Vacuum for Research & Development
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
DRYVAC, LEYVAC screw pumps
SCROLLVAC 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
- COOLVAC refrigerator cryo pumps
- COOLPOWER cold heads for cooling cryo pumps/cryostats
- PHOENIX Li 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 Li** 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
TURBOVAC turbomolecular pumps with mechanical or hybrid suspension
TURBOLAB high vacuum pump systems
DIVAC diaphragm pumps
SCROLLVAC scroll pumps
SOGEVAC rotary vane pumps, single-stage
Vacuum measurement and control equipment

Analytics

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 m³/h
- Ultimate pressure ≤ 5 · 10⁻² mbar

TRIVAC
- Pumping speed 2.5 to 65 m³/h
- Ultimate pressure ≤ 5 · 10⁻⁴ mbar

**SCROLLVAC**

Oil-free scroll pumps

- Dry, universal solution, low operating costs.
- Pumping speed 5 to 60 m³/h
- Ultimate pressure ≤ 1 · 10⁻² mbar
- Robust, low-maintenance design
- High pumping speed even at 1,000 mbar

**LEYVAC**

Dry compressing screw pumps and systems

- Rugged vacuum pumps for rough applications and high process throughputs.
- Pumping speed 80 to 300 m³/h
- Ultimate pressure ≤ 1 · 10⁻² mbar
- Optimized performance for light gases
- Hermetically sealed pump
- Direct connection of RUVAC Roots pumps via adapter

**DRYVAC**

Dry compressing screw pumps and systems

- Rugged, compact vacuum solutions with smart monitoring and control system.
- Pumping speed 450 to 5,000 m³/h
- Rugged, for demanding processes
- Flexible modular system for compact vertical and horizontal installation
- Integrated smart monitoring of major parameters; i-versions with touch screen control and profibus interface

**SCREWLINE**

Dry compressing screw pumps

- Extremely robust for harshest industrial applications, simple on-site maintenance.
- Pumping speed 250 and 630 m³/h
- Ultimate pressure ≤ 1 · 10⁻² mbar
- Monitoring system
- Easy to disassemble pump chamber for rapid cleaning

**PT-Systems / 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 65 - 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
- Control unit for automatic or manual operation optional
TURBOVAC i/ix
Turbomolecular pumps with hybrid bearing technology
Innovative and flexible product range with outstanding performance data and integrated electronics.
  - Pumping speed up to 440 l/s
  - Oil free hybrid bearings (mechanical/permanent magnetic)
  - 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 MAG iNTEGRA
Turbomolecular pumps, magnetically levitated
Most compact product line for industrial applications. On-board frequency converter and power supply. Easy and space-saving system integration.
  - 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

TURBOVAC MAG digital
Turbomolecular pumps, magnetically levitated
Flexible, vibration-free and low-maintenance turbomolecular pumps with separate frequency converter
  - Pumping speed up to 3,200 l/s
  - Compound stage versions available
  - Stable system performance capability; high pumping speed and high compression ratios for all gases
  - Easy system integration
  - Temperature management system

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
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.
- 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

PHOENIX L300i
Leak detectors and leak testing systems
Designed for the requirements of industrial series production. Well-proven and easy to use in production and quality control programs.
- Suitable for mobile or stationary vacuum and sniffer operation
- Configuration of leak rate, time and type of gas according to customer specifications
- Remote control for wireless operation up to a distance of 100 m

Measuring Instruments
Vacuum gauges and pressure gauges
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
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

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