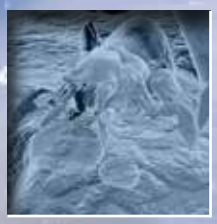
Leybold

Vacuum for Research & Development



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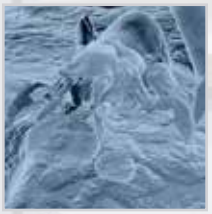
Leybold
UNIVEX 450C

Best conditions for unusual solutions

Extensive research & development often precedes great technological breakthroughs and advancements.
Our vacuum engineering specialists are able to customize solutions for you by taking advantage of our vacuum expertise and experience. We want to partner with you from the very beginning of your research and help you to meet your goals and ultimately achieve success.





Take a look into the future

Observatories high atop Mauna Kea volcano, Hawaii, at sunset.

Vacuum technology not only enables us to gaze into the future but also to peer into the distant past. Giant telescopes like the ones used at Mauna Kea Observatory in Hawaii, the Instituto de Astrofisica in the Canary Islands and the European Southern

Observatory in Chile rely on their flawless mirrors whose reflective coatings would not be possible without vacuum technology such as that provided by Leybold.

Material sciences

Material science is an interdisciplinary field which deals with the discovery and design of new materials, involving studies of its synthesis, structure, properties and performance. The research activities cover the whole range of materials including electronics, optical and magnetic materials, polymers, medical implant materials and nanomaterials like e.g. Graphene. Thus it is a main driver for the development in the fields of electronics, pharmaceutics & medicine, energy, nanotechnology and industrial production of materials in general.

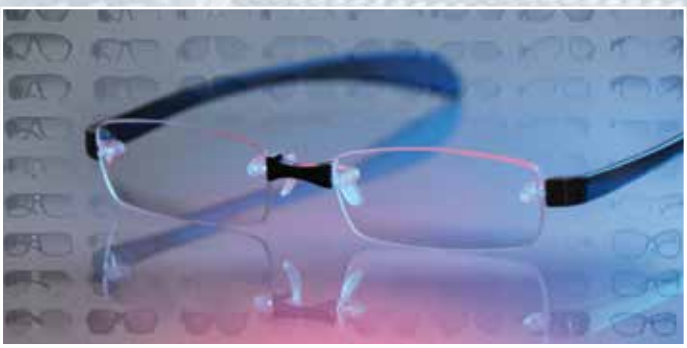
Example applications:
- Research for new coating processes
- Material research
- Nano structures
- Layer performance (thin layer technology)

Products

Modular turn-key
UHV experimentation systems

UNIVEX high vacuum multi-chamber experimentation systems

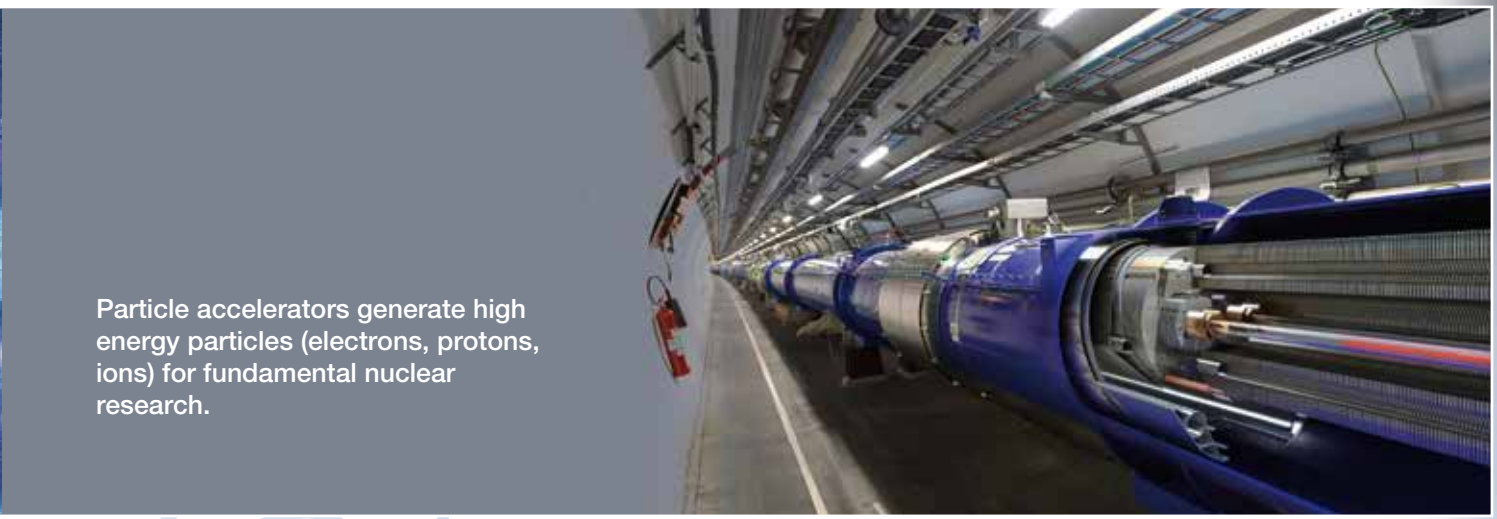
Optical coatings



Optical coatings should improve reflection or transmission properties of optical systems such as filters, lenses, eye glasses or mirrors. Typical optical coatings are a composition of various thin film layers for antireflection (e.g. eye glasses), high-reflector (e.g. filters) or transparent conductive coatings. They are produced by state-of-the-art sputtering or evaporation processes.

Products

Turbomolecular pumps
TURBOVAC MAG
with magnetic suspension
TURBOVAC i/iX
with hybrid bearing technology
Dry fore-vacuum pumps
ECODRY plus roots pumps
DRYVAC, LEYVAC screw pumps
SCROLLVAC SC / plus
scroll pumps



Particle accelerators generate high energy particles (electrons, protons, ions) for fundamental nuclear research.

High Energy Physics

In many research centers storage rings are joined to accumulate a high beam current and accelerate to higher energies. Highest energies are achieved today at the LHC ring at CERN (Geneva).

Many storage rings use the synchrotron light generated in electron storage rings as a brilliant source of radiation e.g. for material science. While linear accelerators require at least high vacuum pressures, the storage rings need ultra-high vacuum, in very large machines 10^{-11} mbar or below!

Leybold offers excellent knowledge on the material and equipment behavior in hard radiation and within strong magnetic fields. This is mandatory to generate and maintain the insulation vacuum of very large superconducting magnets and to safeguard the required leak tightness.

Products

Oil-sealed and dry compressing vacuum pumps, systems and turn-key solutions

Turbomolecular pumps **TURBOVAC** with mechanically suspended and **TURBOVAC i/iX** with hybrid bearing technology

TURBOLAB high vacuum pump systems

COOLVAC refrigerator cryo pumps

COOLPOWER cold heads for cooling cryo pumps/cryostats

TiTan™ ion pumps

SCROLLVAC SC /plus scroll pumps

ECODRY plus multi-stage roots pumps

PHOENIX helium leak detectors and systems

Precisely because space can be considered as the “home of vacuum” both its scientific exploration and technological utilization require the ability to reproduce extreme vacuum conditions on earth.

Space

Space travel, scientific and commercial satellites, extraterrestrial research such as ESA’s Rosetta mission or NASA’s mars rover Opportunity can only be successful if all involved materials, components and devices are successfully tested under high-vacuum and ultrahigh-vacuum conditions. Space simulation chambers vary in size from few liters for testing of e.g. small PCB boards up to several thousand cubic meters to prove space compatibility of complete spacecrafts. However, also terrestrial space observation often requires vacuum, e.g. for mirror coating in telescopes.

Products

COOLVAC cryo pumps
COOLPOWER cold heads

Turn-key vacuum system solutions, tailor-made to individual requirements with integrated fore-vacuum and high vacuum pumps

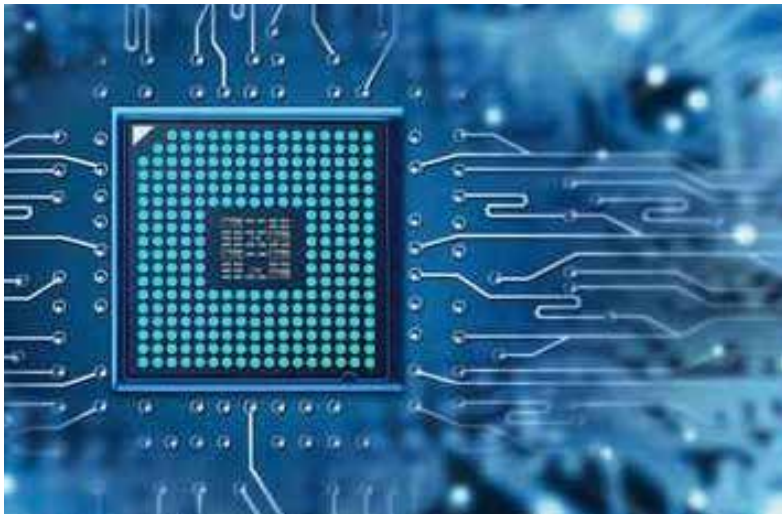
DIP oil diffusion pumps

PHOENIX helium leak detectors and systems

UNIVEX S space simulation system

Comprehensive consulting service, customer specific application support and trainings

Our modern life is pervaded by electronics – visibly and invisibly. Most of today's highly integrated circuits in computers, smart phones, cars, home automation, medical technology etc. are based on semiconductor technologies. Also the generation of renewable energy by solar panels is only possible by suitable semiconductor processes. Most of these harsh processes rely on the presence of reliable and stable vacuum conditions.



Electronics

Products

SCREWLINE and **DRYVAC**
dry compressing screw vacuum pumps

TURBOVAC MAG turbomolecular pumps with magnetic suspension

Analytics

Products

TURBOVAC turbomolecular pumps with mechanical or hybrid suspension

TURBOLAB
high vacuum pump systems

DIVAC diaphragm pumps

SCROLLVAC SC / plus
scroll pumps

ECODRY plus multi-stage roots pumps

SOGEVAC rotary vane pumps, single-stage

Vacuum measurement and control equipment

Analytical instruments today are a strong driver of product improvements. Be it mass spectrometers for water and food quality control or drug development, X-ray analysis in material quality investigation, electron microscopes in biological and semiconductor research or surface analysis in basic material science – most analytical instruments operate in high or even ultra-high vacuum regime.

Most of these instruments use turbomolecular pumps with mechanical or magnetic bearings. Quality of vacuum composition and high uptime of the vacuum system are mandatory requirements for the operation of analytic instruments.

SOGEVAC / TRIVAC
Rotary vane vacuum pumps

Effective investment, long service life.
No oil loss, low power consumption.

SOGEVAC
- Pumping speed 10 to 1,200 m^3/h
- Ultimate pressure ≤ $5 \cdot 10^{-2}$ mbar

TRIVAC
- Pumping speed 2,5 to 65 m^3/h
- Ultimate pressure ≤ $5 \cdot 10^{-4}$ mbar

DIVAC
Diaphragm pumps

Corrosion resistant vacuum pump for laboratories. Backing pumps for turbo-molecular pumps.
Environment-friendly, low operating costs.

- Pumping speed 0.8 to 4.8 m^3/h and 0.6 to 2.2 m^3/h for corrosive media
- Ultimate pressure ≤ 1 mbar
- Dry operation, oil-free
- Media contacting parts made of PTFE and PVDF

SCROLLVAC SC / plus
Oil-free scroll pumps

Dry, universal solution for quiet, low vibration operation.

Low operating cost and long maintenance intervals.

- Pumping speed 5 to 60 m^3/h
- Ultimate pressure ≤ $1 \cdot 10^{-2}$ mbar
- Robust, low-maintenance design
- High pumping speed even at 1000 mbar

ECODRY plus
Dry compressing multi-stage roots pumps

Compact vacuum pumps with low noise emission for clean applications.

- Pumping speed 40 to 65 m^3/h
- Lowest noise level in class
- Air-cooled pump
- Oil and particle-free operation

LEYVAC / SCREWLINE / DRYVAC
Dry compressing screw pumps and systems

Rugged vacuum pumps for rough applications and high process throughputs.

Smart monitoring and control system for process industry applications.

Direct connection of RUVAC Roots pumps via adapter.

LEYVAC
- Pumping speed 80 to 300 m^3/h

SCREWLINE
- Pumping speed 250 and 630 m^3/h
- Ultimate pressure ≤ $1 \cdot 10^{-2}$ mbar

DRYVAC
- Pumping speed 450 to 5,000 m^3/h

Vacuum Systems
Forevacuum pump systems / Helium pump systems

Vacuum solutions and systems of all kinds including customer specific application support.

Benefit from our long-term experience.

- Design and manufacture of custom vacuum solutions
- Integrated forevacuum and high vacuum pump systems for custom requirements
- Efficient solutions

TURBOLAB
High vacuum pump systems

Plug-and-play high vacuum pump systems based on well-proven components. Different configurations cover individual vacuum demands.

- Pumping speed 90 - 450 l/s
- Ultimate vacuum down to 10^{-10} mbar
- Completely preassembled as a benchtop unit with turbomolecular pump, frequency converter and fore-vacuum pump

TURBOVAC i/iX

Turbomolecular pumps with hybrid bearing technology

Innovative and flexible product range with outstanding performance data and integrated electronics.

TURBO.CONTROL i display unit (rack version or benchtop unit) to control and monitor the pump including connection facility for two pressure gauges available as accessory.

- Pumping speed up to 440 l/s
- Oil free hybrid bearings
- Integrated electronics including a variety of options for communication and control of accessory components
- Versions for high compression and high gas throughputs available

TURBOVAC

Turbomolecular pumps, mechanically suspended

Reliable and proven product range for demanding applications with separate pump electronics.

- Pumping speed up to 1,150 l/s
- Two oil-free mechanical ceramic bearings
- High resistance to mechanical shocks and shock venting
- Electronics separable with cable lengths > 140 m

TURBOVAC MAGiNTEGRA

Turbomolecular pumps, magnetically levitated

Most compact product line for clean high and UHV vacuum generation.

On-board frequency converter and power supply.

Easy and space-saving system integration. Low maintenance requirements.

- Pumping speed up to 300 - 2,100 l/s
- High compression ratio for all gases
- Holweck stage incorporated
- Resistant to particles and deposits
- Insensitive to shock-venting
- Monitoring and self-protection functions

COOLVAC

Refrigerator cryo pumps

High water vapor pumping capability, long maintenance intervals, installation in any orientation.

- Pumping speed up to 60,000 l/sec
- Clamp and CF flange versions
- Fully automatic regeneration cycle

COOLPOWER

Cold heads for cooling cryo pumps/cryostats

Gas refrigerating machines for cryogenic temperature generation based on the

Gifford-McMahon principle.

Designed for cooling superconductors.

- Ultimate temperatures:
  - two-stage models down to 8 K,
  - single-stage models down to 25 K
- High refrigerating capacity from the smallest volume
- No need for liquid helium and liquid nitrogen

TiTan™

Ion pumps

A full range of vibration-free and maintenance-free ion pumps, Titan sublimation-pumps and NEG getter pumps to achieve best final pressures in the ultra-high vacuum.

DIGITEL™ controller models for most diverse applications and configurations.

- Pumping speed 0.2 - 1,200 l/s
- Ultimate vacuum < 1 x 10^{-10} mbar
- Various TiTan™ pump elements for different requirements available
- All TiTan™ and TSP components are bakeable up to 400 °C
- Wide range of accessories

UNIVEX
Experimentation and coating systems

Easy operation and accessibility of vacuum chambers. Manual or automatic process control and documentation.

- Multipurpose systems for testing and the production of functional layers
- Modular system configuration, wide range of accessories
- Customized system solutions
- Variable chamber sizes

UNIVEX S
Space simulation systems

Chamber systems for generation of space simulation conditions under vacuum in all sizes and for a wide variety of experiments and tests.
Turn-key system solutions with integrated fore vacuum and high vacuum pumps.

- Customized system solutions in all sizes
- Comprehensive consulting service, customer specific application support and training

PHOENIX 4
Leak detectors

Designed for the demanding requirements in research and development.
Easy to use and well-proven in research centres, production and quality control programs.

Suitable for mobile or stationary vacuum and sniffer operation

- Highly reliable and precise measurement up to $5 \cdot 10^{-12}$ mbar l/s
- Enhanced HMI with simple controls, intuitive menu structure and comfortable multicolored touchscreen
- Integrated webserver for remote control with any internet-enabled mobile device

Measuring Instruments
Vacuum pressure devices, measurement gauges, display units

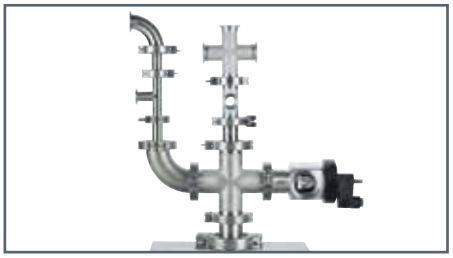
Reliable monitoring and control for all vacuum processes.

- Measurement with active and passive sensors in a pressure range from 2,000 to 10^{-12} mbar for every application
- Pressure switches and pressure control instruments

Flange systems
Connection components, feedthroughs and observation windows

Well proven and widely used technology.
Almost any connection possible.

- Small flanges in sizes DN 10 to DN 50
- Clamped flanges in sizes DN 63 to DN 630
- CF flanges in sizes DN 16 to DN 250
- UHV valves / linear motion feedthroughs



BICOM 20585.02 100.24.02 2.0.02.18
Printed in Germany on chlorine-free bleached paper

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