

CHEMICAL

OIL & GAS

REFRIGERATION

POWER GENERATION

SERVICE



Convincing worldwide:
HERMETIC pumps
in the chemical industry

 **LEDERLE**
Hermetic

Simply the best pump technology

RESPONSIBILITY
FOR THE
ENVIRONMENT



In the function as an operator of complex systems and as a producer of a wide product line there is a great human and environmental responsibility on the part of the chemical industry. This is the reason for an increased awareness of safety in plants for staff and residents and of the environmental protection which is considered as an important item in business strategies.

The chemical industry is making great efforts to improve safety, health and environmental protection. This is based on the overall concept "Sustainable Development", which stands for ecological, environmental, economical and social objectives.

In praxis this means to reduce environmental impact and, at the same time, to maintain the international competitiveness and to take into account the social responsibility for staff.

Sensitive requirements need reliable solutions.

The chemical industry produces a wide range of products for different spheres. One main focus lies on the production of intermediate products for different industrial branches, such as inorganic basic chemicals, petrochemicals, polymers, fine and special chemicals.

Moreover, chemical products are used in the field of health, environmental protection and in the food industry. Thus, the use of chemical products is a contributory factor in improving the quality of life.

HERMETIC pumps provide solutions for special requirements.

The production in the chemical industry is based on:

Our solution:

high availability

We provide you with a reliable and nearly maintenance-free pump technology to safe and optimize various processes.

environment protection and operational safety

The leakage-free pump technology ensures a safe conveying of valuable and dangerous fluids.

cost-intensive research

As an experienced partner in optimizing and developing processes, we already integrate our know-how into the developing phase of the process.

high-grade engineering

Simple constructions allow safe operating methods and minimize the complexity. Thus, it can be reached more process safety.

various applications

We can put a wide range of pumps at your disposal for standardized applications as well as for customized processes.



INNOVATION AND
EXPERIENCE
FOR YOUR PRODUCT



HERMETIC pumps are conversion artists. They continuously adapt to the new conditions and requirements, integrate themselves and become part of the whole. For

HERMETIC pumps one thing is most important:

Straight power – at highest safety.

The products of the company HERMETIC-Pumpen GmbH stand for best quality and highest operational safety in the chemical and petrochemical industry, as well as in refrigeration and power generation.

HERMETIC engineers combine selected materials suitable for process and individual solutions to sophisticated units. Products are developed in partnership with our customers in a flexible construction and production process coming up to the special process requirements.

Long service lives and low life-cycle costs are a main characteristic of HERMETIC products from the beginning.

An integral part of our developments are the requirements for explosion protection according to the directive 94/9/EC (ATEX).

The complete production line of HERMETIC-Pumpen GmbH is an essential contribution in observing the directive 96/61/EC, the so-called IPPC directive (Integrated Pollution Prevention and Control) and the Federal Immission Protection Law and TA-Luft, respectively.

HERMETIC pumps are “**Best Available Technology**” when handling dangerous and harmful fluids, either with single or double mechanical seal, magnetic coupling or canned motor.

We offer a highest level of safety – also with extreme parameters.



HERMETIC pumps are designed for extreme conditions.

Thus, they always are used if conventional technologies come to their limit.

High system pressures, strong temperature fluctuations, most difficult pumping liquids – HERMETIC pumps won't be impressed by that.

But they convince with impressive performance!

For some it may be "extreme", for HERMETIC pumps it's standard

- polymer solutions with variable viscosity
- corrosive and toxic fluids
- shear sensitive and explosive media
- high or low temperatures
- abrasive slurries hot or cold

High potential risk originating from the medium to be conveyed

The liquids to be conveyed such as ethylene oxide, phosgene, chlorine, vinyl chloride, just to state only a few, bears a high or a very high potential risk and constitutes a danger for humans and for the environment. An absolute tightness of the pumps must be guaranteed.

Fluids to be conveyed at extreme temperatures

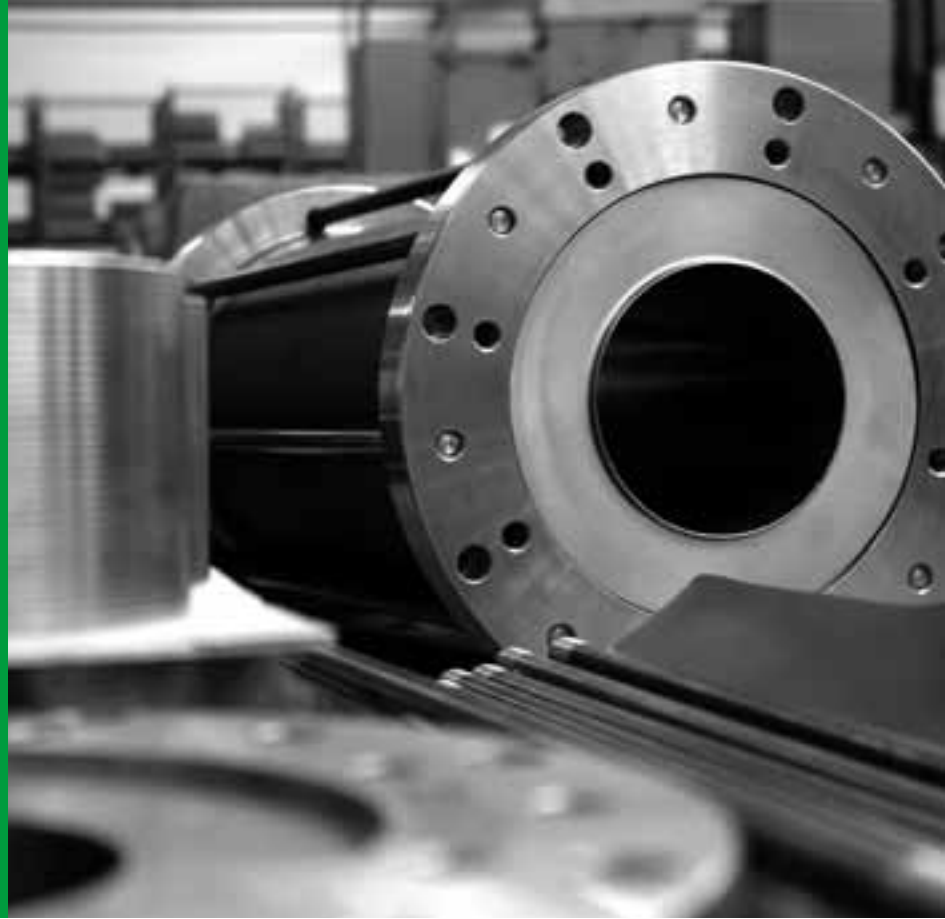
The chemical industry features extremely low and high temperatures, posing an additional challenge on safety and availability of the pumps.

Liquids in a temperature range from -160°C to $+480^{\circ}\text{C}$ can be conveyed through the use of HERMETIC pumps.

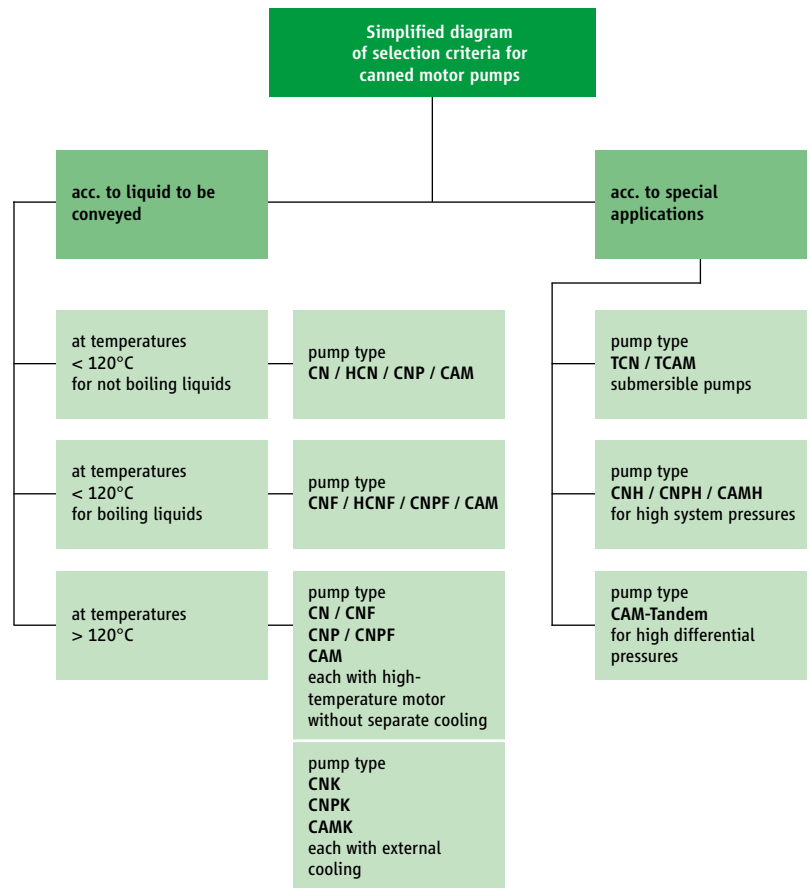
High-pressure circulation

Our pumps are often being used for applications with high-pressure circulation of fluids or supercritical gases such as hydrocarbons, carbon dioxide or supercritical ethylene. Nominal pressures up to 1200 bar are available.

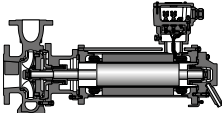
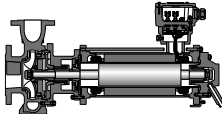
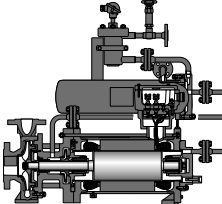
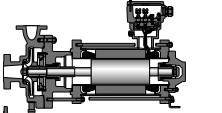
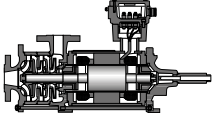
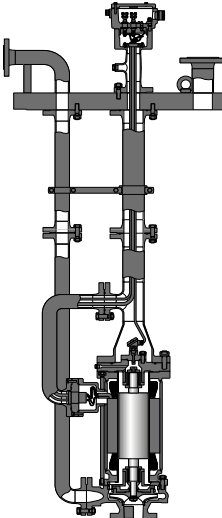
HERMETIC –
OUR NAME
STANDS FOR OUR
PRODUCT LINE



The use of HERMETIC pumps may solve a wide range of different conveying problems. The selection of the different type ranges depends on physical requirements.



With HERMETIC pumps you may solve the most different conveying problems.

Category	Type of construction	
Single-stage centrifugal pumps with canned motor or magnetic drive	Type CN Type HCN Type MCN	
Single- and multistage centrifugal pumps for liquefied gases with canned motor or magnetic drive	Type CNF Type HCNF Type CAM Type MCNF Type MCAM	
Single-stage centrifugal pumps for hot media to be conveyed with canned motor or magnetic drive	Type CNK Type MCNK	
Single-stage centrifugal pumps in process design with axial installation, with canned motor	Type CNP	
Single- and multistage centrifugal pumps for small flow rates and high differential heads with canned motor or magnetic drive	Type CAM Type MCAM	
Single- and multistage submersible pumps for low NPSH values with canned motor	Type TCN Type TCAM	

TECHNOLOGY
AT THE HIGHEST
STAGE



One critical item when using conventional centrifugal pumps is to seal the shaft passages on the pump casing. Besides the high rate of repairs, this is a reason for the steadily increasing use of sealless pumps.

In technical process plants centrifugal pumps are considered as being the most used machines.

The operational safety and reliable functioning of these pumps play an important role. Looking at the troubles and, in particular, at the costs which may occur in connection with the maintenance of mechanic seals, hermetically sealed pumps have become the preferred choice for system planning engineers and operators. The praxis shows that sealless pumps generally have less repairs than in comparison with conventional chemical pumps with mechanical seal and consequently, they feature a longer service life.

This experience from the chemical industry corresponds to the experience made in the field of the heating system technology, where canned motor

pumps have been used for decades with great success and where a service life of 10 and more years is not unusual.

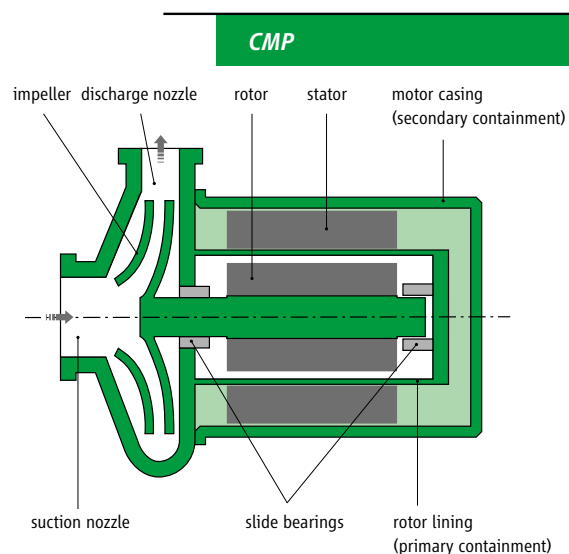
The refrigeration and cooling industry has also used canned motor pumps for a long time without any problems. Thus, besides the absolute tightness and high safety of these pumps, they additionally offer both, the advantage of minimized maintenance and high availability.

In principal, two sealless systems, pumps with canned motor and with permanent magnetic coupling are nowadays considered as being important.

Functional principle of canned motor pumps (CMP)

Canned motor pumps are characterised by a compact, integrated unit without mechanical seal. The motor and pump form a unit with the rotor and the impeller fitted onto a common shaft. The rotor is guided by two identical, medium-lubricated slide bearings. The stator on the drive motor is separated from the rotor space using a thin stator liner. The rotor cavity itself, along with the hydraulic section of the pump, create a combined cavity which needs to

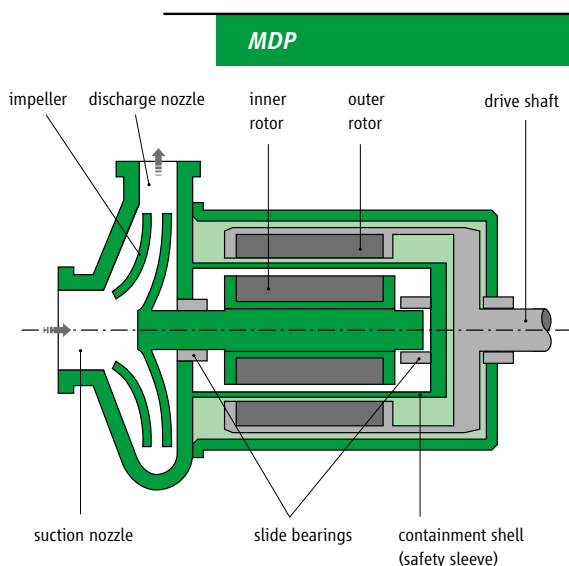
be filled with pumping medium before commissioning. The heat loss from the motor is carried off by a partial flow between the rotor and the stator. At the same time, the partial flow lubricates both slide bearings in the rotor cavity. Both the can, which is a hermetically sealed component, and the motor casing are used as a safety containment. Because of that, canned motor pumps always ensure highest safety level when conveying dangerous, toxic, explosive and valuable media.



Functional principle of magnetic drive pumps (MDP)

Hermetically sealed pumps with magnetic coupling are characterized by a single-acting safety sleeve. The separation of liquid to the atmosphere is effected via the so-called containment shell. As it is the case with conventional centrifugal pumps with

mechanical seal, a common standard motor is used which one is combined with the magnetic drive through a coupling for the drive of the pump. The outer rotor contains permanent magnets transferring the turning moment created by the motor via the containment shell to the inner rotor.



FOR YOUR SAFETY –
ALWAYS BEING
ONE STEP AHEAD



Our longstanding experience and the intensive exchange of experience with our customers allow us to adapt our products according to the latest requirements of technology.

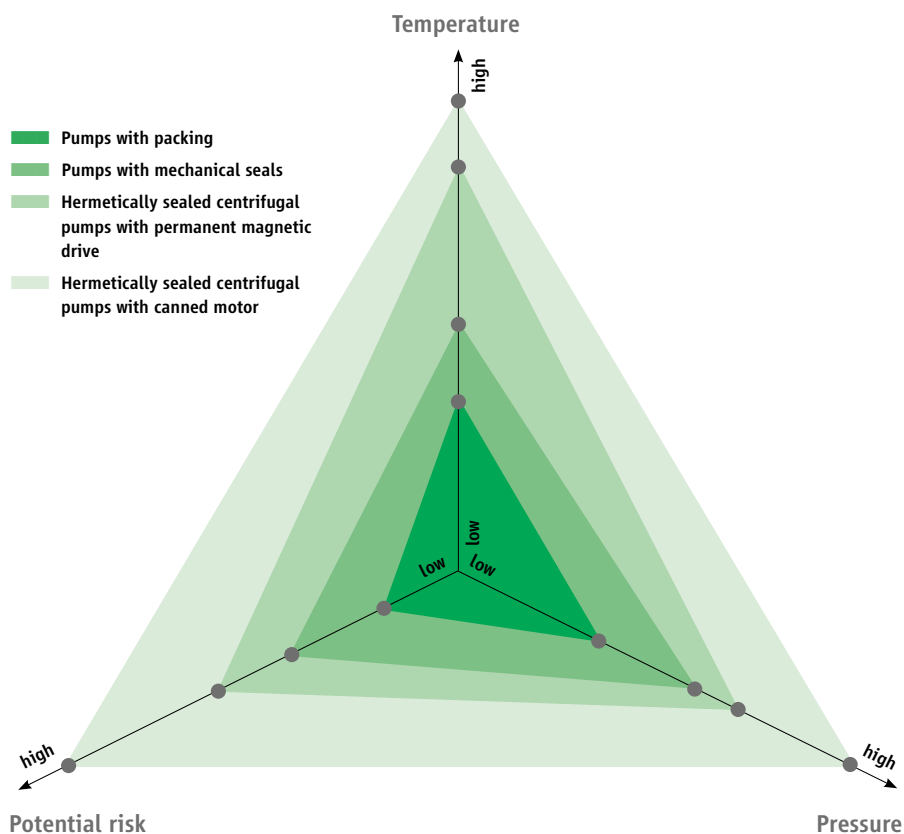
Explosion protection acc. to ATEX

All HERMETIC pumps can optionally be designed according to explosion protection requirements. The pumps meet the requirements of the electrical as well as of the non-electrical explosion protection.

Provided that the rotor cavity, as part of the process system, is permanently filled with liquid, no explosive atmosphere may arise. Internal motor cavity can be considered as "no explosive area."

Customer benefits when using canned motor pumps

- 100% leakage-free thanks to double containment design
- canned motor pumps comply with the most significant requirements regarding environmental protection
- extremely low noise level
- virtual lack of wear and minimized maintenance
- high availability and long service life
- higher MTBF values compared to pumps with mechanical seal
- easy installation, since no shaft alignment of motor and coupling is required



Operational limits

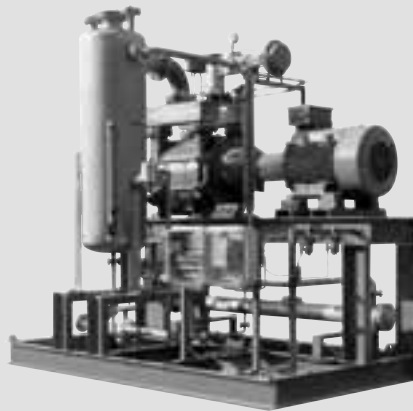
The figure shows the operational limits for conventional and sealless pumps. The diagram consists of three axes, presenting the operating parameters such as temperature, pressure and potential risk. The smaller tetrahedron presents the operating range of pumps with packing, the next larger one shows the range of the mechanical seals.

The outer range with either high potential risk, high temperature, high pressure or a combination of these different parameters presents the typical operating range of sealless pumps.

When choosing magnetic drive pumps or canned motor pumps the job requirements should be taken into consideration. There are different drive systems which provide advantages, depending on the case of application, pressure stage, temperature, class of danger of the medium to be pumped, requirements for explosion protection and safety.



THE SUITABLE
SOLUTION
FOR ALL PROCESS
ENGINEERING
REQUIREMENTS



VACUUM PACKAGE UNIT

with hermetical liquid ring vacuum pump, integrated suction pressure control and closed ring liquid circulation for residual vapour distillation

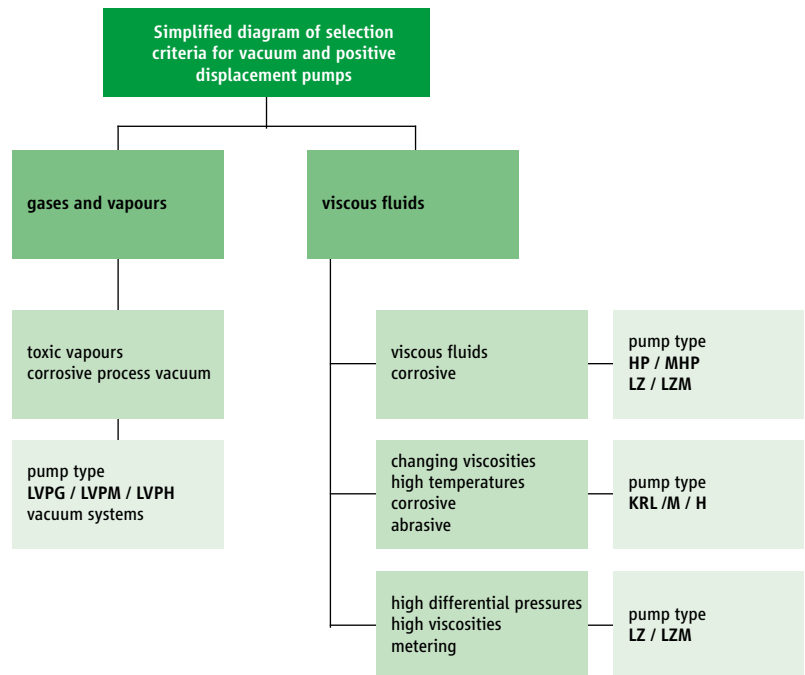


4-STAGE VACUUM PACKAGE UNIT

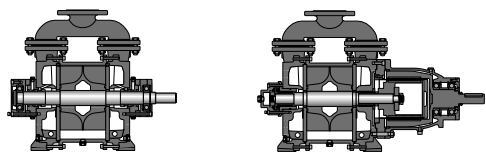
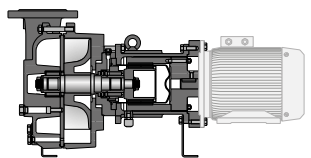
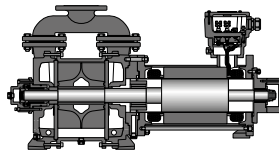
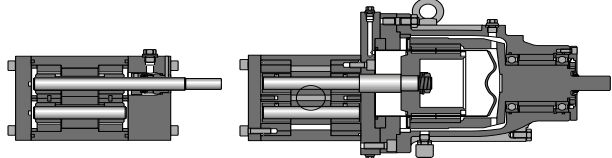
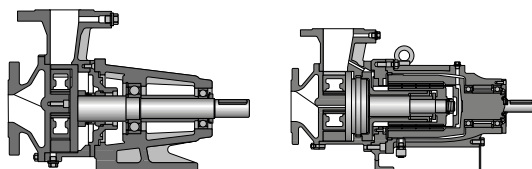
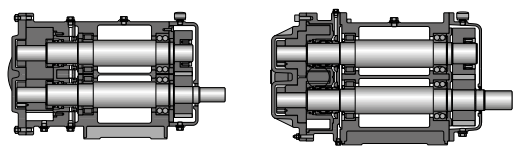
with gas cooler and suction pressure control in an amine production unit

Thanks to a great number of realised projects, HERMETIC engineers dispose of a wide field of experience. Thus, new projects are realised in an efficient and economical way.

HERMETIC quality does not know any compromise.



HERMETIC vacuum pumps, compressors and displacement pumps for process engineering requirements.

Category	Type of construction
Liquid ring vacuum pumps	Type LVPG Type LVPM 
	Type LVPMB 
	Type LVPH 
Gear pumps	Type LZ Type LZM 
Internal gear pumps	Type HP Type MHP 
Rotary piston pumps	Type KRL Type KRH/M 

YOU MAY COUNT
ON US

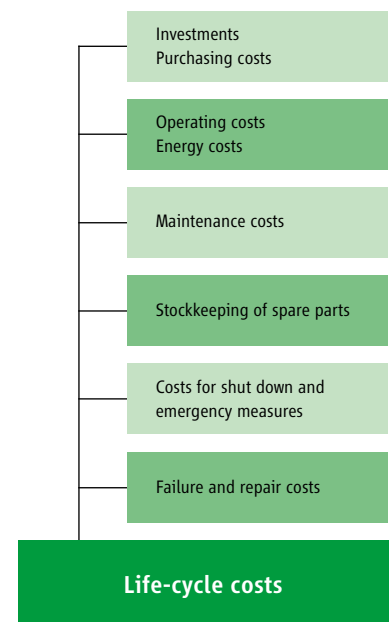


The purchasing process for pumps now also involves considering the life-cycle costs. Looking at the total costs a pump generates in the course of its service life, the sealing system constitutes a significant proportion.

This is why pumps without shaft seals are increasingly being used for conveying media in chemical engineering and process technology. This development has been accelerated by the tightening of legal restrictions and by increased environmental awareness in the chemical and petrochemical industry.

The total costs of a pump over its working life are calculated primarily using the investment costs, and the costs for installation, energy, maintenance, servicing and repairs.

As the purchase costs for a pump normally only represent 5 to 10 % of the total costs, it is well worth taking a look at the life-cycle costs of pumps in the medium- to long-term.





Life-cycle costs.

Depending on the operator's point of view, the results are by their very nature variable, but they all indicate that considering the investment costs alone is not enough in the long-term.

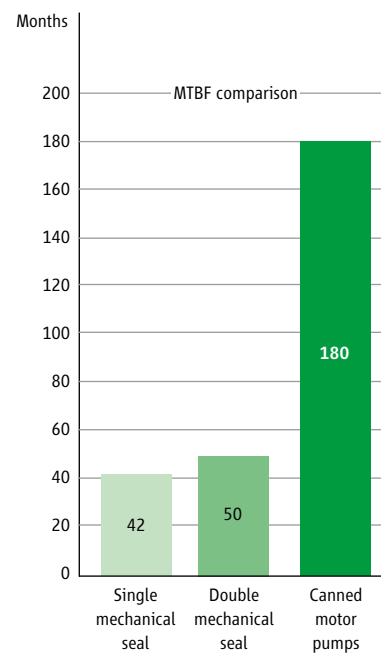
Right figure shows the MTBF values (MTBF = Mean Time Between Failure) between different pump systems. The values for this system show that canned motor pumps (CMP) have a much higher MTBF value than standard pumps with mechanical seal (single- and double-stage).

When focussing the life-cycle costs the economic efficiency of the total system plays an important role. There are partly too many safety factors which need to be taken into account when a system is planned. Consequently, the pump operation is often not effected at its best efficiency.

Studies executed by the "Hydraulic Institute" and "Europump" show that the greatest potential to reduce life-cycle costs depends on the correct dimensioning of the chemical plant. An important portion of the pressure losses in the system is resulted in the dimensioning of tubes and valves, particularly the one of the control and regulating valve.

Through the use of frequency converters there is no further need to install valves for the regulation of the volume flow. Moreover, because of the variable number of rotations, the pump can be operated at different required operating points. Thus, the operation of this pump is effected at a considerably increased efficiency, compared with the throttling via valves.

The clearly stated advantages of our solutions will convince you.



Convincing service.

Important features are readiness, mobility, flexibility, availability and reliability. We are anxious to ensure a pump operation at best availability and efficiency to our customers.

Installation and commissioning

- service effected on site by own service technicians

Spare part servicing

- prompt and longstanding availability
- customized assistance in spare part stockkeeping

Repair and overhauling

- professional repairs including test run executed by the parent factory
- or executed by one of our service stations worldwide

Retrofit

- retrofit of your centrifugal pumps by installing a canned motor to comply with the requirements of the IPPC Directive

Maintenance and service agreement

- concepts individually worked out to increase the availability of your production facilities

Training and workshops

- extra qualification of your staff to ensure the course of your manufacture

Among others, our products comply with:

- Directive 2006/42/EC (Machinery Directive)
- Explosion protection acc. to Directive 94/9/EC (ATEX); UL; KOSHA; NEPSI; CQST; CSA; Rostechnadzor
- Directive 96/61/EC (IPPC Directive)
- Directive 1999/13/EC (VOC Directive)
- TA-Luft
- RCC-M, Niveau 1, 2, 3

HERMETIC-Pumpen GmbH is certified acc. to:

- ISO 9001:2008
- GOST; GOST "R"
- Directive 94/9/EC
- AD 2000 HP 0; Directive 97/23/EC
- DIN EN ISO 3834-2
- KTA 1401; AVS D 100 / 50; IAEA 50-C-Q
- Certified company acc. to § 19 I WH