Vacuum Technology

The Right Solution for Every Application!

Vacuum Technology



Pfeiffer Vacuum – Your ideal partner!

Pfeiffer Vacuum stands for innovative solutions, high technology and reliable products as well as outstanding service. For more than 100 years, we have been setting milestones in vacuum technology with our products. Our comprehensive line of products and services range from individual components to complex vacuum systems.

As a leading supplier in vacuum technology, we have the right solution for every application. Quality and worldwide service play a decisive role in our work. Since we invented the turbopump we have been setting new standards in vacuum engineering. Pfeiffer Vacuum is the world market leader in this field.

With our close-knit, worldwide sales and service network, we are never far away. Its long years of customer- and application-specific experience make Pfeiffer Vacuum your ideal partner.

High-quality, reliable products.
First-class service. Competent advice.

These are our strengths!

Advantages at a glance

- A leading manufacturer of vacuum technology for more than 100 years
- World market leader with approximately 300,000 turbopumps delivered to date
- Major investments in research & development
- An independent, innovative company
- A complete product line, from individual components to complex vacuum systems
- Very high standard of quality – absolutely reliable products
- On-site service worldwide

Vacuum Technology

Pfeiffer Vacuum – Milestones

1890 Founded in Wetzlar as the "Arthur Pfeiffer" Company
1958 Invention of the turbomolecular pump
1996 Pfeiffer Vacuum Technology AG: IPO on the New York Stock Exchange
1997 Introduction of the first dry pump for industrial applications with convection cooling
1998 Second listing on the Deutsche Börse Stock Exchange in Frankfurt (today TecDax)
1999 Market launch of the first high-performance CompactTurbo™ 2000 l/s class
2000 First line of digital gauge heads: DigiLine™
2005 Market launch of the OnTool™ Booster – high-vacuum pump that works against atmosphere
2005 Expanded product portfolio of large turbopumps with pumping speeds from 1000 to 2000 l/s
2007 Market launch of the PrismaPlus™ mass spectrometer – modular design, powerful software, wide range of applications
2007 Market launch of the PentaLine™ – the new two-stage rotary vane pumps
2008 Market launch of the HiPace™, the new generation of turbopumps

Quality management:
Certified under ISO 9001

Environmental management:
Certified under ISO 14001

Rotary Vane Pumps

HenaLine™, UnoLine™ Plus

The single-stage rotary vane pumps for all low and medium vacuum applications.

General process technology

Fluorescent tube manufacturing

Cleanroom transfer chambers

HenaLine™

Applications
- Electron beam welding
- Lamp manufacturing
- Surface coating
- Vacuum drying and degassing
- Leak detection
- Metallurgy
- Simulation chambers (Air conditioning, aerospace)

Advantages at a glance
- A complete line of pumps with pumping speeds of between 25 and 1,000 m^3/h
- Integrated oil mist separator for clean exhaust air
- Low ultimate pressure
- Compact, reliable and powerful

UnoLine™ Plus

Applications
- Transformer drying
- Cable drying
- Oil recovery
- Metallurgy
- Coating

Advantages at a glance
- Rugged and long-lasting
- Resistant to dust and dirt
- Bearings located outside the pumping cavity
- Extremely low speed
- Very high water vapor capacity

Technical data

Rotary vane pump	Hena 25 – Hena 1000	BA 251 – BA 501
Pumping speed at 50 Hz	25 – 1,000 m^3/h	250 – 500 m^3/h
Pumping speed at 60 Hz	30 – 1,200 m^3/h	250 – 500 m^3/h
Ultimate pressure: Total without gas ballast	< 1.2 – < 0,4 mbar	$< 6 \cdot 10^{-2}$ mbar
Ultimate pressure: Total with gas ballast	< 1.5 – < 3 mbar	$< 6 \cdot 10^{-1}$ mbar
Weight	35 – 1,060 kg	570 – 1,100 kg

Rotary Vane Pumps

DuoLine™

Two-stage rotary vane pumps with magnetically coupled drive.

Vacuum drying

Vacuum metallurgy

Coating

DuoLine™

Applications

- Coating
- Industrial
- Analytical industry
- Research & development
- Vacuum chemistry
- Vacuum metallurgy
- Vacuum drying

Advantages at a glance

- Environmentally friendly – No oil leaks
- Minimum operating costs – No shaft seal maintenance
- Corrosion-proof – No non-ferrous metals
- No exchange between process gas and the environment
- Integrated safety and gas ballast valve
- Extensive monitoring and system integration accessories
- Corrosive gas version available

Technical data

Rotary vane pump	DUO 5 M	DUO 10 M	DUO 20 M	DUO 35 M	DUO 65 M
Pumping speed at 50 Hz	5 m^3/h	10 m^3/h	20 m^3/h	32 m^3/h	62 m^3/h
Pumping speed at 60 Hz	6 m^3/h	12 m^3/h	24 m^3/h	36 m^3/h	70 m^3/h
Ultimate pressure: Total without gas ballast	$5 \cdot 10^{-3}$ mbar	$5 \cdot 10^{-3}$ mbar		$3 \cdot 10^{-3}$ mbar	
Ultimate pressure: Total with gas ballast	$2 \cdot 10^{-2}$ mbar	$1 \cdot 10^{-2}$ mbar		$5 \cdot 10^{-3}$ mbar	
Weight	19 kg	27 kg	33 kg	56 kg	65 kg

Rotary Vane Pumps

PentaLine™

Two-stage rotary vane pumps – space-saving and cost-effective.

Analytics

Research & Development

Industry

PentaLine™

Applications

- Freeze drying
- Metallurgy
- Mass spectrometry
- Electron microscopy
- Leak detection
- Gas analysis
- Research & Development
- Coating

Advantages at a glance

- Standby mode – Longer service life, intelligent process control
- Power-saving – Lower operating costs (–50 %), environmentally friendly
- Worldwide power supply – Simple logistics, connects to all standard power supply systems
- Lowest switch-on current – Easy system integration, cost reduction
- Hermetically sealed – No oil leakage, significantly improved leak rate versus conventional rotary vane pumps
- Runs cooler – Gives off less heat in standard operation

Technical data

Rotary vane pumps	Penta 10	Penta 20	Penta 35
Pumping speed max.	11 m^3/h	22 m^3/h	34 m^3/h
Ultimate pressure, without gas ballast	$\leqslant 5 \cdot 10^{-3}$ mbar		
Ultimate pressure, with gas ballast	$< 1 \cdot 10^{-2}$ mbar		
Weight with motor	42 kg	43 kg	45 kg

Roots Pumps

OktaLine™

Just right for every low and medium vacuum application.

Metallurgy

Electron beam welding

Packaging industry

OktaLine™

Applications

- Metallurgy
- Simulation chambers
- Packaging industry
- Freeze/vacuum drying
- Thin-film technology
- Electron beam welding
- Load-locks/transfer chambers
- Chemical and process technology
- Industrial leak detection systems

Advantages at a glance

- Optimum flexibility and maximum process suitability
- Broad range of pumping speeds: 250 to 25,000 m³/h
- Rugged, compact design
- Fast evacuation thanks to high compression ratio
- Maintenance free, maximum reliability and highest uptime thanks to magnetic coupling
- Low operating costs thanks to air cooling and magnetic coupling
- Also available: Explosion-protected series ADx and ADEx

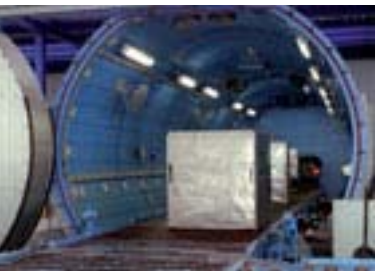
Technical data

Roots pumps	Okta 250	Okta 500	Okta 1000	Okta 2000	Okta 4000	Okta 6000	Okta 8000	Okta 18000
Nominal pumping speed	270 m³/h	490 m³/h	1,070 m³/h	2,065 m³/h	4,050 m³/h	6,075 m³/h	8,000 m³/h	17,850 m³/h
Leak rate:								
Pumps with shaft sealing	$1 \cdot 10^{-2}$ mbar l/s						$1 \cdot 10^{-2}$ mbar l/s	
Magnetic coupled pumps	$1 \cdot 10^{-5}$ mbar l/s						–	
Rotational speed	3,000 1/min						1,500 1/min	
Weight	95 kg	125 kg	250 kg	370 kg	600 kg	850 kg	1,550 kg	3,100 kg

Roots Pumping Stations

CombiLine™

Offering a broad range of Roots pumping stations.



Leak detection

Metallurgy

Coating

WU – with HenaLine™ / UnoLine™ Plus

Applications
- Load-locks / transfer chambers
- Helium leak detection
- Metallurgy
- Vacuum drying and degassing

WD – with DuoLine™

Applications
- Coating
- Thermal protection coatings
- Metallurgy

WH – with HeptaDry™

Applications
- Coating
- Metallurgy
- Vacuum drying
- Degassing of plastics

Advantages at a glance
- Standard pumping stations and customer-specific solutions
- Support in designing your vacuum system
- Magnetically coupled pumping stations available – hermetically tight and maintenance-free

Technical data

Pumping station	WU	WD	WH
Roots pump	250 – 6,000	250 – 4,000	250 – 6,000
Backing pump	Hena 60 – 1000	DUO 35 – 250	HeptaDry™ 100 – 600
Pumping speed at 1 mbar	230 – 5,300 m^3/h	220 – 3,000 m^3/h	240 – 4,900 m^3/h
Final pressure	$< 3 \cdot 10^{-2}$ mbar*	$< 3 \cdot 10^{-4}$ mbar*	$< 2 \cdot 10^{-3}$ mbar**
Weight	210 – 2,300 kg	190 – 1,100 kg	300 – 1,900 kg

* without gas ballast
** 50 Hz

Dry Pumps

XtraDry™ · Diaphragm pumps (MVP) · HeptaDry™

Universal dry compressing pumps.

Coating

Metallurgy

Electron beam welding

XtraDry™

Applications
- Mass spectrometry
- Leak detection
- Electron microscopes
- Vacuum packaging

Advantages at a glance
- No contamination of the process
- No particle emissions
- Absolutely dry suction chamber

Diaphragm pumps (MVP)

Applications
- Research & development
- Laboratories
- Mass spectrometers

Advantages at a glance
- Absolutely dry, oil-free vacuum
- Long diaphragm service life
- Compact and light
- Very quiet operation

HeptaDry™

Applications
- Metallurgy
- Coating
- Freeze-drying
- Load-locks
- Electron beam welding

Advantages at a glance
- Complete series of pumps with pumping speeds from 100 to 600 m^3/h
- Optimum ultimate pressure and broadest range of applications
- Absolutely dry and oil-free
- Water cooling with thermostatic valve
- Low energy consumption, low noise level

Technical data

Dry pumps	XtraDry™ 150 / 250	MVP 006 – 160	HeptaDry™ 100 – 600
Ultimate pressure: Total without gas ballast	< 0.1 / < 7 mbar	$< 5 \cdot 10^{-1}$ – < 4 mbar	< 0.05 mbar
Nominal pumping speed	7.5 / 13 m^3/h	0.9 l/min – 9.6 m^3/h	110 – 525 m^3/h
Leak rate	< 0.01 mbar l/s	$6 \cdot 10^{-2}$ – 1 mbar l/s	–
Rotational speed	–	1,500 – 3,000 1/min	3,000 1/min
Weight	30 kg	1.8 – 25 kg	235 – 660 kg

OnTool™ Booster

The high-vacuum pump that works against atmosphere.

Coating

Light bulb manufacturing

Wafer fabrication

OnTool™ Booster

Applications

- Transfer chambers
- Load-locks
- EUV lithography
- Solar cell coating
- Optical coating
- Surface finishing
- Simulation chambers
- Light bulb manufacturing

Advantages at a glance

- Compact – Modern, convenient design
- Powerful – Extremely high pumping speed of 130 m^3/h
- Cost-effective – Does not require a backing pump
- Particle-free – For all clean applications
- Flexible – Can be used as either a stand-alone or backing pump

Technical data

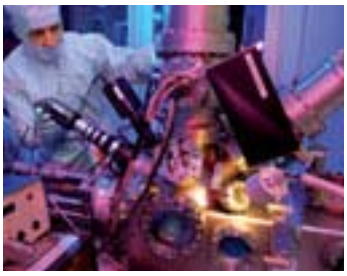
OnTool™ Booster	
Max. pumping speed for N_2:	
At 10^{-1} mbar (75 mTorr) inlet pressure	130 m^3/h
At atmospheric inlet pressure	18 m^3/h
Ultimate pressure	< 10^{-5} mbar
Rotational speed	60,000 1/min
Weight	35 kg

Turbopumps

HiPace™ · HiPace M

Dependable operation. Low cost of ownership.
Wide variety of applications.

Wafer fabrication



Mass spectrometry

Semiconductor

Plasma physics

HiPace™

Applications
- Electron microscopy
- Ion implantation
- Film coating
- Particle accelerators
- Electron beam welding
- Lamp/tube manufacturing

Advantages at a glance
- Compact series of pumps with pumping speeds of from 10 – 700 l/s
- Robust engineering and proven bearing system offer maximum reliability
- Compact design makes for minimum footprint
- High gas throughputs and high pumping speeds

HiPace M

Applications
- Ion beam etching
- Ion implantation
- Space simulation
- Solar cell coating
- Metallurgy

Advantages at a glance
- Integrated drive electronics eliminate the need for cumbersome and costly cabling
- Suitable for most applications thanks to high pumping speed and high gas throughput
- Extremely low vibration and noise for sensitive applications
- Highly reliable thanks to permanent rotor monitoring

Technical data

Pump model	HiPace™ 10 / 80 / 300 / 400 / 700	HiPace M 2400 / 3400
Pumping speed H_2	3.7 – 580 l/s	1,800 – 2,850 l/s
Pumping speed Ar	11.5 – 670 l/s	1,900 – 2,850 l/s
Compression H_2	$3 \cdot 10^2$ – > $4 \cdot 10^5$ mbar	$1 \cdot 10^4$ – $4 \cdot 10^4$ mbar
Compression N_2	$3 \cdot 10^6$ – > $1 \cdot 10^{11}$ mbar	> $1 \cdot 10^9$ mbar
Rotational speed	90,000 – 49,200 1/min	29,400 – 24,000 1/min
Weight	1.9 – 12.3 kg	71 – 94 kg

Turbo Pumping Stations

Economy · TurboCube™

The ideal plug & play solution for your application.

Electron microscopy

Accelerators

Fluorescent tube manufacturing

Economy

Applications
- Laboratory applications
- Spectroscopy
- Surface analysis
- Small coating systems
- Leak detection
- Tube manufacturing

Advantages at a glance
- Plug & play pumping station
- Flexible design
- Dry high-vacuum system with turbo and diaphragm pump
- Versatile accessories
- Integrated gauge connection
- Compact and economical

TurboCube™

Applications
- Research & development
- Accelerators
- Analytics and surface analysis
- Vacuum process engineering
- Electron beam welding

Advantages at a glance
- Modular design with good accessibility of the individual components
- Integrated turbo controller

Technical data

Turbo pumping stations	Economy	TurboCube™
Pumping speed N_2	33 – 60 l/s	33 – 510 l/s
Pumping speed backing pump	0.9 m^3/h	0.9 – 10 m^3/h
Final pressure	$< 1 \cdot 10^{-7}$ – $< 1 \cdot 10^{-8}$ mbar	$< 1 \cdot 10^{-7}$ – $< 5 \cdot 10^{-10}$ mbar
Weight	15 – 16 kg	28 – 69 kg

Components and Feedthroughs

Components and feedthroughs

For all vacuum applications.

Pumping station

Inline coating system

Pumping station

Components

- Connection components
- Seals
- Flanges
- Pipe components
- Bellows
- Adapters
- ISO-KF, ISO-K, CF

Feedthroughs

- Rotary feedthroughs
- Linear feedthroughs
- Rotary/linear feedthroughs
- Liquid feedthroughs
- Sight glass
- Electrical feedthroughs
- Coaxial feedthroughs
- ISO-KF, ISO-K, CF

Technical data

Components	
Nominal diameter	DN 10 – DN 1000
Material	Aluminum, steel, stainless steel
Seal	Neoprene, aluminum, copper, copper silver plated, FPM

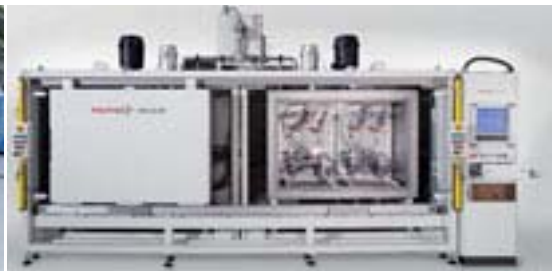
Feedthroughs	**Nominal diameter**	**Connector**	
Rotary feedthroughs	DN 16 – DN 63	ISO-KF, ISO-K, CF	Torque: 0,4 – 500 Nm
Linear feedthroughs	DN 16 – DN 40	CF	Stroke: 25 – 50 mm
Rotary/linear feedthroughs	DN 16 – DN 40	ISO-KF	Stroke: 50 – 150 mm
Liquid feedthroughs	DN 40	ISO-KF, CF	Temperature range: – 200 °C to + 400 °C
Sight glasses	DN 16 – DN 160	ISO-KF, ISO-K, ISO-F, CF	Glasses: Borosilicate, Kodial, Sapphire
Electrical feedthroughs	DN 16 – DN 40	ISO-KF, CF	Voltage: up to 12 kV, Current: up to 1,500 A

Valves

Valves

For shutting off, venting and dosing.

Coating systems



Leak detection systems

Valves

- Angle valves
- Inline valves
- Gate valves
- Bellows-sealed gate valves
- Mini angle valves
- Mini inline valves
- Regulation valves
- ISO-KF
- ISO-K
- CF
- ISO-F

Technical data

Valves	
Nominal diameter	DN 5 – DN 250
Pressure ranges	$1 \cdot 10^{3} – 1 \cdot 10^{-11}$ mbar
Seal	Aluminum, copper, FPM
Housing	Stainless steel, aluminum
Actuation	Manually, electropneumatically, electromagnetically

Measurement and Control Units

DigiLine™ · ActiveLine · ModulLine

Total pressure measurement

DigiLine™

Total pressure measurement with digital signal output.

Advantages at a glance
- Reliable data transfer through digital signals
- Serial interface RS 232/485 selectable
- Five different transmitters and two control units available

ActiveLine

Total pressure measurement with analog signal output.

Advantages at a glance
- Compact design
- Easy integration
- Cost-effective
- Ceramic technology sensor
- Pressure reading independent of gas type
- Eight transmitters and three control units available

ModulLine

For all applications in research & development.

Advantages at a glance
- Rugged and well proven design
- Two different gauges available
- Control unit with slots for two measurement boards and one interface and relais board
- Ideal for harsh environments, i.e. accelerators

Technical data

Gauges	DigiLine™
Measurement range	$1 \cdot 10^{-9}$ – 2,000 mbar
Measuring cycle	40 ms

Gauges	ActiveLine
Measurement range	$1 \cdot 10^{-11}$ – 55,000 mbar
Pressure max.	2 – 15 bar

Gauges	ModulLine
Measurement range	$1 \cdot 10^{-11}$ – 1,000 mbar
Bakeout temperature	150 – 250 °C

Leak Detectors

SmartTest

The ingenious solution to your quality assurance.

Automotive industry

Semiconductor production

Lamp manufacturing

Refrigeration, air conditioning

SmartTest

Applications
- Automotive industry
- Semiconductor production
- Lamp manufacturing
- Refrigeration, air conditioning
- Coating

Advantages at a glance
- Modular concept
- Simple operation
- Utmost sensitivity

Technical data

SmartTest	HLT 550 – 575
Smallest detectable leak rate for He	< $5 \cdot 10^{-12}$ mbar l/s
Test method	Vacuum and sniffing leak detection
Detectable gases	^4He, ^3He, H_2
Response time	0.5 s
Pumping speed for He	2.5 l/s
Inlet pressure max.	25 mbar
Available backing pumps	Rotary vane, diaphragm and scroll pumps as well as XtraDry™

Mass Spectrometer

PrismaPlus™ · HiQuad™ · OmniStar™ · ThermoStar™

For gas analysis.

Accelerator

Coating

Research & Development

PrismaPlus™

Advantages at a glance

- Modular design offers optimum adaptability
- Compact size yet high performance
- A variety of interfaces make for simple systems integration
- High measurement speed, stability and resolution
- Interchangeability of analyzers and electronics
- Intuitive operation of the Quadera® software
- Mass ranges 1 – 100 amu, 1 – 200 amu, 1 – 300 amu

HiQuad™

Advantages at a glance

- Modular, flexible design
- Simple operation with Quadera® software
- Extremely high measurement speed
- Maximum sensitivity and wide dynamic range
- Outstanding long-term stability
- Ethernet interface
- Integral Internet browser and OPC server for communicating with PC-based programs

OmniStar™

Advantages at a glance

- Quantitative gas analysis – inclusive non-polar molecules, inert gases, etc.
- Low detection threshold (< 1 ppm) even for condensable gases
- Temperature-controlled gas line (stainless steel capillary)
- Control of up to 64 gas components
- Short response time
- Online process control
- Mass ranges 1 – 100 amu, 1 – 200 amu, 1 – 300 amu

ThermoStar™

Advantages at a glance

- Reactive and condensable gases are detectable even in small concentrations
- Temperature-controlled gas line (quartz capillary)
- No chemical reaction
- Certain identification of unknown gases
- Mass ranges 1 – 100 amu, 1 – 200 amu, 1 – 300 amu

Vacuum Systems

Helium leak detection systems

Best-in-class technology for your quality assurance.

Leak detection systems

Helium leak detection systems

Applications

- Automotive industry
  (e.g. airbags, aluminum rims, fuel tanks system assemblies, air conditioning and air suspension system components)
- Refrigeration / air conditioning technology
  (e.g. evaporators, compressors)
- Vacuum and pressurization technology
  (e.g. valves and fittings)
- Packaging technology
  (e.g. for pharmaceutical products, foods)

Advantages at a glance

- Optimum sensitivity in detecting even the smallest leaks
- Dry testing instead of bubble testing
- Automated measurement method
- Minimizes testing times and operating costs
- Compliance with quality and environmental requirements
- Fully automated test procedure

Vacuum Systems

Vacu²

The revolution in die casting!

From raw material ...

... to final products

Visual comparison of a conventional vacuum process (left hand) with Vacu² from Pfeiffer Vacuum (right hand) following glow test at 500 °C

Vacu²

Application

- Die casting

Advantages at a glance

- Better vacuum translates into optimum quality
- Reliable process monitoring reduces the rejection rate
- Faster process optimization and better designed molds as low as vent valves reduce your costs

Technical data

Vacu²	
Pumping speed	200 m³/h
Achievable ultimate pressure in buffer recipient	5 mbar
Footprint	
Dimensions (W x D x H)	1,300 x 930 x 3,716[1)] mm
Weight	1,000 kg
Electrical connection data	
Rating	7.2 kVA
Frequency	50 Hz / 60 Hz
Voltage	3 x 400 V / 3 x 208 V
Control voltage	24 VDC

[1)] Variable, depending upon recipient

Service and Training



First-class service and training for high-quality products.

Service

- Fast, competent service worldwide
- On-site bearing replacement
- Exchange products and spare parts
- Custom-tailored service agreements

Training

- Standard and customized training
- Competent trainings worldwide

www.pfeiffer-vacuum.net

Leading innovations.
Too fast to be copied.

Pfeiffer Vacuum – A name that stands for reliable high-tech products and innovative solutions that support our customers in their applications and pave the way to their success.

Our vacuum technology developments always keep us a step ahead!

Sales, service and consulting

- Worldwide on-site service
- Comprehensive in-factory and on-site training programs
- Modular service system ranging from spare parts to maintenance contracts

PFEIFFER VACUUM

Pfeiffer Vacuum · Headquarters / Germany