds boiling pressures automatically and switches to two-point operation.
- Optional possibility to control two different processes in parallel with one controller.

# Selection of VACUU·LAN® components

## Vacuum controller for the workstation

### Different controller types

The compact touchscreen controller VACUU-SELECT is highly versatile and adapts to different laboratory environments. Available as a benchtop device, and for mounting on stands, or integrated into laboratory workstations, it offers comfortable, intuitive operation with optimal use of space.



Compact controller  
built-in version



Compact controller  
benchtop version



Compact controller  
stand version

### Versatile

- Also available as benchtop device, on stands, or for installation in laboratory workstations
- Quick integration with standard laboratory connections

### Chemically resistant and compact

- Wetted parts in chemically resistant design for long service life
- Unit comprising ceramic vacuum sensor, venting valve (also for inert gas), check valve, and suction line valve

# Selection of VACUU·LAN® components

## Vacuum controller for the workstation



### Practical function extensions

The VACUU-SELECT vacuum controller offers unique extensions that go beyond standard functions and make your daily laboratory work more effective and comfortable.

#### User management

- Flexible rights assignment per user for individual requirements
- Ensuring consistent process parameters
- Tailored working environment for each user

#### SYNCHRO

- Parallel control of two processes possible with one vacuum controller (for both rough and fine vacuum)
- Simultaneous and independent operation of the processes
- Limited to two-point control



Information on function extensions  
and their activation

# Flexible network solutions

## Combination of network and single workstation solution

For your laboratory projects, we develop tailor-made vacuum concepts that optimally combine both network and single workstation solutions. We take into account your specific applications and required vacuum ranges.

## Classic VACUU·LAN® for vacuum down to 2 mbar

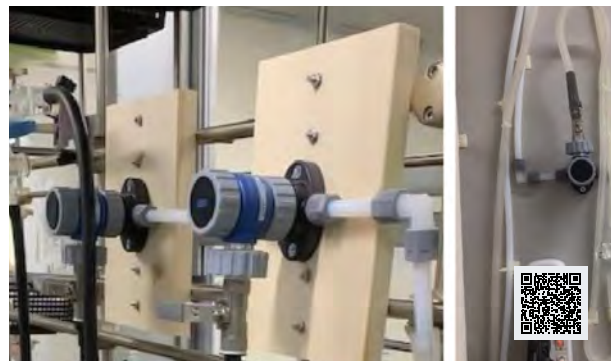
- Flexible network size – from small laboratories to extensive systems with many outlets
- Multiple independent networks – for example, separate systems for filtration processes and evaporation applications
- Proven pump technology – oil-free chemistry diaphragm pumps for reliable and low-maintenance operation
- Complementary single workstation supply – e.g. our BVC systems for precise liquid aspiration

## Specialized network solutions for vacuum down to $10^{-3}$ mbar

- Smaller network size – typically with a lower number of outlets
- Various pump technologies:
  - Oil-free chemistry screw pump VACUU·PURE®
  - Classic rotary vane pumps
  - Chemistry HYBRID pumps (corrosion-optimized combination of rotary vane pump and diaphragm pump)
- Complementary single workstation solutions – for special requirements or when no network is needed
- Piping and valves matched to industry standards for installation in laboratory fume hoods
- With SYNCHRO function, parallel control of one rough vacuum and one fine vacuum process possible with just one controller



Interview on laboratory planning at the University of Würzburg



Earthquake-proof vacuum network in Japan



Network pump for two synthesis fume hoods at the Max Planck Institute

# Comprehensive consultation



We have decades of experience as a complete provider of rough and fine vacuum solutions in the laboratory. That is why we are able to support both users and planners – from concept to installation. Close and efficient collaboration with all involved laboratory service providers is an essential part of our quality philosophy. With our highly flexible, modular vacuum solutions, we always find the right solution for you.

## Comprehensive support from concept to installation:

- Individual and software-supported consultation (CAD planning data)
- Installation service and training
- After-Sales-Support

# 10 questions for planning

At VACUUBRAND, specialists use checklists to determine the exact requirements for each project and provide detailed consultation. This assessment at an early stage of planning can save a lot of time, costs, and resources during the construction process – but also in later ongoing operation.

## 1. Which applications require vacuum?

These include processes such as filtration, solid-phase extraction, and liquid aspiration, as well as procedures with higher vacuum requirements such as distillation, evaporation, drying, and freeze-drying. Depending on the application, different solvents are used in varying quantities. All these factors influence the desired properties of the vacuum system – particularly pressure range, performance, and chemical resistance.

## 2. What are the requirements for pressure range and performance?

The various applications require either rough vacuum (down to approx. 1 mbar), e.g. for a rotary evaporator, or fine vacuum (below 1 mbar), e.g. for a Schlenk line. The required pumping speed ranges from low values to high performance of up to 20 m<sup>3</sup>/h, depending on the process.

## 3. Which vacuum control is the right one?

For simpler processes, manual control may be sufficient in some cases. To carry out sensitive processes safely and efficiently, electronic vacuum control is recommended. With VACUU-LAN, the network pump with integrated vacuum controller provides a strong vacuum for all connections, which can be limited downward via life science mode if required. Alternatively, more precise control is possible directly at the workstation via an additional controller with two-point control. For single workstation solutions, speed-controlled VARIO® pumps offer the highest precision. In combination with suitable interfaces, these are also ideally suited for integration into automation systems.

## 4. How many workstations require vacuum?

If different users are to use multiple applications in one area, this affects both the number of outlets and the required capacity of the vacuum system. Optional function extensions such as "User Management" with individual rights assignment or "SYNCHRO" for parallel operation of two processes can also be useful.

## 5. What are the requirements for the outlets?

Various modules are available for the vacuum outlets, which can also be expanded later. The module selection is based on the desired operating function – for example, manual control module, shut-off/control module, manual control module for fume hoods, or workstation controller.

## 6. Where are the outlets located?

The outlets can be planned individually. Depending on the position, the length of the piping and necessary connecting elements (corner connectors, T-connectors, extensions) are determined. In addition, integrated check valves are necessary to avoid mutual interference between workstations.

## 7. Are additional single workstation pumps required?

It is advisable to check whether the vacuum system should be designed as a combination of network and single workstation supply. In addition to network pumps that supply several workstations with vacuum simultaneously, individual workstations can then be equipped with their own pumps. This is the case, for example, with applications where automatic evaporation is required for single workstation pumps (VARIO® vacuum control with boiling point detection and adaptive vacuum tracking).

## 8. What chemical stresses must the system withstand?

With aggressive vapors or corrosive media, it must be ensured that all components – pumps, piping, modules, and controllers – have high chemical resistance.

## 9. What safety and legal requirements must be observed?

Depending on the area of application, safety standards and regulatory requirements must be met. This concerns, for example, the handling of toxic or infectious materials, solvent recovery, and exhaust air treatment. In laboratories with increased solvent use or explosive environments, the ATEX directives apply, for example.

## 10. How flexible and scalable must the system be?

Depending on whether it is a new building or renovation, integration into the laboratory furniture or open installation on the wall can be carried out. Accordingly, the selection of connection elements and vacuum lines is made. A particular advantage is that the modular vacuum system can easily be adapted or expanded to accommodate future laboratory extensions and changing requirements.



Our vacuum experts will find the optimal solution  
for your laboratory together with you.

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**VACUUBRAND®**

VACUUBRAND is part of the Brand Group, which develops, produces, and distributes high-quality and innovative laboratory equipment, vacuum pumps, and systems worldwide with approximately 1,000 employees.

With highly motivated and qualified employees, we manufacture the most comprehensive product family worldwide for vacuum generation, measurement, and control in the rough and fine vacuum range in the laboratory.

**All with one goal:**

Enabling our customers to run reliable, safe and efficient processes. This is why we commit ourselves to continuous innovation, first-class performance, and outstanding quality.

Engineering excellence is central to our ability to deliver products and solutions renowned for their quality, durability, and reliability. Innovative technology, high quality materials and extensive testing deliver unmatched performance - engineered and manufactured in Germany.

Together with you, our experts will find the best solution for your application and provide you with first-class service along the way.

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