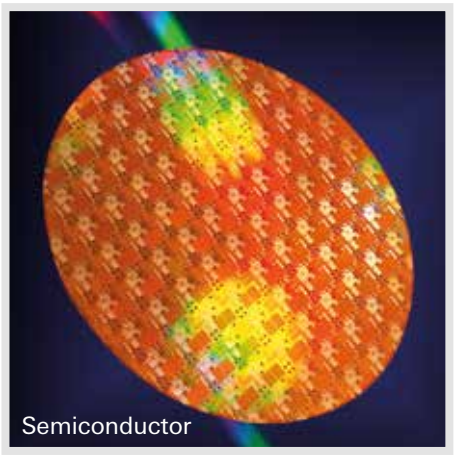


Vacuum solutions from a single source

Our complete product portfolio at a glance

PFEIFFER VACUUM

Complete solutions

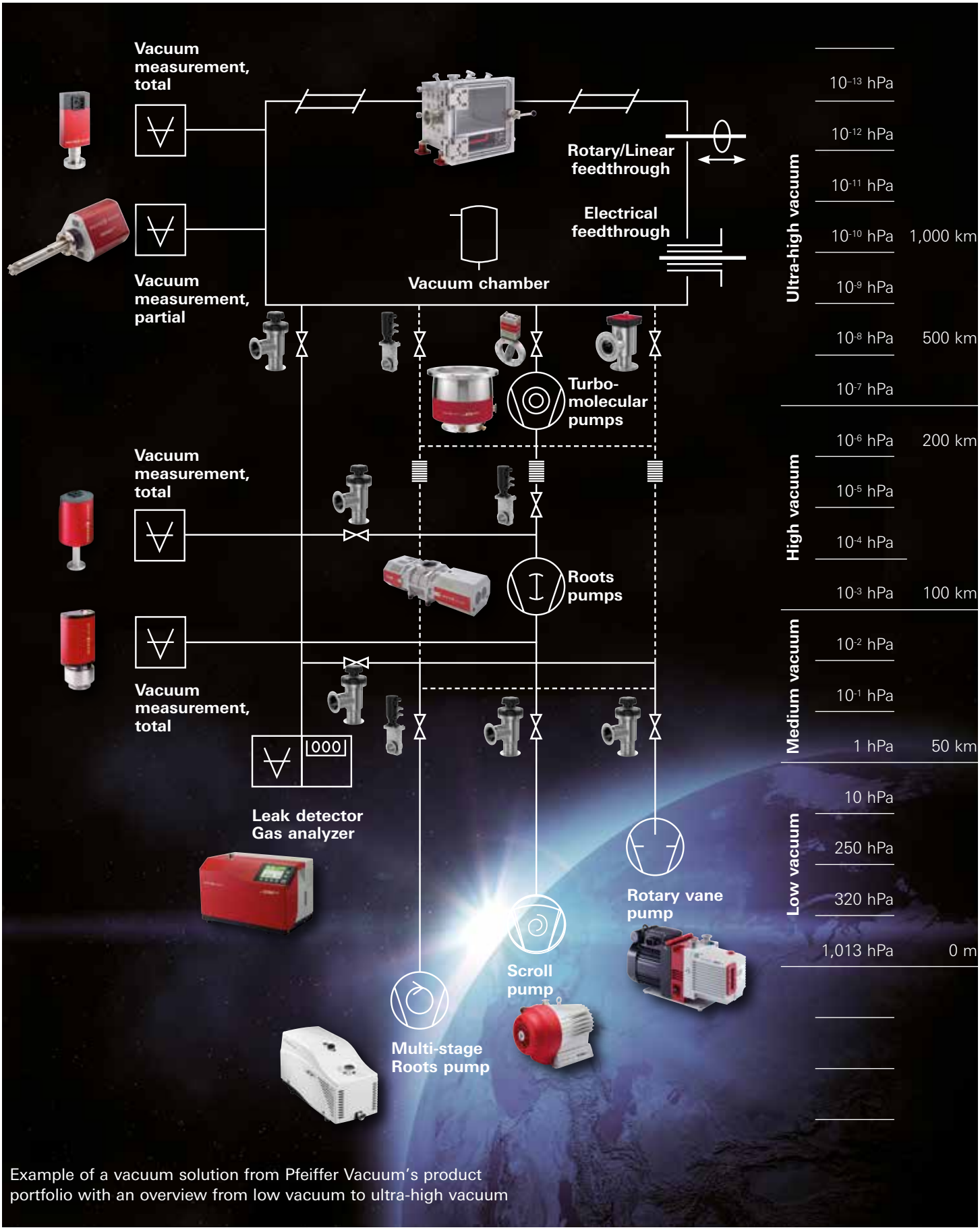
Pfeiffer Vacuum offers extensive solutions from a single source. A strong partner with a complete product portfolio.

From consulting in the initial offer phase to the servicing of installed systems, Pfeiffer Vacuum stands for top quality products and services. Unique to Pfeiffer Vacuum is the **combination of extensive technical expertise, high value products, competent advice and customer friendly service**.

- **Whether for vacuum generation, measurement, analysis, leak detection, complete systems or components:** the Pfeiffer Vacuum product portfolio offers the perfect solution to meet every need. Excellent quality and state-of-the-art technology are standard with all products.
- The complete range also includes **extensive services**: Our product training and other courses provide the technical basics of vacuum technology along with important information about the proper operation of our products in the real world.
- To best meet your requirements, we offer a **broad range of consulting services**. We work closely with you right from the planning stage to best meet your needs. In addition, we also offer information in the form of a full catalog, a vacuum technology compendium, and the Internet. Pfeiffer Vacuum describes the scientific principles of vacuum technology, offers technical details and provides vacuum expertise – perfect for both practice and research.

Thanks to our service offices and our competent customer service, we can be on site quickly – anywhere, anytime. With repairs, support for independent maintenance, and product maintenance, we will help you – and only use genuine replacement parts.

Vacuum solutions from a single source – professional, customer friendly and competent.



Example of a vacuum solution from Pfeiffer Vacuum's product portfolio with an overview from low vacuum to ultra-high vacuum

Product safety

Safety for high demands

Our vacuum solutions range from the selection of individual components to complete vacuum systems. Important to note: The more complex the product, the more important product safety becomes. Safe products create a high level of protection for employees and long system life – so safety does have a direct impact on the economic feasibility of a product.

Our vacuum solutions are efficient and safe

Product safety in the European Union is primarily influenced by the EC directives, which we adhere to as a matter of course.

Many products are also certified in accordance with Underwriters Laboratories (UL) and SEMI guidelines and standards (SEMI = Semiconductor Equipment and Materials International). For example, our turbopumps meet the UL 61010 and SEMI S2 guidelines.
At www.pfeiffer-vacuum.com, our multi-lingual technical documents are ready for your download.

EC directives, depending on which of our products are used:

Directive	Application to
2006/42/EC	Machinery and partly completed machinery
2014/35/EU	Electrical devices of 50 to 1,000 V AC or 75 to 1,500 V DC
2014/30/EU	Electromagnetic compatibility
2014/68/EU	Pressure devices (overpressure >500 hPa)
2014/29/EU	Simple pressure vessels
2014/34/EU	Equipment and protective systems intended for use in potentially explosive atmospheres (ATEX)
2011/65/EU	ROHS Restriction of the use of certain Hazardous Substances

Risk assessment in accordance with EN ISO 12100 "Safety of machinery"

Whenever individual products are combined with one another, tests need to be conducted to determine whether new risks are generated as a result of the new structure. Thanks to our extensive total solution program, we offer you the opportunity to acquire all relevant parts of a vacuum system from a single source – a huge advantage when it comes to assessing and guaranteeing product safety, since all the data needed to carry out a risk assessment in accordance with EN ISO 12100 can be obtained from the same source. Upon request, we will carry out an individual safety assessment for any combination of our products and then supply you with a corresponding solution. For example, we can manufacture vacuum chambers that perfectly adjust to the particular turbopump in use and whose connection flanges are able to cope with extraordinary loads during unusual events.

After-sales service comes naturally to us

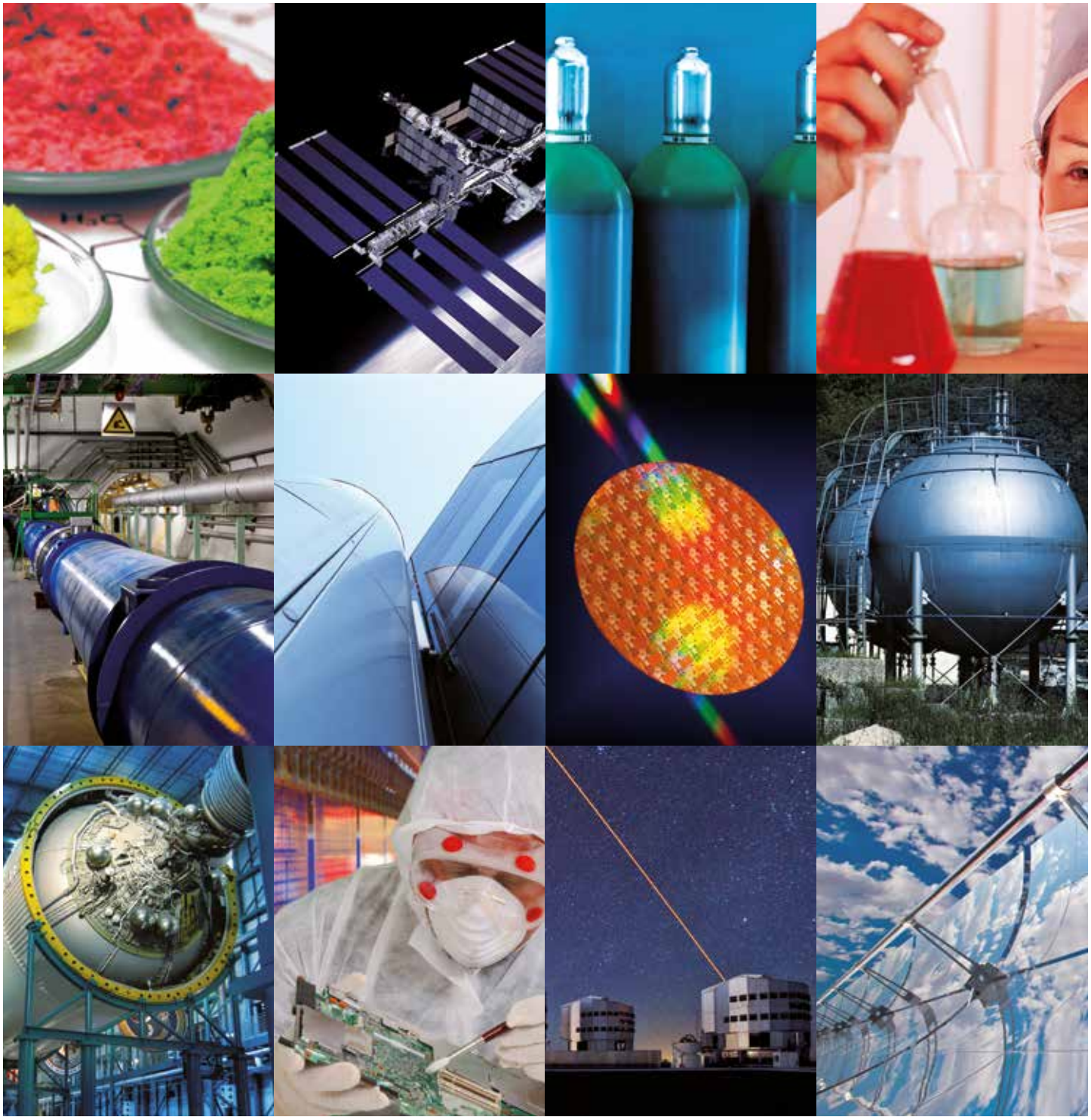
In the event of serious changes to your vacuum system, we are happy to assist with expert advice.

This is who we are – an overview of our strengths:

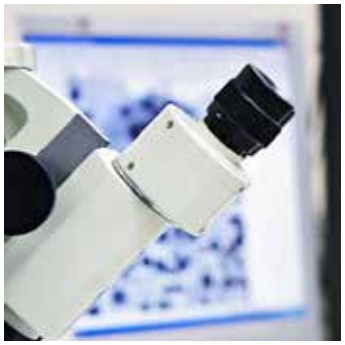
- Vacuum solutions from a single source – safe vacuum systems thanks to our extensive product range and components tested for safety
- As experts in vacuum solutions, we provide individual project consultation
- CE adherence and safety tested systems
- Additional safety certification for many products
- After-sales service provides you support when making adjustments to your current vacuum system

Market overview

Vacuum solutions for many
applications and numerous markets



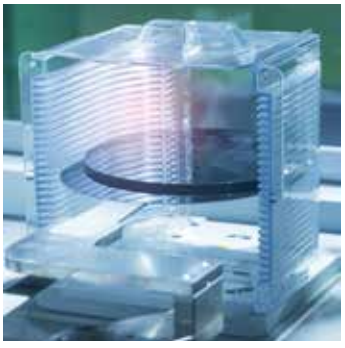
Technology needs vacuum. We provide extensive solutions for these markets:



Analytics
- Biotechnology
- Nanotechnology
- Quality assurance
- Surface analysis
- Spectroscopy

Industry
- Medical and Pharma
- Mobility
- Energy
- Process industry
- Industrial vacuum
- Thin film deposition

Research & development,
- Fusion reactors
- Accelerators
- Surface technology
- Space simulation chambers
- Superconductor applications
- Nanotechnology



Semiconductor and Emerging Technologies
- Ion implantation
- Plasma etching
- Deposition (PVD, CVD, ALD)
- Lithography
- Inspection

Vacuum generation

Single-stage and two-stage rotary vane pumps

Single-stage rotary vane pumps

HenaLine	Advantages	Benefits
	■ Low oil filling level	■ Reduced operating costs
	■ Water cooling available upon request	■ Allowing applications under the hardest conditions with high thermal loads
	■ Long oil life	■ Cost savings through extended maintenance intervals
	■ Integrated oil mist eliminator	■ Reliable due to clean and oil-free exhaust

UnoLine Plus	Advantages	Benefits
	■ Robust through minimal wear	■ Long lifetime
	■ Resistant to dirt and grime	■ Maximum process suitability
	■ Integrated oil regeneration unit	■ Reliable due to clean and oil-free exhaust
	■ Extremely high water vapor capacity	■ Ideally suited for drying processes

Pascal	Advantages	Benefits
	■ Low back diffusion	■ High reliability for your processes
	■ Easy access to all control elements and service ports through practical placement on the front side	■ Easy to use and integrate
	■ Compact design	■ Simple system integration
	■ Very few abrading parts	■ Low cost of ownership and easy maintenance

Two-stage rotary vane pumps

DuoLine™	Advantages	Benefits
	■ Hermetically sealed	■ High operating safety
	■ Standard magnetically coupled (M), corrosive gas version magnetically coupled (MC) available	■ Optimal adaptation to your processes
	■ Compact design	■ Simple system integration
	■ No maintenance of shaft seal rings (for M and MC)	■ Cost savings for each pump and maintenance interval

Pascal[1)]	Advantages	Benefits
	■ Low back diffusion	■ High reliability for your processes
	■ Easy access to all control elements and service ports through practical placement on the front side	■ Easy to use and integrate
	■ Gas ballast valve allows high gas flows	■ High water vapor tolerance
	■ Very few abrading parts	■ Low cost of ownership and easy maintenance

[1)] **Various versions available:**
- **SD version** for all vacuum applications with non-corrosive gases
- **I version** with additional oil pump for the requirements of instrumental analytics
- **C1 version** for applications with aggressive or corrosive gases
- **C2 version** for harsh duty applications with the most aggressive pumping environment

Vacuum generation

Diaphragm pumps, screw pumps

MVP diaphragm pumps	Advantages	Benefits
	■ Particulary high pumping speed in DC version	■ Short cycle times due to quick pump down
	■ Particulary efficent in DC version	■ Low operating costs
	■ Long diaphragm service life	■ Long maintenance intervals
	■ Easy diaphragm and valve replacement	■ Very maintenance friendly

HeptaDry® screw pumps	Advantages	Benefits
	■ Energy saving operation through optimal rotor geometry	■ Low cost of ownership
	■ No contact between operating fluid and process gas	■ No disposal costs for operating fluids in this process
	■ High pumping speed at atmospheric pressure	■ Short cycle times due to quick pump down
	■ Tolerant of dirt and contamination	■ High reliability for your processes

HiScroll scroll pumps	Advantages	Benefits
	■ No hydrocarbons	■ Absolutely dry and oil-free vacuum pump
	■ Low noise level, little vibration and compact design for use e.g. in the laboratory	■ Quiet, self-regulating air cooling system
	■ Safe operation	■ Integrated safety valve and hermetically sealed pump system
	■ Comfort and efficiency	■ Low CoO thanks to highest quality, short service times and long maintenance intervals
	■ Sustainable operation	■ Less heat generation and lower cooling requirements due to 15% higher motor efficiency

Vacuum generation

Multi-stage Roots pumps

Clean processes

ACP 15–40 SD/G/GV/CP/SR [1]	Advantages	Benefits
	■ Dry, air cooled pumping solution	■ Improvement of process quality through oil free and particle free vacuum
	■ Long maintenance intervals	■ Low operating costs
	■ Pump system runs contact-free	■ Consistent long-term performance
	■ Gas ballast and purge line available upon request	■ Large volume pumping of condensable vapors

A 100 L / A 200 L	Advantages	Benefits
	■ High performance and heavy cycling compatible	■ High throughput
	■ Compact, stackable, optimized installation	■ Simple, flexible system integration
	■ High energy eficiency	■ Low operating costs
	■ On-tool assembly due to quiet operation and low vibration; oil and particle-free	■ Improves process quality in clean room, compact system integration

ADH series	Advantages	Benefits
	■ Pumping speed from 600 to 4500 m^3/h	■ Large choice of dry pumping solution
	■ Optimized internal design and clearances	■ Similar pumping performance in H_2 and N_2
	■ Optimized transfer channels, lobes shapes and double temperature controlled	■ By-product management and condensation avoided
	■ Excellent resistance to static and dynamic internal stresses	■ Enhanced safety for applications running explosive gases such as hydrogen and silane

ACP 120G, ACG 600G	Advantages	Benefits
	■ Long maintenance intervals (up to four years)	■ Low service costs
	■ Oil and particle-free vacuum thanks to wear-free pump block	■ Increased process quality
	■ High tightness of motor and pump block	■ No contamination of your products
	■ Compact design	■ Compact system integration

Harsh duty applications

A4 H / X / XN series [2]	Advantages	Benefits
	■ High energy efficiency	■ Reduced total cost of ownership
	■ Wide operating temperature range and corrosion resistant materials	■ Increased lifetime and wider range of application
	■ High particle tolerance	■ Increased uptime
	■ Extended monitoring functionalities	■ Better control of pump conditions

[1] **Various versions available:**
- **SD version** designed for dust-free inert gases
- **G version** designed for low quantities of corrosive gases
- **CV version** compatible with condensable gases
- **CP version** for gas recirculation
- **SR version** with remote electronic and fluorine free

[2] **Various versions available:**
- **XN version** for extremely corrosive applications
- **X version** for corrosive applications
- **H version** for applications without corrosive gasese

Vacuum generation

Roots pumps

Universal boosters

HiLobe	Advantages	Benefits
	■ Usable up to 200 Hz with frequency converter	■ Shorter pump down times and higher pumping speed
	■ Equipped with energy-efficient motor	■ Lowest operational costs
	■ Compact design	■ Small footprint and less weight
	■ Integrated condition monitoring	■ Highest operational safety

OktaLine®	Advantages	Benefits
	■ No cooling water due to air cooling	■ Reduced operating costs
	■ Robust structure thanks to field-tested design	■ Long lifetime
	■ Usable up to 75 Hz with frequency converter	■ Shorter pump down times and higher pumping speed
	■ Protected against thermal overload	■ High reliability

Explosion protection

OktaLine® ATEX	Advantages	Benefits
	■ Equipment category 2 and 3, T3	■ Qualified for zone 1 and 2
	■ Overflow valve available for every version	■ Optimized process adaption
	■ Pressure surge resistant up to 16 bar	■ Highest operation flow
	■ No thermal overload due to redundant temperature sensors	■ Optimized process monitoring

Highes pressure difference

OktaLine® G	Advantages	Benefits
	■ High differential pressures up to 900 hPa possible	■ Cost savings as backing pump is not needed
	■ Used as booster pump in pumping stations	■ Small number of pumps and high reliability
	■ Process temperature regulation eliminates residue in the pump	■ High stability for your processes
	■ Controlled gas-circulation-cooling	■ Highest operating safety due to automatic process adaption

Vacuum generation

Roots pumping stations

Pumping station with OktaLine Roots pump

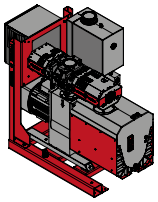
CombiLine WH	Advantages	Benefits
	■ Various pump and accessory combinations possible	■ Optimal adaptation to your processes
	■ Energy-saving operation (IE3 motors)	■ Low operating costs
	■ No contact between operating fluid and process gas	■ No disposal costs for operating fluids in this process
	■ High pumping speed at atmospheric pressure	■ Short cycle times due to quick pump down

CombiLine WU	Advantages	Benefits
	■ Various pump and accessory combinations possible	■ Optimal adaptation to your processes
	■ Optimized design	■ Simple service
	■ High pumping speed of the backing pump at atmospheric pressure	■ Short cycle times due to quick pump down
	■ High water vapor tolerance	■ Reliable even in complicated processes

CombiLine WD	Advantages	Benefits
	■ Various pump and accessory combinations possible	■ Optimal adaptation to your processes
	■ Compact design and small footprint	■ Simple, space-saving integration in your system
	■ Clean exhaust through integrated oil mist eliminator	■ No damage to the environment
	■ Low-wearing and low leakage rate with magnetic coupling	■ Low service costs, no leaks and pumping of critcal gases possible

Pumping station with HiLobe Roots pump

CombiLine RH	Advantages	Benefits
	■ Various pump and accessory combinations possible	■ Optimal adaptation to your processes
	■ Equipped with energy-efficient motor	■ Low operating costs
	■ Compact design	■ Small footprint and less weight
	■ No contact between operating fluid and process gas	■ No disposal costs for operating materials in this process

CombiLine RU	Advantages	Benefits
	■ Various pump and accessory combinations possible	■ Optimal adaptation to your processes
	■ Equipped with energy-efficient motor	■ Low operating costs
	■ Compact design	■ Small footprint and less weight
	■ High water vapor tolerance	■ Reliable even in complicated processes

CombiLine RD	Advantages	Benefits
	■ Various pump and accessory combinations possible	■ Optimal adaptation to your processes
	■ Equipped with energy-efficient motor	■ Low operating costs
	■ Compact design	■ Small footprint and less weight
	■ Clean exhaust air through integrated oil mist separator	■ No environmental pollution

Vacuum generation

Turbopumps

With hybrid bearings

HiPace® 10 – 800	Advantages	Benefits
	■ Compact design along with numerous mounting positions[1)]	■ Minimal space requirements and simple system integration
	■ Bearing replacement on site	■ Cost savings through reduced service intervals
	■ Highest reliability thanks to robust design and proven bearing system	■ Long maintenance intervals
	■ Quick start-up due to high performance, integrated electronic drive unit	■ Reduced process times

HiPace® 1200 – 2300	Advantages	Benefits
	■ Robustness against particle problems	■ Long maintenance cycles
	■ Bearing replacement on site	■ Cost savings through reduced service intervals
	■ Various interface options available	■ Easy system integration
	■ Intelligent sensors through the implementation of appropriate parameters in the integrated electronics	■ Highest safety level

SplitFlow™	Advantages	Benefits
	■ Replaces several discrete turbopumps	■ Huge cost savings ■ Significant improvement in reliability and faster service through reduced number of components
	■ Ball bearing replacement possible in installed pumps	■ System does not need to be taken apart
	■ Individual mechanical and vacuum design	■ Pump system optimally adapted to customer needs

With magnetically levitated bearings

HiPace® 300 – 800 M, ATH 500 M	Advantages	Benefits
	■ Lower energy consumption through efficient magnetically levitating system	■ Low operating costs
	■ Magnetic levitation	■ Maintenance free operation, lower lifetime costs
	■ Low vibrations and low magnetic stray field	■ High reliability for your processes
	■ Additional speeds thanks to intelligent electronic drive unit	■ Cost savings as control valve is not needed

ATH 1600 – 3204 M, ATP 2300 M	Advantages	Benefits
	■ Magnetic levitation	■ Maintenance free operation, lower lifetime costs
	■ Intelligent sensors and electronics	■ High operating safety
	■ Freely selectable rotation speed in a broad RPM range	■ Optimized process adaptation
	■ Any mounting orientation	■ Easy system integration

[1)] HiPace Plus: 0°

Vacuum generation

Turbo pumping stations

Compact

HiCube® Eco	Advantages	Benefits
	■ Pumping station ready for operation	■ Plug and play – no installation or wiring needed
	■ Compact dimensions with low weight (17 kg)	■ Small, handy and portable
	■ No oil contamination thanks to dry sealed backing pump	■ No process impairments
	■ Perfectly coordinated individual components	■ Long life, high safety level and best reliability

Standard

HiCube® Classic	Advantages	Benefits
	■ Pumping station ready for operation	■ Plug and play – no installation or wiring needed
	■ Field-tested, robust construction	■ Reliable and safe
	■ Wide selection of pump combinations and options	■ Individual adaptation to your processes
	■ Perfectly coordinated individual components	■ Long life, high safety level and best reliability

High performance

HiCube® Pro	Advantages	Benefits
	■ Particularly fast pumpdown times due to the high pumping speed of the backing pump	■ Cost savings through time reductions
	■ Easy access to the individual components	■ Extremely service friendly
	■ Pumping station ready for operation	■ Plug and play – no installation or wiring needed
	■ Wide selection of pump combinations and options	■ Individual adaptation to your processes

Measurement & Analysis

Measurement equipment

Digital

DigiLine	Advantages	Benefits
	■ Standard serial interfaces	■ Low installation costs
	■ Data directly readable in PC or PLC	■ Secure data transmission thanks to digital signals
	■ Industrial Ethernet- and Fieldbus interfaces and analog output with two setpoints available upon request	■ Flexible use

Analog

ActiveLine	Advantages	Benefits
	■ Compact design	■ Easy integration
	■ Large selection of vacuum gauges	■ Flexible use
	■ Controllers with automatic gauge recognition	■ Simple installation (plug and play)

CenterLine	Advantages	Benefits
	■ Compact design	■ Easy integration
	■ Easy replacement of competitor´s gauges	■ Little effort when replacing your gauges
	■ Controllers with automatic gauge recognition	■ Simple installation (plug and play)

Modular

ModulLine	Advantages	Benefits
	■ Rugged and well-proven design	■ Field-tested long life
	■ Resistant against ionizing radiation as sensor and electronics are separated	■ Used in applications that place great demands on the vacuum technology

Hand held gauges + Manometer

TPG 201, 202 / Manometer	Advantages	Benefits
	■ Compact handheld gauges and robust manometers	■ Pressure display at the process chamber itself
	■ Manometer do not need a power supply	■ Pressure display even after power failure

Measurement & Analysis

Analytical equipment

Residual gas analysis and gas analysis

PrismaPro®	Advantages	Benefits
	■ Modular design	■ Optimal adaptation to numerous measurement tasks
	■ Ion sources with two filaments	■ High up-times
	■ Intuitive operation of the PV MassSpec software	■ Saving of time during the creation of the measurement recipes

OmniStar®/ThermoStar®	Advantages	Benefits
	■ Compact complete system [1] Especially designed for coupling with thermobalences	■ Low space requirements
	■ Sophisticated software	■ Easy to use even for quantitative gas analysis
	■ Multi-stage heatable gas inlet system	■ Reliable analysis
	[1] ThermoStar only	

Measurement & Analysis

Analytical equipment

Gas analysis

HPA	Advantages	Benefits
	■ Numerous gas inlet options	■ Individual adaptation to your measurement tasks
	■ Compact dimensions	■ Easy, flexible system integration
	■ Multiplex operation possible	■ Simultaneous analysis of several systems

HiQuad®	Advantages	Benefits
	■ Extremely high measurement speed thanks to modern electronics	■ Highly sensitive measurements in the lowest amount of time
	■ High sensitivity along with large dynamic range thanks to precision mechanics and elaborated amplifier	■ Excellent long-term stability
	■ Fieldaxis technology and biased ionziation chamber	■ Low background and highest sensitivity

Leak detection

Tracer gas leak detectors (Helium/Hydrogen)

Portable

ASM 310	Advantages	Benefits
	■ Small, light (21 kg), compact	■ Ideal for servicing work
	■ Saving of measurements and configurations on SD card	■ Easy data documentation
	■ 9 languages available on control panel	■ Simple use and easy operation in international environments

Multipurpose

ASM 340, ASM 340 D	Advantages	Benefits
	■ Detection of large leaks up to 100 hPa	■ Large range of applications
	■ Performs helium and hydrogen leak detection in vacuum and sniffer modes	■ Flexible operation
	■ Excellent connection compatibility to previous models	■ Existing accessories can be used
	■ High performance vacuum system	■ Fastest time to test in its class
	■ Oil-free in version 340 D	■ Use in clean applications

High performance

ASM 390 / 392	Advantages	Benefits
	■ High maneuverability and compact design	■ Easy access to test area even in tight spaces
	■ Highest pumping speed of backing pump in its class (35 m^3/h) as well as high helium pumping speed (10 or 25 l/s)	■ Fast, accurate and reliable leak detection
	■ Integrated storage space for tools, vacuum bellows and accessories	■ Practical access and quick availability of tools

Modular

ASI 35	Advantages	Benefits
	■ Compact, robust, modular system	■ Simple and compact integration in any mounting position
	■ Operation via PC or PLC possible	■ Cost savings as control panel is not mandatory
	■ Broad selection of interfaces and configurations	■ Best possible compatibility to your individual control concept

Sniffing

ASM 306 S	Advantages	Benefits
	■ Sniffer for Helium and Hydrogen test gases	■ Give versatility to your production line
	■ Intelligent sniffer probe with high flow	■ Fast testing and easy reading of test status
	■ Robust design and rugged construction	■ Low cost of ownership

Leak detection

Leak testers

Micro-Flow (Air)

E-PDQ	Advantages	Benefits
	■ Faster test time compared to alternative technologies	■ Shortest cycle times and high efficiency
	■ High accuracy and repeatability	■ Optimum quality and process control
	■ Compact design with integrated pressure reservoir	■ Small footprint and easy integration

E2	Advantages	Benefits
	■ Fast and reliable leak testing using air	■ Short cycle times and low operating costs
	■ Integrated touch screen graphical display	■ User-friendly operation also for stand-alone use
	■ For small and medium sized test parts	■ Flexibly usable for variable test parts

Mass Extraction

ME2	Advantages	Benefits
	■ Allows for detection of smallest leaks (< 1 µm) using air	■ Clearly lower operating costs compared to test methods with comparable detection limits
	■ Faster test times for leak testing using air	■ Shortest cycle times and high efficiency
	■ Recognized by USP 1207 and ASTM (F3287-17)	■ Easy and safe certification of test process

Optical Emission Spectrometry (Air/Nitrogen – Multi gas detector)

AMI 1000	Advantages	Benefits
	■ Large detection range for gross and fine leak test	■ Only one device to cover the complete test range
	■ Highest accuracy	■ Optimum quality and process controlling
	■ Quantitative and user-independent go/no-go result	■ Without risk of operating errors

ASM 2000	Advantages	Benefits
	■ Large detection range for gross and fine leak test	■ Only one device to cover the complete test range
	■ Highest accuracy	■ Optimum quality and process controlling
	■ Quantitative and user-independent go/no-go result	■ Without risk of operating errors

System technology

Contamination management solutions

Contamination management solutions

APA	Advantages	Benefits
	■ Real time AMC monitoring in FOUP	■ Immediate recognition of contaminations
	■ Upgradable Tool	■ Possible to add analyzers, option for off line analysis
	■ High Throughput 12 FOUPS/hours	■ Large numbers of FOUPS can be processed for statistical production purposes

APR	Advantages	Benefits
	■ Remove HR and AMC from FOUP and wafer	■ Yield enhancement
	■ Best possible quality assurance with compact dimensions	■ Low footprint in Semi Fabs
	■ Customized design	■ Individual adaptation to the customer processes

ADPC	Advantages	Benefits
	■ Real time particles measurement and location in FOUPS	■ Immediate information about FOUP contamination
	■ Can measure down to 10 nanometer particle	■ Ideal for advanced semi Fabs
	■ High throughput (8-14 FOUPS/h)	■ Large numbers of FOUPS can be processed for statistical production purposes

AMPC	Advantages	Benefits
	■ Up to 128 sampling lines for AMC tracking	■ All semi Fab area can be connected onto one single tool
	■ Upgradable Tool	■ Possible to add analyzers, options.
	■ Low sampling time, innovative software	■ Immediate results to be pushed to Fabs data center

System technology

Vacuum systems

Multi-stage vacuum process

Vacu²	Advantages	Benefits
	■ Mold cavity and shot chamber in high pressure die cast systems are quickly evacuated	■ Avoidance of air bubbles in cast parts improves their quality
	■ Complete production monitoring	■ High process availability in high pressure die cast systems
	■ Very low vacuum	■ Quality improvements to the cast products
	■ High process stability in high pressure die cast systems	■ Cost savings through fewer rejects

Individual systems

e.g. Calibration systems	Advantages	Benefits
	■ Customized design possible	■ Optimal adaption to your application
	■ Bundled competences and products from a single source	■ Smooth workflow and uncomplicated communication
	■ 24-hour system service world-wide	■ Minimal downtimes thanks to the immediate reaction in case of any failure

Ion Beam Technology

Ion sources, ion beam optic and ion beam diagnostics

Electron & Ion Beam Technologies

Ion sources

Dresden EBIS	Advantages	Benefits
	■ Production of highly charged ions of almost all chemical elements at nearly all charge states as pulsed as well as DC ion beam	■ Broad range of ion projectiles, efficient acceleration of highly charged ions in particle accelerators, usuable for materials analytics among others
	■ Maintenance-free room temperature permanent magnet electron beam ion source (cryogenic high performance system on request)	■ Low power consumption, no need for cryogenic equipment, low maintenance costs
	■ Production of characteristic X-rays of various elements of almost all charge states	■ High accuracy calibration of radiation detectors (for X-rays, EUV, visible light) is possible

Ion beam diagnostics

Wien filter	Advantages	Benefits
	■ Compact design	■ Less expensive and more compact than a comparable dipole magnet
	■ Low power consumption	■ Low running costs, maintainance-free
	■ Charge state and mass separation without changing the direction of particle motion	■ Straight beamline design (no L-shape)

Faraday cup	Advantages	Benefits
	■ Broad product range of various Faraday cup designs	■ Different Faraday cup models for various applications measuring ion currents from fA up to mA
	■ Manual or automated control possible	■ Low cost models up to high automated Faraday cup systems
	■ High sensitive low power Faraday cups up to water cooled high power Faraday cups of up to several 100 W power load	■ A broad range of ion energy (eV up to MeV) and ion current (fA up to mA) can be covered

Ion beam optics

Beam deflection optics	Advantages	Benefits
	■ Compact design	■ Low space consumption in beamline
	■ Low abberation	■ Small impact on beam quality
	■ Broad product portfolio – numerous lens models and beam deflection systems	■ Broad variety of beam formation and deflection possible

Complete facilities

Ion irradiation facility	Advantages	Benefits
	■ Complete beamline with vacuum system and computer control system including target handling	■ Semi-automated control system with simple user interface
	■ Production of charge state separated ion beams with variable projectile energy	■ Continuous and pulsed irradiation of targets with various ion projectiles in the energy range of eV up to MeV
	■ Production of stable ion beams of almost all elements including metal ions	■ Long-term irradiation with a broad range of ion species and projectile energies with one facility

Chambers & Components

Chambers

High vacuum chambers	Advantages	Benefits
	■ Pre-configured design	■ Cost savings through lower design expenses
	■ Proven, tough format	■ Reliable and safe
	■ Selectable doors	■ Individual adaptation to your processes

Medium vacuum chambers	Advantages	Benefits
	■ Pre-configured design	■ Cost savings through lower design efforts
	■ Proven, tough design	■ Reliable and safe
	■ Selectable doors	■ Individual adaptation to your processes

Modular vacuum chambers	Advantages	Benefits
	■ Pre-configured design	■ Cost savings through lower design expenses
	■ Expansion and module replacement possible	■ Maximum flexibility at all times
	■ Selectable doors	■ Individual adaptation to your application

Custom vacuum chambers	Advantages	Benefits
	■ Individual design	■ Optimally adjustable to your process
	■ High quality materials	■ Best quality and long life-time
	■ Proven, tough design	■ Reliable and safe

Chambers & Components

Components

ISO-KF, ISO-K/ISO-F	Advantages	Benefits
	■ Helium-leak tested components	■ Fulfills high quality requirements
	■ Large number of flange diameters	■ Optimally suited for your vacuum system
	■ Extensive, standardized system components	■ Perfect compatibility

CF, COF	Advantages	Benefits
	■ UHV suitable due to low desorption rates	■ Creates uniquely clean vacuum
	■ Helium-leak tested components	■ Fulfills high quality requirements
	■ Extensive, standardized system components	■ Perfect compatibility

Viewports	Advantages	Benefits
	■ Large selection of glass types	■ Suitable for a wide variety of applications
	■ Extensive, standardized system components	■ Perfect compatibility

Custom components	Advantages	Benefits
	■ Development of specific components	■ Customized components for your requirements
	■ High quality materials	■ Best quality and life

Chambers & Components

Feedthroughs and manipulators

Feedthroughs

Electrical/thermocouple/fluid/ pipe feedthroughs, isolators	Advantages	Benefits
	■ High reliability	■ Very long service life
	■ Large selection of various feedthroughs	■ Customized applications also possible

Rotary-/linear-/ rotary/linear feedthroughs	Advantages	Benefits
	■ Field-tested design	■ High reliability
	■ Large selection of various feedthroughs	■ Customized applications also possible

Manipulators

Z-/XY-/XYZ-axis manipulators, rotary/adjustment manipulators	Advantages	Benefits
	■ Extremely precise thanks to high degree of inherent rigidity and precise movements	■ Highest precision and excellent reproducibility
	■ Use of mechanical components with low wear	■ Very long lifetime
	■ Field-tested design	■ High reliability

Custom manipulators	Advantages	Benefits
	■ Individual design	■ Optimal process adjustment
	■ Proven, tough design	■ Reliable and safe
	■ Easy to combine with other Pfeiffer Vacuum products	■ Excellent adaptation to your process components

Valves

Isolation valves – high vacuum ($1 \cdot 10^{-9}$ hPa)

Manual angle valves	Advantages	Benefits
	■ Quick turn option	■ Easy, visual position indication
	■ Multi-turn handwheel option	■ Can be used for full or partial opening and closing
	■ Field tested, robust construction	■ Reliable and safe
	■ Bellows retract fully from the side port when the valve is completely open	■ Eliminate buildup of by-products on bellows

Pneumatic, electropneumatic, & electromagnetic angle valves	Advantages	Benefits
	■ Quick reaction due to short opening and closing times	■ Can be used in complicated processes
	■ Easy, cost effective maintenance and service	■ Removable bellow/actuator assemblies
	■ High cycle life	■ Ideal for automation processes
	■ Field tested, robust construction	■ Reliable and safe

HV gate valves	Advantages	Benefits
	■ High conductance value for molecular flows through viscous flow	■ Guarantees optimal pump performance
	■ Smaller volume results in lower outgassing	■ Faster pump down
	■ Removable carriage assembly and actuator	■ Easy and cost effective maintenance and service
	■ High cycle life	■ Ideal for automation processes
	■ Field tested, robust construction	■ Reliable and safe

Pendulum valves	Advantages	Benefits
	■ Smooth actuation	■ Low particle generation
	■ Removable body cover for in-situ serviceability	■ Easy and cost effective maintenance and service
	■ Compact design	■ Space saving

Ball valves	Advantages	Benefits
	■ PTFE ball seats	■ Ideal for corrosive environments
	■ Manual and pneumatic operations available	■ Ideal for large installations
	■ Simple design	■ Easy and cost effective maintenance and service
	■ 3-way option with a through hole	■ Metal ball rotates 90° for full cross-sectional clearance

Butterfly valves	Advantages	Benefits
	■ Quarter turn actuation	■ Easy open/close and visual position indication
	■ Small footprint	■ Shortest possible gas path
	■ Field tested, robust construction	■ Reliable and safe

Valves

Isolation valves – ultra high vacuum ($1 \cdot 10^{-11}$ hPa)

Manual angle valves	Advantages	Benefits
	■ Multi-turn handwheel option	■ Can be used for full or partial opening and closing
	■ Field tested, robust construction	■ Reliable and safe
	■ Bellows retract fully from the side port when the valve is completely open	■ Eliminate buildup of by-products on bellows

UHV pneumatic and electropneumatic angle valves	Advantages	Benefits
	■ Quick reaction due to short open and close times	■ Can be used in complicated processes
	■ Easy, cost effective maintenance and service	■ Removable bellow/actuator assemblies
	■ High cycle life	■ Ideal for automation processes
	■ Field tested, robust construction	■ Reliable and safe

UHV gate valves	Advantages	Benefits
	■ High conductance value for molecular flows through viscous flow	■ Guarantees optimal pump performance
	■ Smaller volume results in lower outgassing	■ Faster pump down
	■ Removable carriage assembly and actuator	■ Easy and cost effective maintenance and service
	■ High cycle life	■ Ideal for automation processes
	■ Field tested, robust construction	■ Reliable and safe

All metal valves	Advantages	Benefits
	■ All metal seal	■ Use in UHV or cryogenic applications
	■ Simple design	■ Easy and cost effective maintenance

Valves

Pressure control valves

Throttling pendulum valves	Advantages	Benefits
	■ Smooth actuation	■ Low particle generation
	■ In-situ serviceability through removable body cover	■ Easy and cost effective maintenance and service
	■ Compact design	■ Space saving

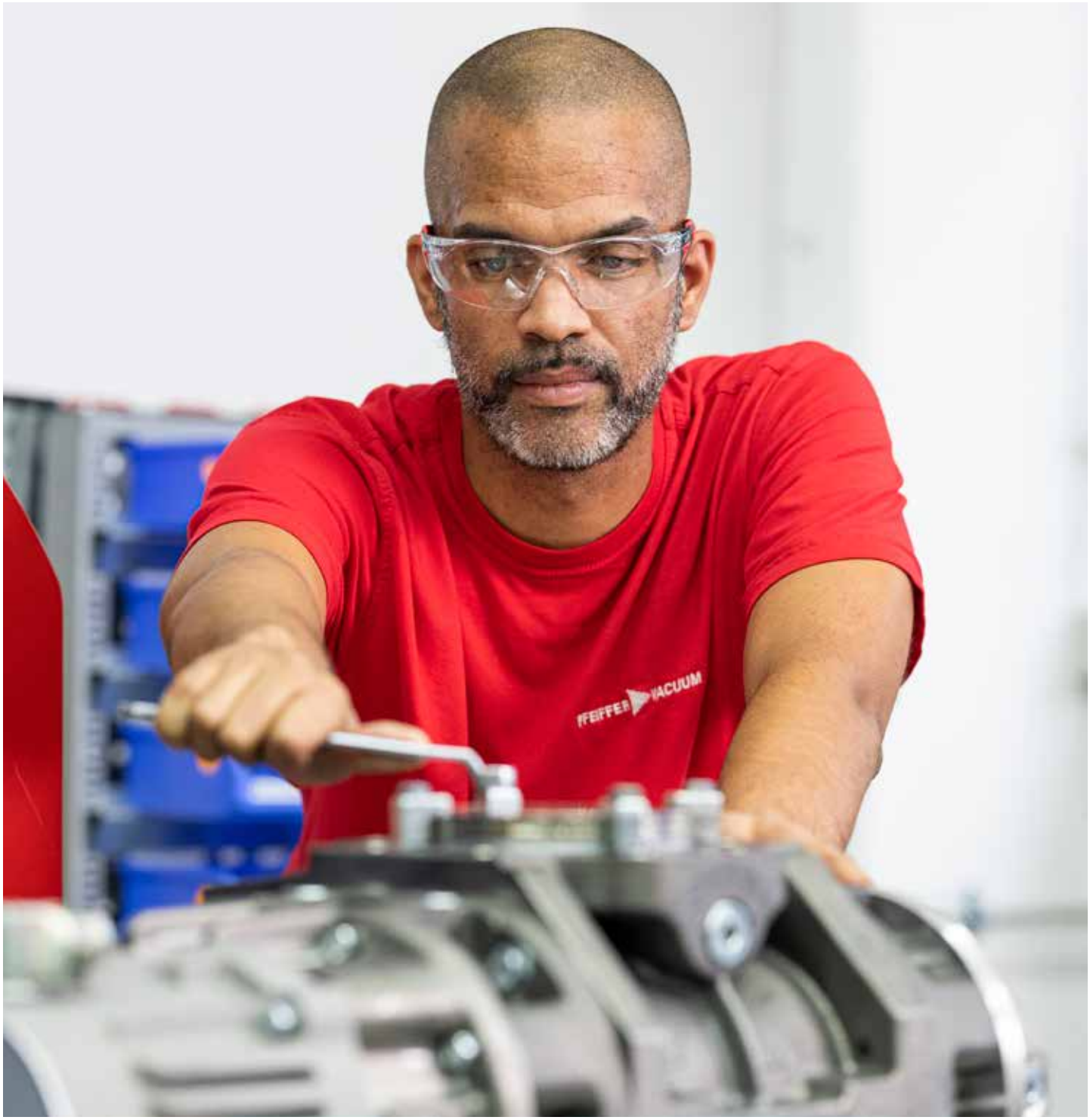
Throttling butterfly valves	Advantages	Benefits
	■ High conductance value for molecular flows through viscous flow	■ Low particle generation and optimal pump performance
	■ Adaptive algorithm	■ Improved stability and faster pressure transitions
	■ High cycle life	■ Ideal for automation processes
	■ Battery backup	■ Fail-safe positioning
	■ Field tested, robust construction	■ Reliable and safe

Throttling butterfly valves - nearly sealing	Advantages	Benefits
	■ High conductance value for molecular flows through viscous flow	■ Low particle generation and optimal pump preformance
	■ Nearly sealing capability	■ Improved isolation
	■ Adaptive algorithm	■ Improved stability and faster pressure transitions
	■ High cycle life	■ Ideal for automation processes
	■ Battery backup	■ Fail-safe positioning
	■ Field tested, robust construction	■ Reliable and safe

Gas dosing and gas regulating valves	Advantages	Benefits
	■ Variable gas throughput	■ Numerous applications
	■ Large control range	■ Variable control options
	■ Field-tested, robust construction	■ Reliable and safe

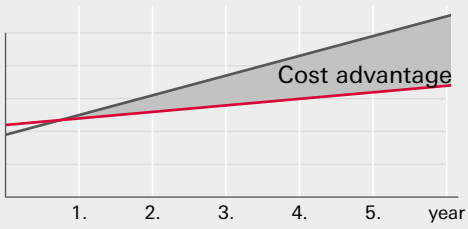
Service solutions

First-class service for
high-quality products.



Extended vacuum component service life, coupled with minimal downtimes, is what you can expect from us. We satisfy your requirements with high-performance products and excellent service.

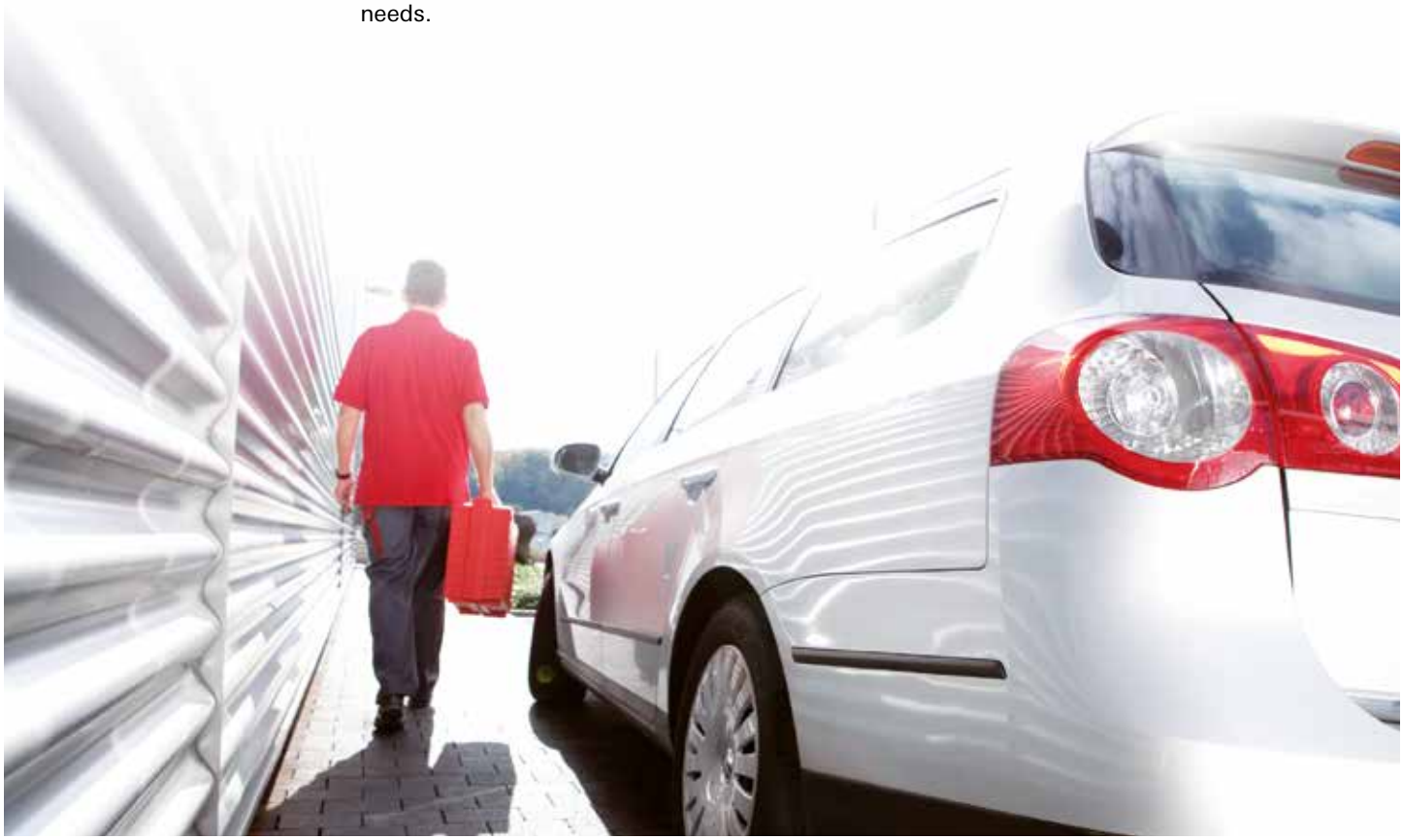
Our extensive range of training courses provides you with the best possible expertise for safeguarding against the dreaded “worst-case scenario” and to perfect the way you handle vacuum components.



In addition to the cost of acquisition, total cost of ownership throughout the life of the product is also contingent upon operating and maintenance expenses.

Our professional sales engineers and service technicians provide you with hands-on support world-wide.

Pfeiffer Vacuum offers a complete service portfolio ranging from genuine spare parts right through to service agreements: The modular service system is adjusted precisely to your needs.



Service solutions

Fast, competent service around the globe

Training

Qualified staff is vital to guarantee the smooth operation of our vacuum solutions in your company. We offer you training courses for every need, covering a wide variety of topics: spanning from theoretical basic courses up to application training courses that provide you with the skills to maintain your systems. Make sure your staff has the vacuum expertise you need!

In addition to the regular training courses, arrangements for individual courses can be made. Necessary for all courses: Practice based focus is vital. All courses can take place either in our company headquarters in Asslar, Germany, or on site at your company. More information about our training courses can be found in our customer training course program on our website.

Genuine replacement parts and tools

For carrying out some common maintenance items yourself, we recommend that you only use genuine replacement parts and tools. These are available from Pfeiffer Vacuum and will ensure the quality and long life of our products. All of our experience that we have gathered in the development and production of our components is used in putting together replacement part packages and the development of our tools. Our promise: All genuine replacement parts and tools are state-of-the-art.

Preventative service

Optimal maintenance is important to guarantee the best possible functionality of our products. To reduce downtimes as much as possible, Pfeiffer Vacuum can maintain many of our products directly on-site at your company. For preventative maintenance, we offer a lower-priced service replacement; you receive an exchange product tested to the latest specifications. We can also create your own individual service schedule within the frame of a service agreement and support you in monitoring maintenance intervals.

Corrective service

If maintenance is no longer sufficient, we will do everything to make sure your product is up and running once again. With more than 80 service locations worldwide, we are ready to provide a quick solution nearby using uniform standards. If a quick turnaround time is needed, we will be happy to provide you with a replacement product in mint condition.

Refurbished products

Another choice is our refurbished products that also meet the highest quality standards. These products are in perfect technical condition and are tested according to new product criteria. Our customer service department will be happy to issue you a quote and check for immediate availability.

Additional services

Additional on-site services include the commissioning of components and systems, gas analysis and leak detection on site as well as the calibration of vacuum gauges and test leaks. Any short-term requirements can be accommodated through the rental of your required product.

On-site worldwide for you

Production, sales and service

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