

PRODUCT RANGE PUMPS



## PRODUCT RANGE PUMPS

CENTRIFUGAL / TWIN SCREW PUMPS  
ACC. DIN EN ISO / API / ASME



[www.klaus-union.com](http://www.klaus-union.com)

# KLAUS UNION PUMPS & SYSTEMS



Founded in 1946 in Bochum, Germany, today Klaus Union is a market leader for the production and supply of pump systems and valves. Klaus Union keeps numerous patents and offers a comprehensive product portfolio of centrifugal and screw pumps. Since many of the global endusers of Klaus Union Pump Systems & Valves are from the chemical, petrochemical, oil & gas industry, particularly high requirements are placed on all related products.

Pumping/ Handling aggressive, toxic and/or explosive fluids does not allow any compromise on quality, service life and safety. Klaus Union state of the art products guarantee reliable operation and protection of both, people and environment.

## Klaus Union Innovation for Your Safety

In the early 1950s, Klaus Union had already developed the world's first magnet drive, which was introduced at the AICHEM in Frankfurt in 1955.

Further trendsetting developments followed, such as the first titanium pump manufactured in Europe or entire new magnet systems.

In 2012, Klaus Union developed Double Volute Twin Screw Pumps with pre-assembled cartridges for quick and easy maintenance. Due to safety and service reasons, today Klaus Union pumping systems are the focus for numerous industries.

## Advanced Material – Highest Quality

Klaus Union's product range covers pump systems and valves for a number of industries.

They are used e.g. in temperature sensitive applications (refrigeration, heat transfer), in power stations, liquid gas plants or in galvanic processes.

Beside steel and stainless steel, corrosion-resistant materials, such as nickel- and titanium-based alloys, are forming today's basis of all Klaus Union products.

A state of the art quality management system guarantees the highest degree of quality. Endusers around the world trust in Klaus Union products. The reliability of our products is supported by comprehensive factory service, provided on-site 24/7.

Klaus Union offers worldwide services by Klaus Union Service GmbH, an affiliate of the Klaus Union Group.

Experience  
Responsibility  
Passion

## Quality Assurance

A major element of the Klaus Union ethos is to ensure highest product quality.

Existing quality assurance procedures with Klaus Union suppliers are constantly monitored from order placement to goods receipt and final assembly.

This quality assurance system, developed on latest technologies, complies with the requirements of international regulations.

Klaus Union products and processes are certified according to:

- ▶ DIN EN ISO 9001
- ▶ DIN EN ISO 50001
- ▶ EC Pressure Equipment Directive 2014 / 68 / EU
- ▶ Machinery Directive 2006 / 42 / EC
- ▶ Explosion Protection Directive 2014 / 34 / EU ("ATEX Directive", equipment category 2 for use in explosion protection zone 1, II2GcT4)
- ▶ EAC Certificate - Certificate of conformity with requirements of technical regulations CU TR 004/010/012/020/2011, Russia



In accordance with TÜV NORD CERT procedures,

KLAUS UNION GmbH & Co. KG  
Blumenfeldstraße 18, 44795 Bochum  
&  
KLAUS UNION Service GmbH & Co. KG  
Blumenfeldstraße 18, 44795 Bochum

are certified according to  
DIN EN ISO 9001

# PRODUCT PORTFOLIO MAGNET DRIVE PUMPS & MECHANICALLY SEALED PUMPS



## Pumps with Magnet Drive



**SLM NV**  
Single-Stage  
Centrifugal Pump  
Acc. DIN EN ISO 2858 /  
DIN EN ISO 15783



**SLM AV**  
Single-Stage  
Centrifugal Pump  
Acc. ASME B73.3M



**SLM AP**  
Single-Stage  
Centrifugal Pump  
Acc. API 685 2<sup>nd</sup> Ed.



**SLM SV**  
Multi-Stage  
Side Channel Pump  
Acc. DIN EN ISO 15783



**SLM GV**  
Multi-Stage  
Centrifugal Pump  
Barrel Design  
Acc. DIN EN ISO 15783



**SLM NVT**  
Vertically Suspended Pump  
Single- & Multi-Stage  
Acc. DIN EN ISO 15783



**SLM DSP-2C**  
Single Volute  
Twin Screw Pump  
Acc. API 676 3<sup>rd</sup> Ed.

## Mechanically Sealed Pumps



**NOV**  
Single-Stage  
Centrifugal Pump  
Acc. DIN EN ISO 2858 /  
DIN EN ISO 5199



**GOV**  
Multi-Stage  
Centrifugal Pump  
Acc. DIN EN ISO 5199



**TP NO**  
Single-Stage  
Submerged Pump  
Acc. DIN EN ISO 5199



**P**  
Single-Stage  
Propeller Pump



**DSP-2C**  
Single Volute  
Twin Screw Pump  
Acc. API 676 3<sup>rd</sup> Ed.



**DSP-4C**  
Double Volute  
Twin Screw Pump  
Acc. API 676 3<sup>rd</sup> Ed.

All Klaus Union magnet drive pumps (excl. series SLM NVT) are also available in close-coupled design (page 08/09).

# THE MODULAR SYSTEM FOR MAGNET DRIVE PUMPS

## The Modular System

Klaus Union's modular pump system consists of three different elements:

- ▶ Pump Hydraulic
- ▶ Magnet Coupling
- ▶ Bearing Bracket

The combination of these components allows a large operating envelope with few differing parts. The parts are even interchangeable between the screw pump and centrifugal pump series.

Over 100 different pump sizes and magnet drives cover operation parameters up to 3.500 m<sup>3</sup>/h and 400 bar. Interchangeability, stock size and servicing equipment become easy to handle subjects.

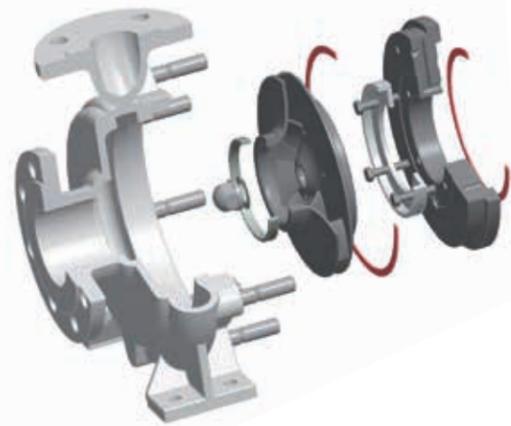


Fig. 1: Pump Hydraulic (Centrifugal Pump), 41 Sizes

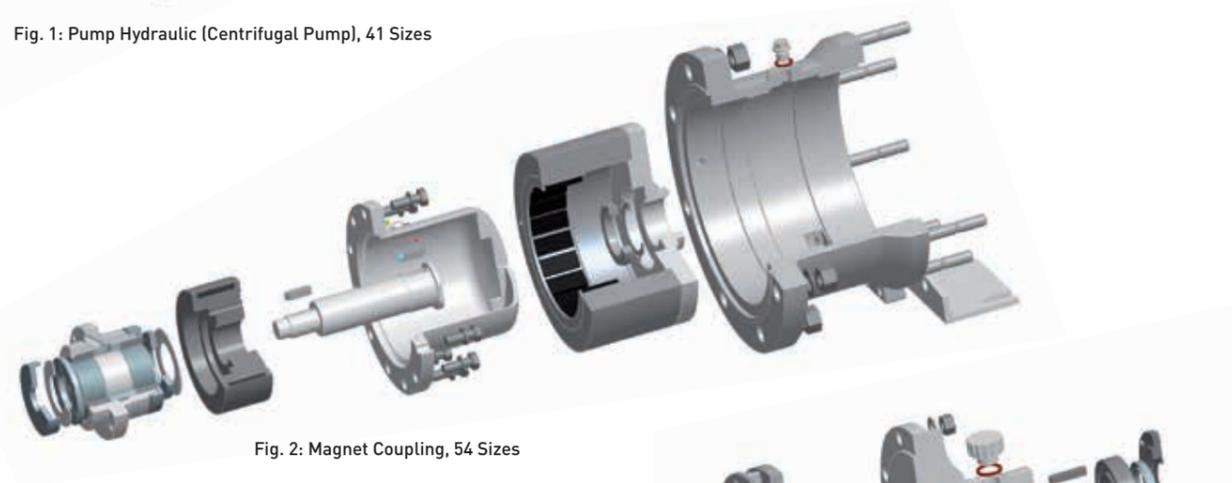


Fig. 2: Magnet Coupling, 54 Sizes

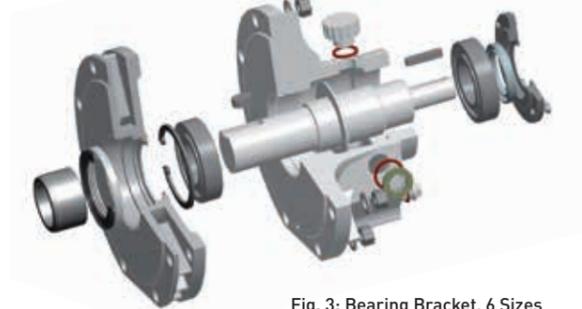


Fig. 3: Bearing Bracket, 6 Sizes

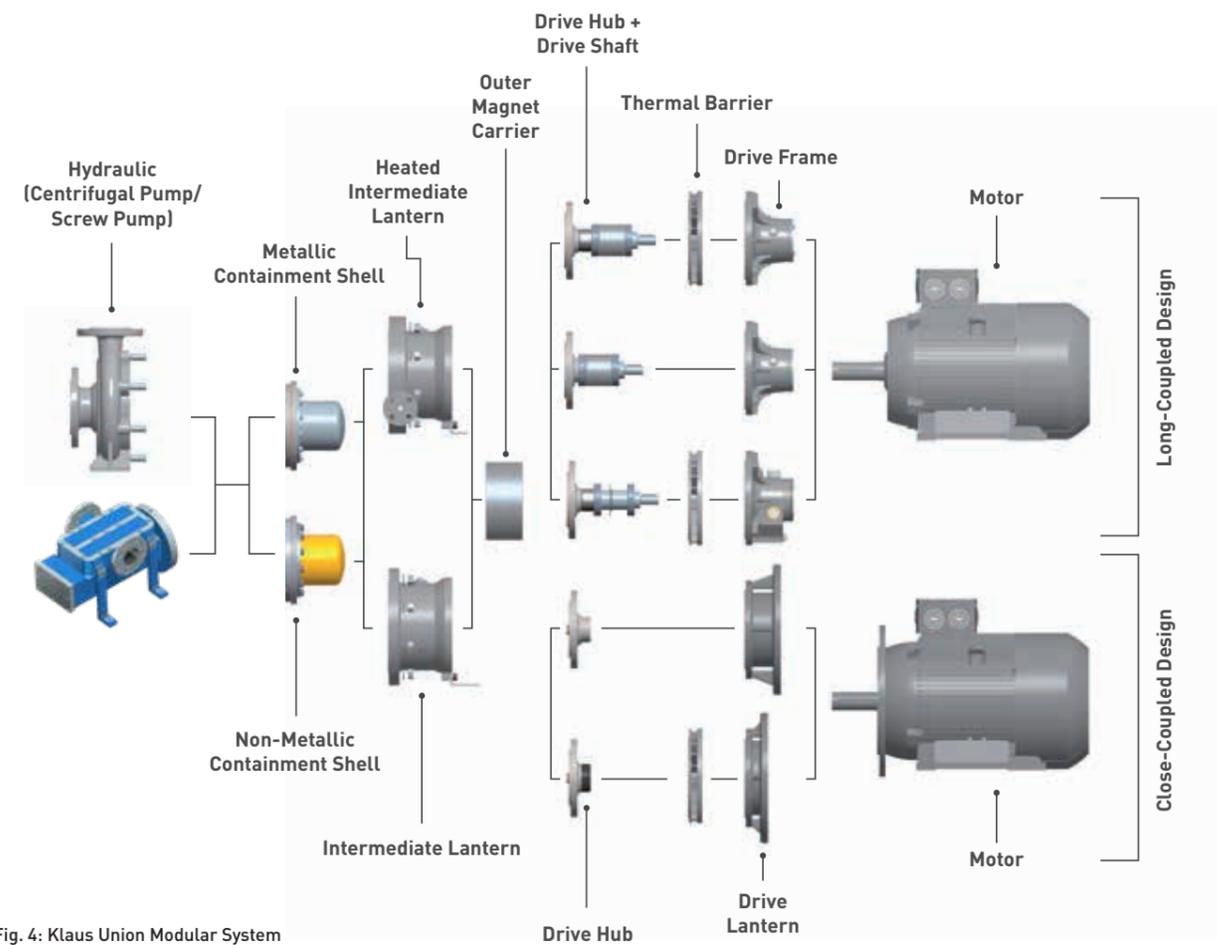


Fig. 4: Klaus Union Modular System

# CLOSE-COUPLED DESIGN FOR MAGNET DRIVE PUMPS

## Klaus Union Pumps in Close-Coupled Design

Close-coupled pumps are the result of the continuous development of the proven Klaus Union pumps with magnet drive and without shaft seal.

Pumps in close-coupled design meet highest technical and economic requirements that refineries and the (petro-) chemical industry expect today from pumps without shaft seals.

The design without shaft seal but with magnet drive guarantees that the pump operates leak free, in accordance with the TA-Luft specification (German Technical Instruction on Air Quality Control). In comparison to pumps with mechanical seal, Klaus Union's sealless magnet drive pumps operate maintenance-free.

Klaus Union's leak-free pumps are particularly suitable for pumping toxic, aggressive, inflammable and other environmentally hazardous liquids particularly in the following industries:



→ Refineries    → On-/Offshore    → Petrochemical    → Chemical

The design covers the complete performance range of centrifugal and twin screw pumps. Multistage centrifugal pumps and pumps designed for high pressure applications are also available as special designs.

The close-coupled design offers significant cost savings because of the following advantages:

- ▶ No alignment between pump and motor
- ▶ No coupling and coupling guard
- ▶ No ball bearings
  - Pump does not require scheduled maintenance
  - No oil lubrication necessary
  - Lower noise level
- ▶ High stiffness of the pump shaft because of small overhung compared to pumps with shaft seal
- ▶ Use of standard high efficient IEC and NEMA motors contrary to canned motors
  - Better availability with standard motors
  - Maintenance of motors is standardized and can be done by the customer on site
- ▶ Base plates for close-coupled design do not need to be rigid acc. to API 685 - 7.3

All Klaus Union magnet drive pumps (excl. series SLM NVT) are available in close-coupled design.

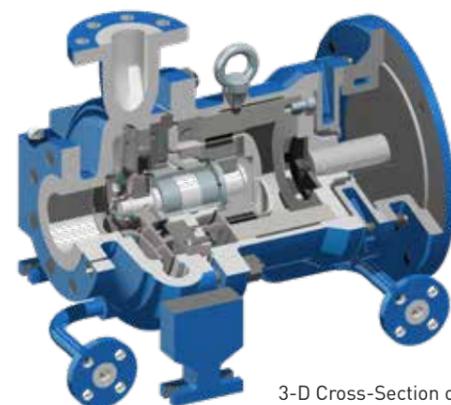


Fig. 5.  
3-D Cross-Section of SLM APC  
No coupling and coupling guard

## Tailor-Made Solutions



Fig. 6.  
Magnet Drive Centrifugal Pump SLM NVB  
(Close-Coupled Design)



Fig. 7.  
Magnet Drive Centrifugal Pump SLM APC  
(Close-Coupled Design)

# ENERGY EFFICIENT DESIGN FOR MAGNET DRIVE PUMPS

## Enhancing Pump Efficiency without Compromising its Performance

Through the use of non-metallic containment shells instead of the traditionally used metallic containment shells, Klaus Union eliminates eddy current losses and increases the efficiency of magnet drive pumps significantly.

Thanks to the leak-free magnet drive concept, pumps with magnet drives have a huge market share in the chemical and petrochemical industry.

For many years, Klaus Union has used nonmetallic containment shells and particularly those made from ceramics for various applications due to their high chemical resistance.

Until recently, the operative range has been limited due to the specific material characteristics. However, pump applications increasingly demand higher operating pressures, temperatures and flow rates whilst still offering maximum efficiency.

Klaus Union's ceramic containment shells meet this challenge and provide the following application coverage:

- ▶ **Nom. Pressure Range:** PN 40 (PN 50 / PN 63 available on request)
- ▶ **Temperature Range:** -200 °C to +400 °C
- ▶ **Transmittable Power:** 1 MW



Fig. 8.  
Size Range Zirconium Oxide Containment Shells

## Performance, Technology and Innovation

### Modularity makes the Difference

Klaus Union offers a modular system for all sealless centrifugal and screw pumps.

This system consists of the pump hydraulic, the magnet coupling and the bearing bracket. All pump types in this system have an universal casing cover, which easily allows to change an existing containment shell regardless of its material.

Within the modularity, containment shells made of ceramic are available for every magnet coupling size (09E/P/T - 31E/P/T).

Our containment shell design is based on the modern Finite Element Method (FEM). This simulation method allows to detect and analyze accurate approximations of tensions and deformations. The result is an optimization of structural parts and its quality as well as the elimination of the risk of failure.

The graphics show a displacement analysis (Fig. 9) and a stress analysis on the (Fig. 10) in a 60 bar pressure test.

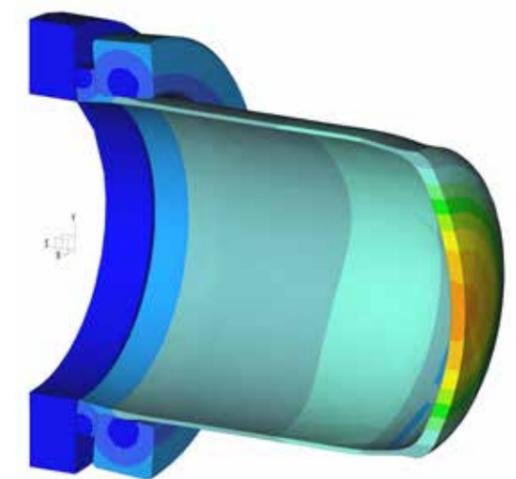


Fig. 9.  
Displacement Analysis

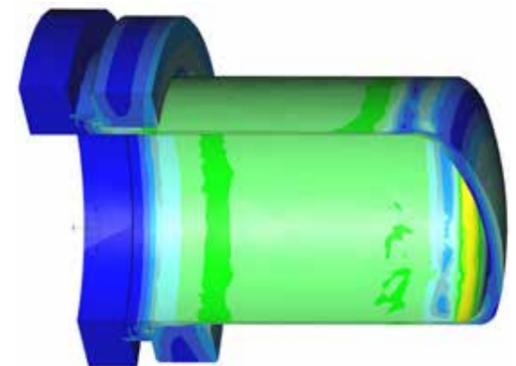


Fig. 10.  
Stress Analysis

# ENERGY EFFICIENT DESIGN FOR MAGNET DRIVE PUMPS

## Advantages of Ceramic Containment Shells

Containment Shells made of Zirconium Oxid are not magnetizable. Due to this quality there are no eddy currents impacting the pump's performance. In consequence, the pumping fluid is not being heated in the process.

### This has the following advantages:

- ▶ Enables for dry run capable executions (RTZ-design) and executions without flush flow to cool the containment shell (OTZ-design).
- ▶ Enables for applications with high gas content.
- ▶ Pumps can handle fluids close to vapor pressure curve, e.g. liquid gas applications.
- ▶ Instrumentation to monitor the isolation shell temperature is not required anymore, since eddy current losses are eliminated.

### Further advantages:

- ▶ High mechanical strength; Extension of the application through higher pump speed.
- ▶ Vacuum tight up to 0,1 bar absolute.
- ▶ Large corrosion and erosion allowance; Zirconium Oxide is resistant against most lyes and acids.
- ▶ Excellent thermal shock resistance.
- ▶ Enhanced energy efficiency.

### Retrofit of pumps with shaft seal:

- ▶ As there are no eddy current losses, shaft powers comparable to pumps with shaft seals can be achieved.

For quality control purposes, all Klaus Union containment shells are equipped with an individual, engraved serial number. Furthermore, Klaus Union provides material certificates on request.

### Cost Savings through the Application of Zirconium Oxid

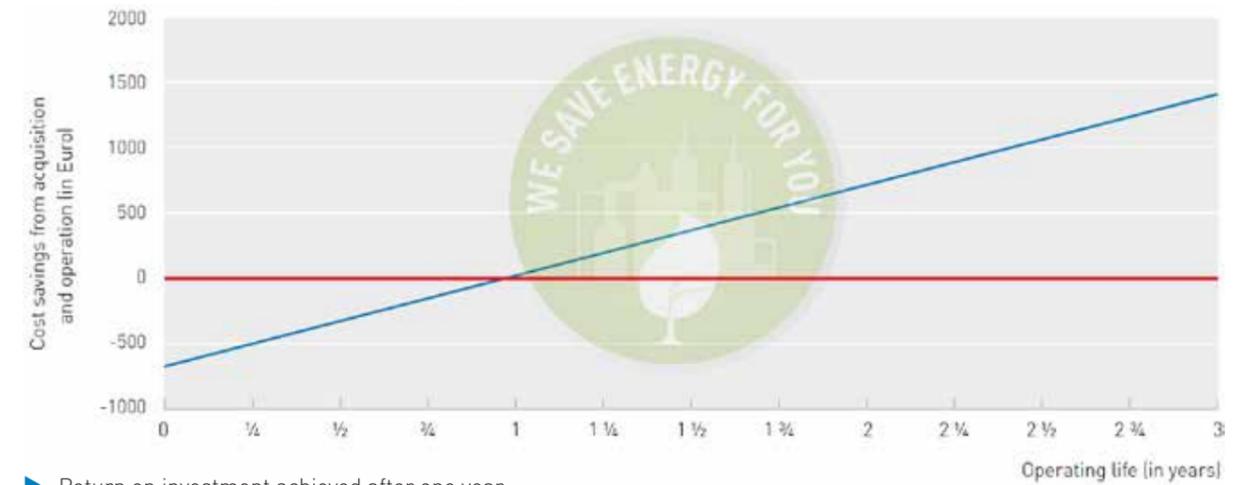
- ▶ Ceramic containment shells are an important part of Klaus Union's modular pump system. Due to the universal casing cover containment shells can be easily and safely mounted or replaced. The operator saves stock capacities and service costs.
- ▶ Energy consumption can be lowered as there are no performance-impairing eddy currents. In fact, the required motor power can be reduced by 10 to 15 %.
- ▶ Due to the lower power requirement, smaller electric motors can be installed.
- ▶ The ceramic containment shell per se guarantees an absolute leak-free operation. In conjunction with the high durability of the material, both the risk and the maintenance costs are minimized.



## Energy-saving potential by eliminating eddy current power losses

Case study during 8800 operating hours illustrating the energy saving potential

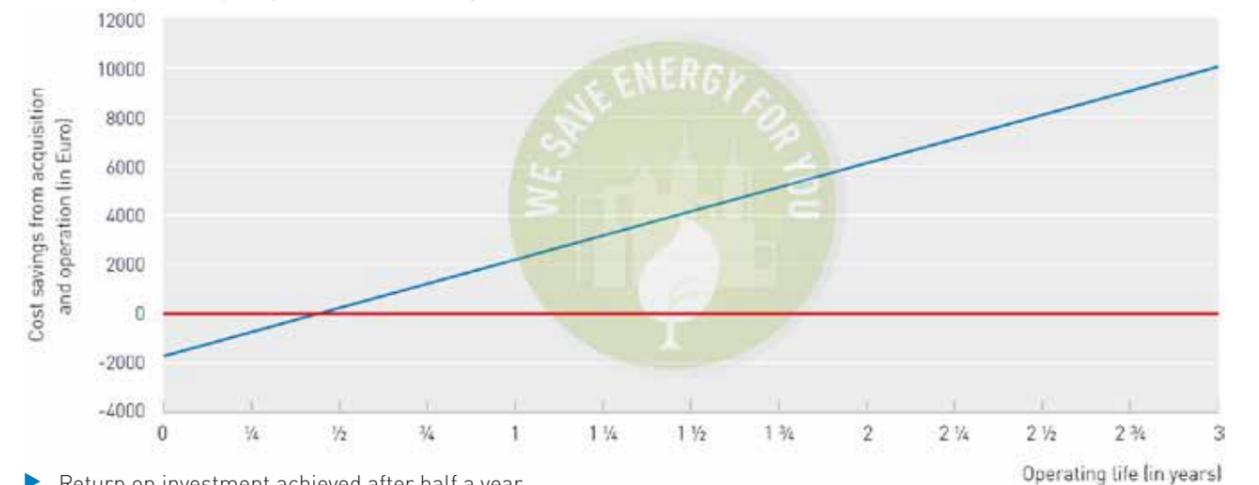
### Cost-comparison pump with 10 kW magnet drive



- ▶ Return on investment achieved after one year

Centrifugal pump with magnet drive ▶ Energy-efficient design ▶ Standard design

### Cost-comparison pump with 100 kW magnet drive



- ▶ Return on investment achieved after half a year.

Centrifugal pump with magnet drive ▶ Energy-efficient design ▶ Standard design

# CENTRIFUGAL PUMP WITH MAGNET DRIVE SERIES SLM NV



Fig. 11.  
Magnet Drive Centrifugal Pump  
SLM NVO, Oil-Lubricated Bearing Bracket

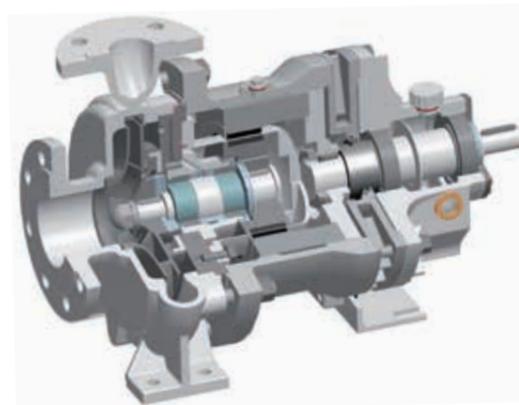


Fig. 12.  
3-D Cross-Section of Magnet Drive Centrifugal Pump  
SLM NVO, Oil-Lubricated Bearing Bracket

According  
**DIN EN ISO 2858**  
**DIN EN ISO 15783**

## Industries

- ▶ Chemical Industry
- ▶ Petrochemical Industry
- ▶ Refrigeration and Heat Transfer
- ▶ Oil & Gas
- ▶ Power

## Typical Applications

- ▶ Acids
- ▶ Lyes
- ▶ Hydrocarbons
- ▶ Heat Transfer Liquids
- ▶ Coolants
- ▶ Liquid Gases
- ▶ Aggressive, Explosive and Toxic Liquids
- ▶ Liquids Containing Solids
- ▶ High-Viscosity Liquids

## Operating Range

- ▶ Flow Rate: max. 3.500 m<sup>3</sup>/h
- ▶ Delivery Head: max. 220 m L.C.
- ▶ Temperature Range: -120 °C to +450 °C
- ▶ Pressure Rating: max. PN 400

## Design

- ▶ Single-Stage, Horizontal Centrifugal Pump in Process Design
- ▶ Hydraulic Performance and Dimensions according to DIN EN ISO 2858
- ▶ Design based on DIN EN ISO 15783
- ▶ Permanent Magnet Drive
  - Maintenance-Free
  - Separation of Liquid Chamber and Atmosphere by Means of Containment Shell
  - Synchronous Design
- ▶ Materials: Steel, Stainless Steel, Nickel- Based Materials, Titanium
- ▶ Bearing Bracket with Oil-Lubricated or Greased-for-Life Anti-Friction Bearings
- ▶ Optional: Close-Coupled Design (SLM NVB)
- ▶ Product-Lubricated Journal Bearings; made of Silicon Carbide (SSiC) or Customized Materials

# CENTRIFUGAL PUMP WITH MAGNET DRIVE SERIES SLM AV



Fig. 13.  
Magnet Drive Centrifugal Pump SLM AVO,  
Oil-Lubricated Bearing Bracket

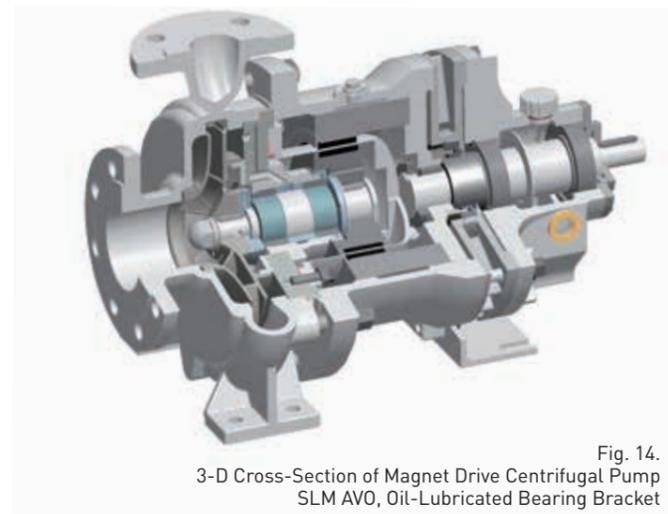


Fig. 14.  
3-D Cross-Section of Magnet Drive Centrifugal Pump  
SLM AVO, Oil-Lubricated Bearing Bracket

According  
**ASME 73.3M**



## Industries

- ▶ Chemical Industry
- ▶ Petrochemical Industry
- ▶ Oil & Gas
- ▶ Power
- ▶ Refrigeration and Heat Transfer

## Typical Applications

- ▶ Acids
- ▶ Lyes
- ▶ Hydrocarbons
- ▶ Aggressive, Explosive and Toxic Liquids
- ▶ Liquid Gases
- ▶ Heat Transfer Liquids
- ▶ Coolants
- ▶ Liquids Containing Solids
- ▶ High-Viscosity Liquids

## Operating Range

- ▶ Flow Rate: max. 150 m<sup>3</sup>/h
- ▶ Delivery Head: max. 100 m L.C.
- ▶ Temperature Range: -120 °C to +450 °C
- ▶ Pressure Rating: max. PN 400

## Design

- ▶ Single-Stage, Horizontal Centrifugal Pump in Process Design
- ▶ Hydraulic Performance and Dimensions according to ASME B73.3 M
- ▶ Permanent Magnet Drive
  - Maintenance-Free
  - Separation of Liquid Chamber and Atmosphere by Means of Containment Shell
  - Synchronous Design
- ▶ Materials: Steel, Stainless Steel, Nickel- Based Materials, Titanium
- ▶ Bearing Bracket with Oil-Lubricated or Greased-for-Life Anti-Friction Bearings
- ▶ Optional: Close-Coupled Design
- ▶ Product-Lubricated Journal Bearings; made of Silicon Carbide (SSiC) or Customized Materials

# CENTRIFUGAL PUMP WITH MAGNET DRIVE SERIES SLM AP



Fig. 15.  
Magnet Drive Centrifugal Pump SLM APL  
(Process Design)

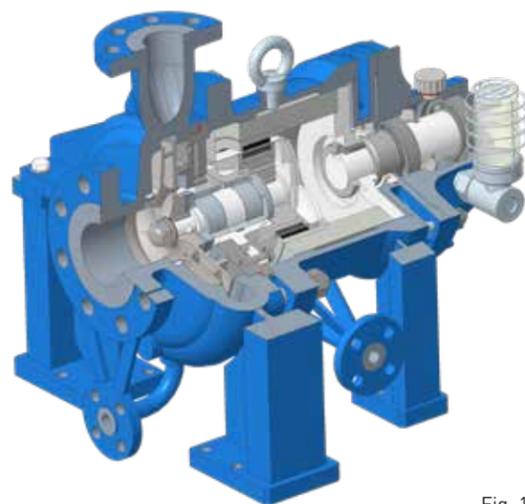


Fig. 16.  
3-D Cross-Section of Magnet Drive Centrifugal Pump  
SLM APL (Process Design)

According  
**API 685 2<sup>nd</sup> Edition**



## Industries

- ▶ Chemical Industry
- ▶ Petrochemical Industry
- ▶ Refrigeration and Heat Transfer
- ▶ Oil & Gas
- ▶ Power
- ▶ On- / Offshore Plants

## Typical Applications

- ▶ Hydrocarbons
- ▶ Liquid Gases
- ▶ Aggressive, Explosive and Toxic Liquids
- ▶ Heat Transfer Liquids
- ▶ Coolants
- ▶ Acids
- ▶ Lyes

## Operating Range

- ▶ Flow Rate: max. 3.500 m<sup>3</sup>/h
- ▶ Delivery Head: max. 220 m L.C.
- ▶ Temperature Range: -120 °C to +450 °C (SLM APL)  
-120 °C to +350 °C (SLM APC)
- ▶ Pressure Rating: max. PN 400

## Design

- ▶ Single-Stage, Horizontal Centrifugal Pump in
  - Process Design (SLM APL)
  - Close-Coupled Design (SLM APC)
- ▶ Hydraulic Performance and Dimensions with reference to ASME B73.3 M
- ▶ Technical Design according to API 685
- ▶ Flanges according to ANSI/ASME B16.5, Class 150 (PN 20), Class 300 (PN 50)
- ▶ Permanent Magnet Drive
  - Maintenance-Free
  - Separation of Liquid Chamber and Atmosphere by Means of Containment Shell
  - Synchronous Design
- ▶ Materials: Steel, Stainless Steel, Nickel- Based Material, Titanium
- ▶ Bearing Bracket with Oil-Lubricated Anti-Friction Bearings (optional: Greased-for-Life)
- ▶ Optional: Close-Coupled Design
- ▶ Centreline Support
- ▶ Product-Lubricated Journal Bearings; made of Silicon Carbide (SSiC) or Customized Materials

# SIDE CHANNEL PUMP WITH MAGNET DRIVE SERIES SLM SV



Fig. 17.  
Magnet Drive Side Channel Pump SLM SVS,  
Grease-Lubricated Bearing Bracket

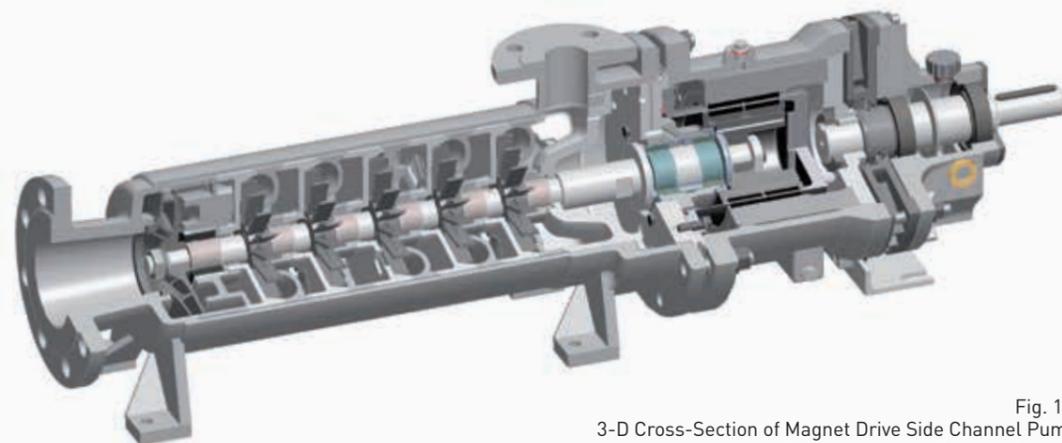


Fig. 18.  
3-D Cross-Section of Magnet Drive Side Channel Pump  
SLM SVS, Oil-Lubricated Bearing Bracket

According  
**DIN EN ISO 15783**



## Industries

- ▶ Chemical Industry
- ▶ Petrochemical Industry
- ▶ Refrigeration Engineering
- ▶ Oil & Gas
- ▶ Vacuum Technology

## Typical Applications

- ▶ Acids
- ▶ Lyes
- ▶ Hydrocarbons
- ▶ Solvents
- ▶ Liquid Gases
- ▶ Refrigerants

## Operating Range

- ▶ Flow Rate: max. 42 m<sup>3</sup>/h
- ▶ Delivery Head: max. 470 m L.C.
- ▶ Temperature Range: -120 °C to +250 °C
- ▶ Pressure Rating: max. PN 400

## Design

- ▶ Multi-Stage, Horizontal Side Channel Pump in Process Design
- ▶ Design based on DIN EN ISO 15783
- ▶ Maximum Number of Stages: 8
- ▶ Self-Priming
- ▶ Barrel Design Housing with just Two Gaskets
- ▶ Gas Handling
- ▶ First Low-NPSH Stage for Improved Suction Performance
- ▶ Permanent Magnet Drive
  - Maintenance-Free
  - Separation of Liquid Chamber and Atmosphere by Means of Containment Shell
  - Synchronous Design
- ▶ Material: Stainless Steel
- ▶ Bearing Bracket with Oil-Lubricated or Greased-for-Life Anti-Friction Bearings
- ▶ Optional: Close-Coupled Design
- ▶ Product-Lubricated Journal Bearings; made of Silicon Carbide (SSiC) or Customized Materials

# MULTI-STAGE PUMP WITH MAGNET DRIVE SERIES SLM GV

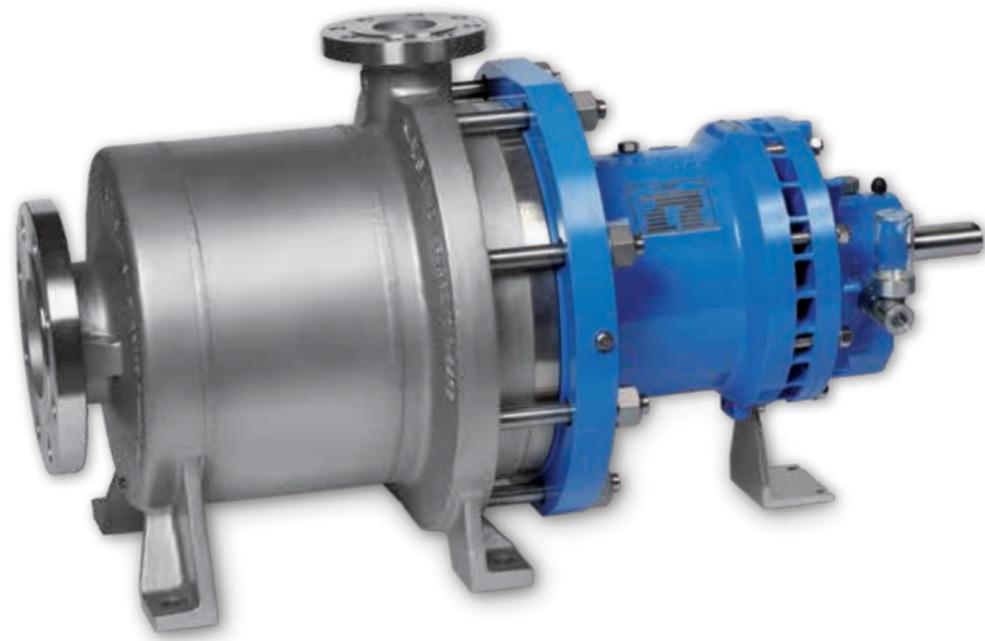


Fig. 19.  
Multi-Stage Magnet Drive Centrifugal Pump SLM GVOT,  
Oil-Lubricated Bearing Bracket

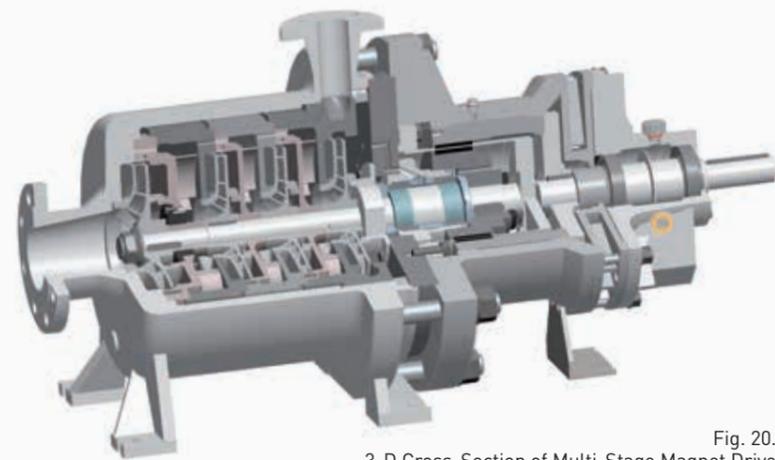


Fig. 20.  
3-D Cross-Section of Multi-Stage Magnet Drive  
Centrifugal Pump SLM GVOT,  
Oil-Lubricated Bearing Bracket

According  
**DIN EN ISO 15783**



## Industries

- ▶ Chemical Industry
- ▶ Petrochemical Industry
- ▶ Refrigeration and Heat Transfer
- ▶ Oil & Gas
- ▶ Power

## Typical Applications

- ▶ Acids
- ▶ Lyes
- ▶ Hydrocarbons
- ▶ Hot Water
- ▶ Heat Transfer Liquids
- ▶ Liquid Gases
- ▶ Aggressive, Explosive and Toxic Liquids

## Operating Range

- ▶ Flow Rate: max. 350 m<sup>3</sup>/h
- ▶ Delivery Head: max. 700 m L.C.
- ▶ Temperature Range: -120 °C to +350 °C
- ▶ Pressure Rating: max. PN 200

## Design

- ▶ Multi-Stage, Horizontal Centrifugal Pump in Process Design
- ▶ Design based on DIN EN ISO 15783
- ▶ Impeller Arrangement in Series; Maximum Number of Stages: 6
- ▶ First Low-NPSH Stage for Improved Suction Performance
- ▶ Barrel Design Housing with just Two Gaskets
- ▶ Centreline Support
- ▶ Permanent Magnet Drive
  - Maintenance-Free
  - Separation of Liquid Chamber and Atmosphere by Means of Containment Shell
  - Synchronous Design
- ▶ Materials: Steel, Stainless Steel
- ▶ Bearing Bracket with Oil-Lubricated or Greased-for-Life Anti-Friction Bearings
- ▶ Optional: Close-Coupled Design
- ▶ Optional: Features acc. to API 685 2<sup>nd</sup> Edition
- ▶ Product-Lubricated Journal Bearings; made of Silicon Carbide (SSiC) or Customized Materials
- ▶ Designs: Barrel Design Housing or Tension Rod Design

# SUBMERGED PUMP WITH MAGNET DRIVE SERIES SLM NVT



Fig. 21.  
Magnet Drive Submerged Pump SLM NVT



Fig. 22.  
3-D Cross-Section of Magnet Drive Submerged Pump  
SLM NVT

According  
**DIN EN ISO 2858**  
**DIN EN ISO 15783**

## Industries

- ▶ Chemical Industry
- ▶ Petrochemical Industry
- ▶ Power

## Typical Applications

- ▶ Acids
- ▶ Lyes
- ▶ Hydrocarbons
- ▶ Heat Transfer Liquids
- ▶ Aggressive, Explosive and Toxic Liquids
- ▶ Industrial Effluent

## Operating Range

- ▶ Flow Rate: max. 900 m<sup>3</sup>/h
- ▶ Delivery Head: max. 200 m L.C.
- ▶ Temperature Range: -50 °C to +200 °C
- ▶ Pressure Rating: max. PN 40
- ▶ Submerging Depth: max. 10.000 mm

## Design

- ▶ Single-Stage Submerged Centrifugal Pump
- ▶ Hydraulic Performance according to DIN EN ISO 2858
- ▶ Design based on DIN EN ISO 15783
- ▶ Permanent Magnet Drive
  - Maintenance-Free
  - Separation of Liquid Chamber and Atmosphere by Means of Containment Shell
  - Synchronous Design
- ▶ Materials: Steel, Stainless Steel, Nickel- Based Material, Titanium
- ▶ Bearing Bracket with Greased-for-Life Anti-Friction Bearings
- ▶ Product-Lubricated Journal Bearings; made of Silicon Carbide (SSiC) or Customized Materials
- ▶ Multi-Stage Design available (Series SLM GVTT)

# TWIN SCREW PUMP WITH MAGNET DRIVE SERIES SLM DSP-2C

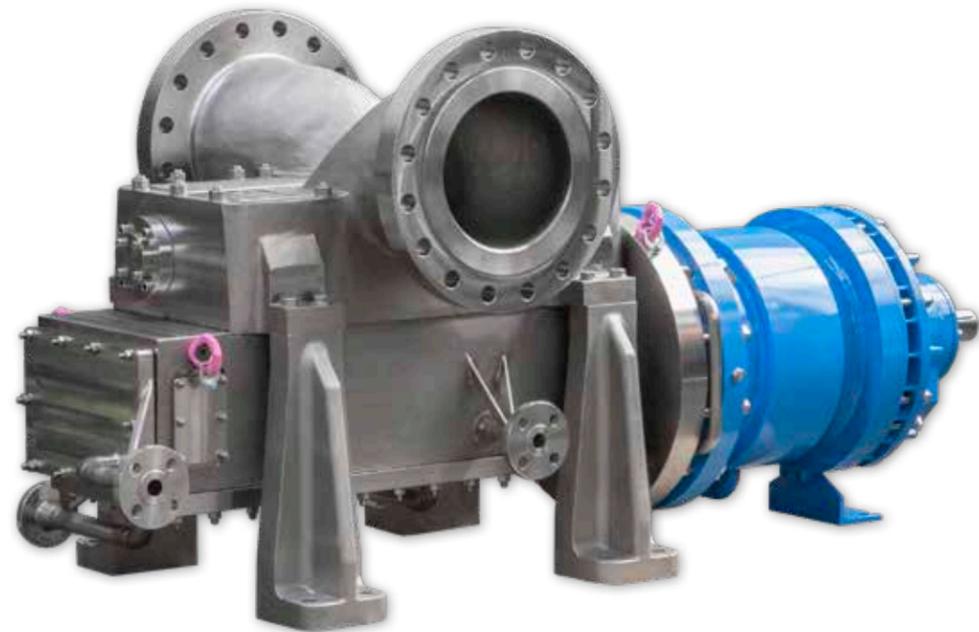


Fig. 23.  
Twin Screw Pump SLM DSP-2C, Process Design

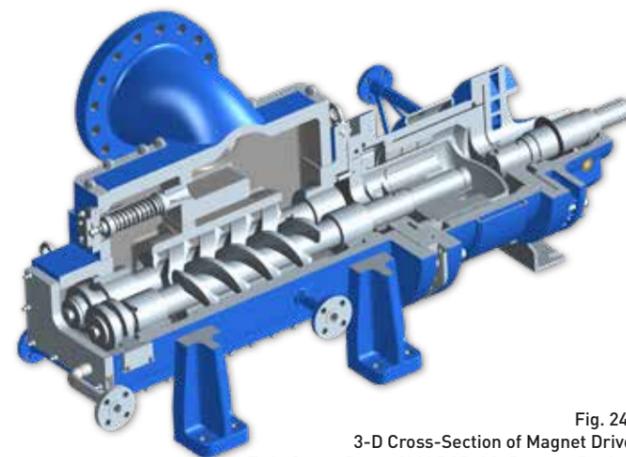


Fig. 24.  
3-D Cross-Section of Magnet Drive  
Twin Screw Pump SLM DSP-2C, Process Design

According  
**API 676 3<sup>rd</sup> Edition**



## Industries

- ▶ Chemical Industry
- ▶ Petrochemical Industry
- ▶ Sugar Industry
- ▶ Paint
- ▶ Oil & Gas
- ▶ Power

## Typical Applications

- ▶ Acids
- ▶ Lyes
- ▶ Hydrocarbons
- ▶ Bitumen / Asphalt
- ▶ Tar
- ▶ Fuel Oils (Light and Heavy)
- ▶ Polymers
- ▶ Aggressive, Explosive and Toxic Liquids
- ▶ Liquids Containing Solids
- ▶ High-Viscosity Liquids

## Operating Range

- ▶ Flow Rate: max. 1.800 m<sup>3</sup>/h
- ▶ Diff. Pressure: max. 40 bar
- ▶ Temperature Range: -120 °C to +350 °C
- ▶ Pressure Rating: max. PN 400

## Design

- ▶ Single Volute Twin Screw Pump in Process or in Tank Farm Design
- ▶ Design based on API 676, 3<sup>rd</sup> Ed.
- ▶ Axial Split Modular Casing
- ▶ Pressure Limiting Valve using Klaus Union Valve Series Internals
- ▶ Centerline Mounting
- ▶ Permanent Magnet Drive
  - Maintenance Free
  - Separation of Liquid Chamber and Atmosphere by Means of Containment Shell
  - Synchronous Design
- ▶ Magnet Drive acc. API 685 available
- ▶ High Viscosity optimized design available
- ▶ Materials: Steel, Stainless steel, nickel based materials or Titanium
- ▶ Bearing Bracket with Oil-Lubricated or Greased-for-Life Anti-Friction Bearings
- ▶ Optional: Close-coupled design (SLM DSP-2CB)
- ▶ Spare parts of magnetic coupling and bearing brackets are interchangeable with centrifugal pump series

# CENTRIFUGAL PUMP WITH MECHANICAL SEAL SERIES NOV



Fig. 25.  
Centrifugal Pump NOV with Shaft Sealing, Oil-Lubricated

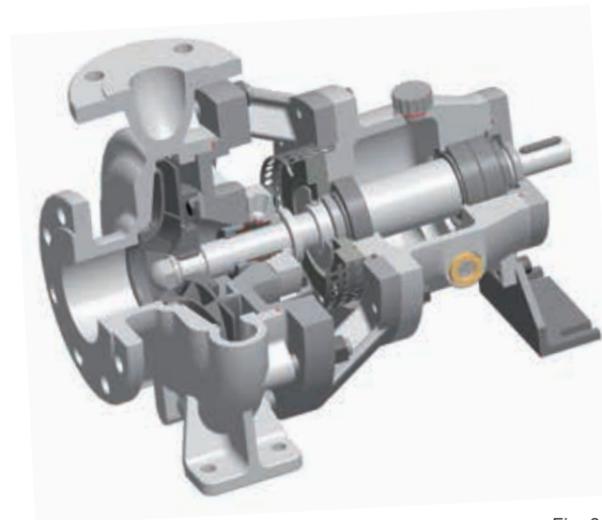


Fig. 26.  
3-D Cross-Section of Centrifugal Pump NOV  
with Shaft Sealing, Oil-Lubricated

According  
**DIN EN ISO 2858**  
**DIN EN ISO 5199**



## Industries

- ▶ Chemical Industry
- ▶ Petrochemical Industry
- ▶ Refrigeration and Heat Transfer
- ▶ Oil & Gas
- ▶ Paper and Cellulose Plants
- ▶ Power
- ▶ Sugar Industry
- ▶ Coking Plants

## Typical Applications

- ▶ Acids
- ▶ Lyes
- ▶ Hydrocarbons
- ▶ Heat Transfer Liquids
- ▶ Coolants
- ▶ Liquid Gases
- ▶ Sewage
- ▶ Colouring Matters
- ▶ Salt Solutions
- ▶ Pulp

## Operating Range

- ▶ Flow Rate: max. 3.500 m<sup>3</sup>/h
- ▶ Delivery Head: max. 220 m L.C.
- ▶ Temperature Range: -120 °C to +450 °C
- ▶ Pressure Rating: max. PN 100

## Design

- ▶ Single-Stage, Horizontal Centrifugal Pump
- ▶ Hydraulic Performance and Dimensions according to DIN EN ISO 2858
- ▶ Design according to DIN EN ISO 5199
- ▶ Shaft Sealing Space for Installation of Mechanical Seals according to DIN EN 12756 or Stuffing Box Packings
- ▶ Materials: Steel, Stainless Steel, Nickel- Based Material, Titanium
- ▶ Bearing Bracket with Oil-Lubricated Anti-Friction Bearings

# MULTI-STAGE PUMP WITH MECHANICAL SEAL SERIES GOV



Fig. 27.  
Multi-Stage Centrifugal Pump GOVT  
with Mechanical Sealing

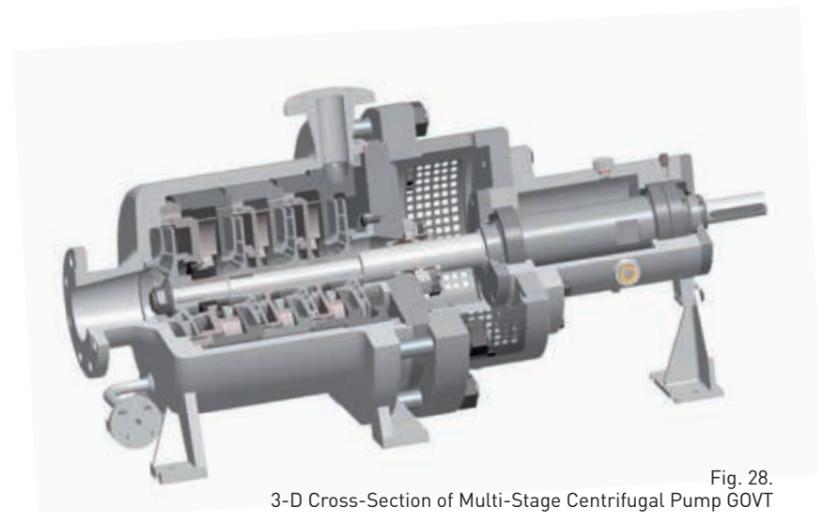


Fig. 28.  
3-D Cross-Section of Multi-Stage Centrifugal Pump GOVT  
with Mechanical Sealing

According  
**DIN EN ISO 5199**

## Industries

- ▶ Chemical Industry
- ▶ Petrochemical Industry
- ▶ Refrigeration and Heat Transfer
- ▶ Oil & Gas
- ▶ Power

## Typical Applications

- ▶ Liquid Gases
- ▶ Acids
- ▶ Lyes
- ▶ Hydrocarbons
- ▶ Hot Water
- ▶ Heat Transfer Liquids

## Operating Range

- ▶ Flow Rate: max. 350 m<sup>3</sup>/h
- ▶ Delivery Head: max. 700 m L.C.
- ▶ Temperature Range: -120 °C to +350 °C
- ▶ Pressure Rating: max. PN 100

## Design

- ▶ Multi-Stage, Horizontal Centrifugal Pump in Process Design
- ▶ Technical Design based on DIN EN ISO 5199
- ▶ Impeller Arrangement in Series, Maximum Number of Stages: 6
- ▶ First Low-NPSH Stage for Improved Suction Performance
- ▶ Shaft Sealing Space for Installation of Mechanical Seals according to DIN EN 12756 or Stuffing Box Packings
- ▶ Materials: Steel, Stainless Steel
- ▶ Bearing Bracket with Oil-Lubricated Anti-Friction Bearings
- ▶ Designs: Barrel Design Housing or Tension Rod Design

# SUBMERGED PUMP WITH MECHANICAL SEAL SERIES TP NO



Fig. 29.  
Submerged Pump TP NO with Shaft Sealing



Fig. 30.  
3-D Cross-Section Submerged Pump  
TP NO with Shaft Sealing

According  
**DIN EN ISO 2858**  
**DIN EN ISO 5199**

## Industries

- ▶ Chemical Industry
- ▶ Petrochemical Industry
- ▶ Refrigeration and Heat Transfer
- ▶ Power
- ▶ Coking Plants

## Typical Applications

- ▶ Acids
- ▶ Lyes
- ▶ Hydrocarbons
- ▶ Heat Transfer Liquids
- ▶ Liquid Gases

## Operating Range

- ▶ Flow Rate: max. 1.600 m<sup>3</sup>/h
- ▶ Delivery Head: max. 200 m L.C.
- ▶ Temperature Range: -50 °C to +250 °C
- ▶ Pressure Rating: max. PN 40
- ▶ Submerging Depth: max. 10.000 mm

## Design

- ▶ Single-Stage Submerged Centrifugal Pump
- ▶ Hydraulic Performance according to DIN EN ISO 2858
- ▶ Design based on DIN EN ISO 5199
- ▶ Shaft Sealing Space for Installation of Mechanical Seals according to DIN EN 12756 or Stuffing Box Packings
- ▶ Materials: Steel, Stainless Steel, Nickel- Based Material, Titanium
- ▶ Product-Lubricated Journal Bearings; made of Silicon Carbide (SSiC) or Customized Materials
- ▶ Multi-Stage Design available (Series TP GO)

# PROPELLER PUMP WITH MECHANICAL SEAL SERIES P

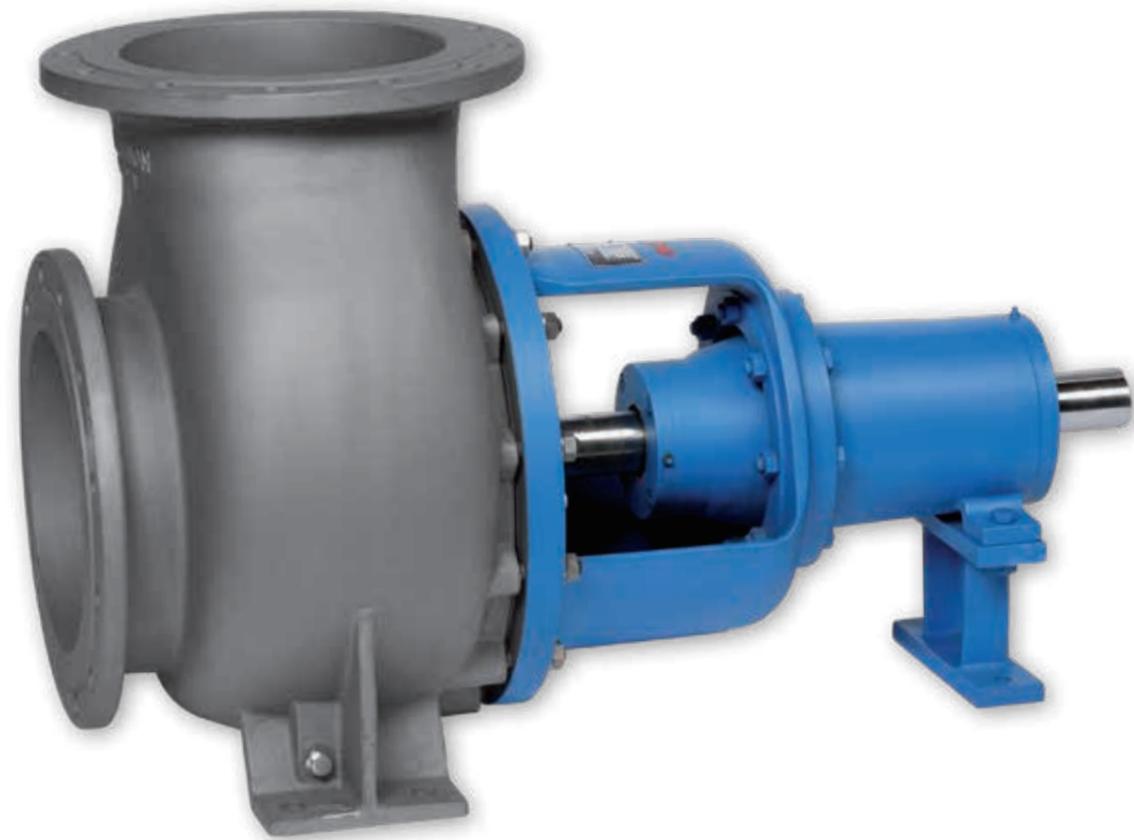


Fig. 31.  
Propeller Pump P

Practical,  
Application-Specific  
Solutions



## Industries

- ▶ Power
- ▶ Chemical Industry
- ▶ Petrochemical Industry
- ▶ Paper and Cellulose Industry
- ▶ Cooling Water Plants
- ▶ Sea Water Treatments

## Typical Applications

- ▶ Acids
- ▶ Lyes
- ▶ Paper and Cellulose Mash
- ▶ Brine (Evaporation Plants)
- ▶ Mineral Fertilisers (Liquid)
- ▶ Sea Water
- ▶ Cooling Water
- ▶ Dyes

## Operating Range

- ▶ Flow Rate: max. 12.000 m<sup>3</sup>/h
- ▶ Delivery Head: max. 12 m L.C.
- ▶ Temperature Range: -120 °C to +250 °C
- ▶ Pressure Rating: max. PN 100

## Design

- ▶ Horizontal Axial Flow Pump
- ▶ Pump Casing in Cast or Welded Construction
- ▶ Shaft Sealing Space for Installation of Mechanical Seals according to DIN EN 12756 or Stuffing Box Packings
- ▶ Materials: Steel, Stainless Steel
- ▶ Bearing Bracket with Oil- or Grease-Lubricated Anti-Friction Bearings
- ▶ Pumping Direction Freely Selectable
- ▶ Modification of Performance Possible by Means of Adjusting Propeller Blades

# TWIN SCREW PUMP WITH MECHANICAL SEAL SERIES DSP-2C

According  
**API 676 3<sup>rd</sup> Edition**

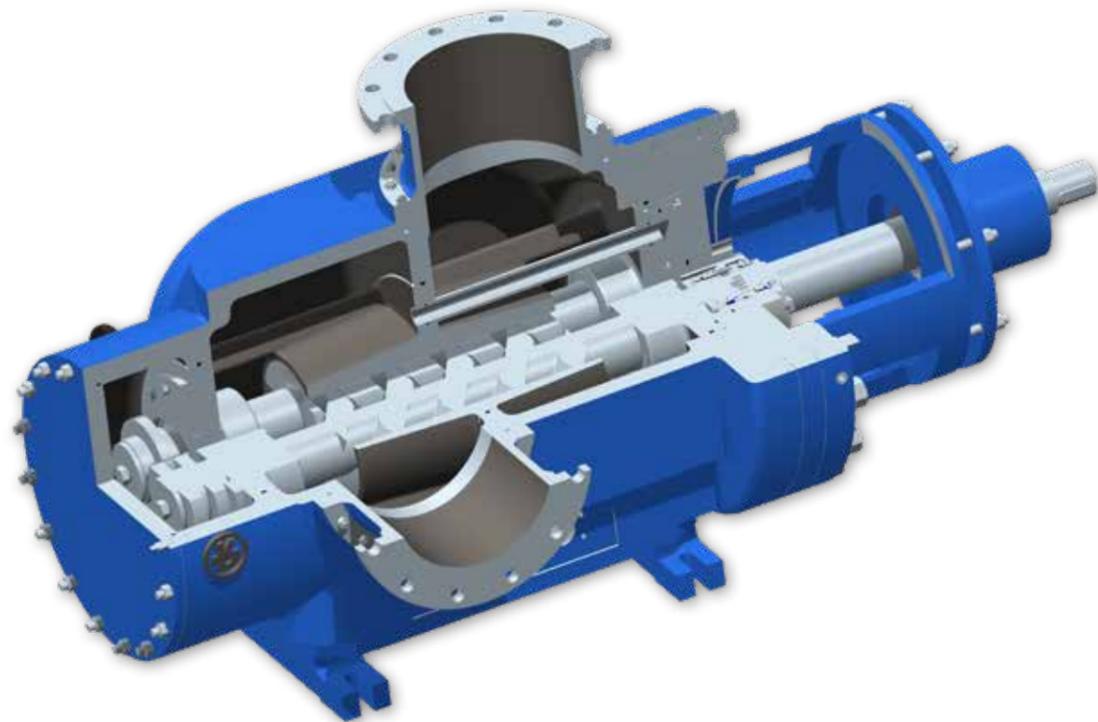


Fig. 32.  
3-D Cross-Section Twin Screw Pump DSP-2C



Fig. 33.  
Twin Screw Pump DSP-2C,  
with Pressure Limiting Valve

## Industries

- ▶ Chemical Industry
- ▶ Petrochemical Industry
- ▶ Sugar Industry
- ▶ Paint
- ▶ Oil & Gas
- ▶ Power

## Typical Applications

- ▶ Acids
- ▶ Lyes
- ▶ Hydrocarbons
- ▶ Bitumen / Asphalt
- ▶ Tar
- ▶ Fuel Oils (Light and Heavy)
- ▶ Polymers
- ▶ Aggressive, Explosive and Toxic Liquids
- ▶ Liquids Containing Solids
- ▶ High-Viscosity Liquids

## Operating Range

- ▶ Flow Rate: max. 1.800 m<sup>3</sup>/h
- ▶ Diff. Pressure: max. 40 bar
- ▶ Temperature Range: -120 °C to +350 °C
- ▶ Pressure Rating: max. PN 400

## Design

- ▶ Single Volute Twin Screw Pump in Process or in Tank Farm Design
- ▶ Technical Design based on API 676, 3<sup>rd</sup> Ed.
- ▶ Axial Split Modular Casing
- ▶ Pressure Limiting Valve using Klaus Union Valve Series Internals
- ▶ Centerline Mounting
- ▶ Materials: Steel, Stainless steel, nickel based materials or Titanium
- ▶ Bearing Bracket with Oil-Lubricated or Greased-for-Life Anti-Friction Bearings
- ▶ Spare parts of magnetic coupling and bearing brackets interchangeable with centrifugal pump series
- ▶ Mechanical Seals acc. EN 12756 or API 682 / ISO 21049 as per customer preferences

# TWIN SCREW PUMP WITH MECHANICAL SEAL SERIES DSP-4C

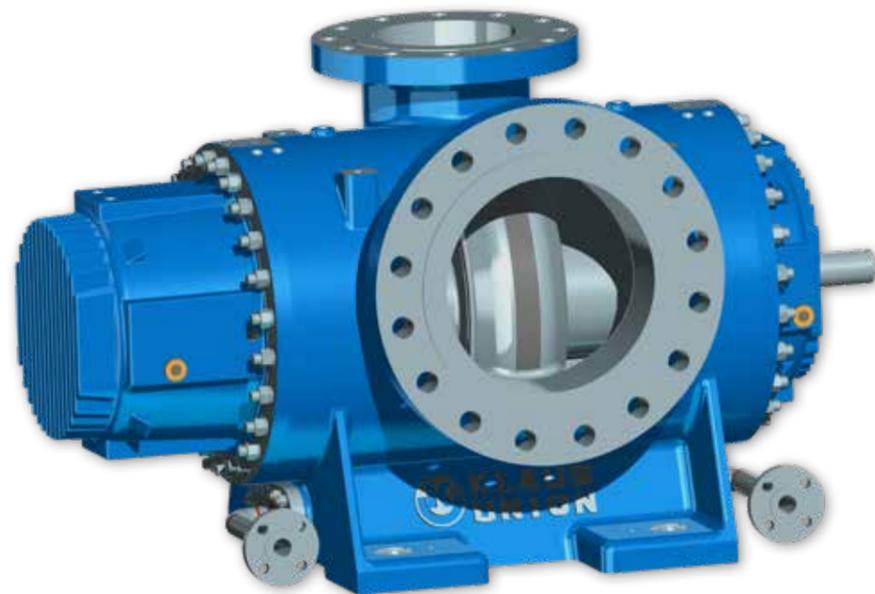


Fig. 34.  
Double Volute Twin Screw Pump DSP-4C in Cartridge Design

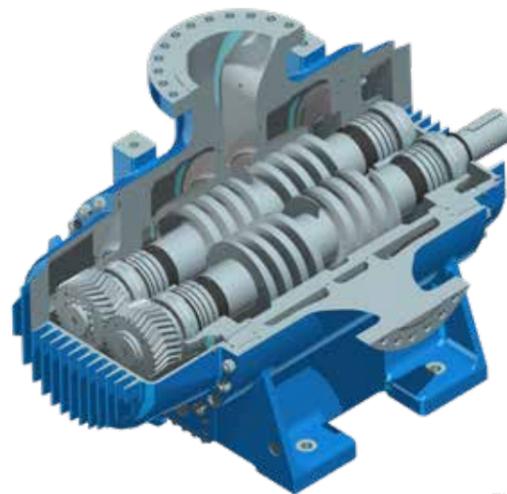


Fig. 35.  
3-D Cross-Section  
Twin Screw Pump DSP-4C

According  
**API 676 3<sup>rd</sup> Edition**



## Industries

- ▶ Oil & Gas
- ▶ Shipbuilding
- ▶ Chemical Industry
- ▶ Power
- ▶ Sugar Industry
- ▶ Paints

## Operating Range

- ▶ Flow Rate: max. 5.000 m<sup>3</sup>/h
- ▶ Differential Pressure: max. 100 bar
- ▶ Temperature Range: -120 °C to + 350 °C
- ▶ Viscosity: max. 100.000 mPas

## Typical Applications

- ▶ Viscous Liquids Containing Considerable Amount of Solids
- ▶ Lube, Crude or Fuel Oils
- ▶ Bitumen
- ▶ Tar
- ▶ Asphalt
- ▶ Fats
- ▶ Resins
- ▶ Residues
- ▶ Multiphase Products Containing Liquids, Gas and Solids

## Design

- ▶ Horizontal, Double Volute Twin Screw Pump
- ▶ 'Plug & Pump' Design
- ▶ Drive Torque Transfer by Timing Gear located outside of Pumping Chamber
- ▶ Materials: Steel, Stainless Steel
- ▶ Rotors Manufactured from Single Piece Bar Stock
- ▶ Bearings located outside of Pumping Chamber
- ▶ Adaptive to customer Piping Standards
- ▶ Inline or Side in / Top out
- ▶ Improved NPSH / NPIP
- ▶ Casted Design

# CUSTOM MATERIALS OF CONSTRUCTION

Steel	
Castings	Rolled Material
1.0619 GP240GH	1.7139 16MnCrS5
1.6220 G20Mn5	1.7225 42CrMo4
0.7043 EN-GJS-400-18	1.7227 42CrMoS4
	1.8550 34CrAlNi7
	1.0038 S235JR
	1.0460 P250GH
	1.0421 P355T1
Stainless Steel	
Castings	Rolled Material
1.4408 GX5CrNiMo 19-11-2	1.4571 X6CrNiMoTi 17-12-2
1.4308 GX5CrNi 19-10	1.4404 X2CrNiMo 17-12-2
1.4470 GX2CrNiMoN 22-5-3	1.4122 X39CrMo 17-1
1.4409 GX2CrNiMo19-11-2	1.4541 X6CrNiTi 18-10
	1.4462 X2CrNiMoN 22-5-3
Nickel-Based Materials	
Castings	Rolled Material
9.4600 G-NiMo29Cr	2.4610 NiMo16Cr16Ti
9.4610 G-NiMo16Cr16	2.4068 Ni99
2.4170 G-Ni95	2.4360 NiCu30Fe
9.4660 GX1NiCrMoCuN35-20	2.4660 NiCr20CuMo
2.4365 G-NiCu30Nb	
Titanium	
Castings	Rolled Material
3.7031 G-Ti2	3.7035 Ti2
3.7032 G-Ti2Pd	3.7165 Ti6Al4V

Further materials upon request



Klaus Union  
Quality is our  
Success

## Customized Solutions

- ▶ Magnet Drives adapted to Individual Applications
- ▶ Pump Retrofitting
  - Reverse Engineering
  - Standard Replacement
- ▶ Multi-Stage Centrifugal Pump for Delivery Heads of up to 1.000 m SLM HV/H
- ▶ Multi-Stage Submerged Pump with Magnet Drive SLM GVTT
- ▶ Multi-Stage Submerged Pump with Stuffing Box Packing TP GO
- ▶ Mobile Pump Units
- ▶ Pipe Elbow Propeller Pumps PK
- ▶ Multiphase Systems



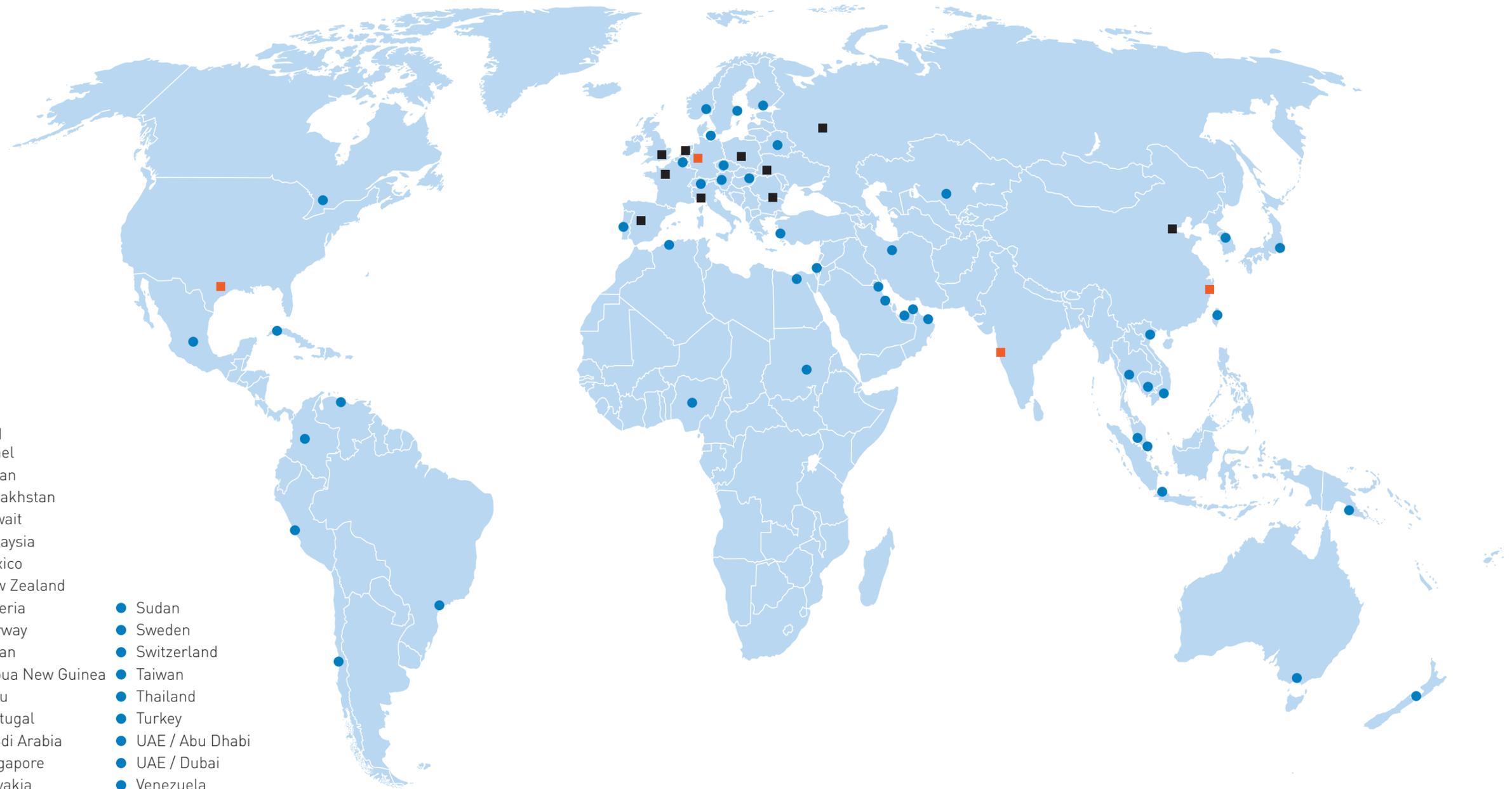
# KLAUS UNION GLOBAL PRESENCE



- Klaus Union Center of Competence
- Klaus Union Subsidiary
- Klaus Union Sales Office

- Germany, Bochum
- India, Pune
- China, Ningbo
- USA, Houston
- China, Tianjin
- England
- France
- Italy
- The Netherlands
- Poland
- Romania
- Russia
- Spain
- Ukraine

- Algeria
- Australia
- Austria
- Belarus
- Belgium
- Brazil
- Cambodia
- Canada
- Chile
- Colombia
- Cuba
- Czech Republic
- Denmark
- Egypt
- Finland
- Hungary
- Indonesia
- Iran
- Iraq
- Israel
- Japan
- Kazakhstan
- Kuwait
- Malaysia
- Mexico
- New Zealand
- Nigeria
- Norway
- Oman
- Papua New Guinea
- Peru
- Portugal
- Saudi Arabia
- Singapore
- Slovakia
- South Korea
- Sudan
- Sweden
- Switzerland
- Taiwan
- Thailand
- Turkey
- UAE / Abu Dhabi
- UAE / Dubai
- Venezuela
- Vietnam



# KLAUS UNION SERVICE

## Klaus Union Worldwide Service

Following our service philosophy „worldwide – close to the customer“, Klaus Union presents itself with affiliates, subsidiaries, marketing agencies and representatives as well as selected co-operation partners worldwide.

Since the founding of Klaus Union Service GmbH in 2006 we focus our efforts to provide service and support for you as our customer quickly and comprehensively.

As an independent service company with exceptionally strong customer orientation, full service, using state of the art technologies and a high level of competence, Klaus Union Service draws on 70 years of process engineering with pumps, valves and agitator drives made by Klaus Union.

We are your partners for advice service and planning, clearly arranged documentation and other required services, including the quick delivery of spare parts and a high level of readiness for delivery.

Our individual service and maintenance contracts provide safety, regardless of where you happen to be.

Experienced, thoroughly trained maintenance personnel and highly specialised product experts are available to you worldwide in our companies, distribution offices and with our co-operation partners. Workshops throughout the world complying with the strict criteria of Klaus Union offer you our services, training classes and on site service.

An important part of our company policy is assuring the high quality of our products.

The quality assurance measures are introduced already at the level of our sub-suppliers, and further inspections are made as from the receiving inspection to the final assembly.

The quality assurance system, developed according to modern principles complying with DIN EN ISO 9001, fulfills the requirements our customers have on our products.



Worldwide  
Close to the  
Customer



## Our Range of Services

Analysis of technical problems and devising an attractively priced technically sound solution belong to our range of services, just like scheduled maintenance and quick assistance in the case of failures.

Production and operational reliability, maximising of plant availability and risk management are becoming increasingly important for our customers.

To successfully work together with the plant operators in these areas, close co-operation on the basis of partnership is indispensable for mutual benefits.

Klaus Union Service GmbH through the direct co-operation with Klaus Union as manufacturer has the unique advantage of access to state of the art production and processing techniques. Spare parts are managed worldwide by the Klaus Union Service GmbH's logistics.

In the future our distribution centre cooperating with a global logistics company will be available to you worldwide with a quick delivery of spare parts.

## Service Performance

- ▶ Workshop Repairs
- ▶ On-Site Repairs
- ▶ Genuine Spare Part Delivery Worldwide
- ▶ Spare Parts Storage
- ▶ Customized Spare Parts Management
- ▶ On-Site Maintenance
- ▶ Installation
- ▶ Retrofitting
- ▶ On-Site Testing
- ▶ Customer Advisory Service
- ▶ Laser Alignment
- ▶ Start Up & Commissioning
- ▶ Individual 24/7-Service
- ▶ Trouble-Shooting
- ▶ In-House & On-Site Training
- ▶ On-Site Assembly and Disassembly
- ▶ Long-Term Maintenance Contracts
- ▶ On-Site Monitoring
- ▶ Maintenance Planning and Consulting
- ▶ Diagnostics

# KLAUS UNION SERVICE

## Testing Facilities

In our modern testing facility, pumps are tested in realistic environment up to DN 1200.

Testing of the repaired pumps with appropriate test reports gives you optimum plant safety.

- ▶ Testing range:
  - Q = 0.1 m<sup>3</sup>/h up to 5.000 m<sup>3</sup>/h
  - H = 2 m L.C. up to 1.000 m L.C.
  - ΔP = up to 100 bar
  - Motor power: up to 1.800 kW
  - n = up to max. 3.500 rpm
- ▶ NPSH-measurements
- ▶ Axial thrust measurements
- ▶ Vibration measurements
- ▶ Noise measurements
- ▶ Test run according to HI 14.6 / DIN EN ISO 9906 and API 685 2<sup>nd</sup> Edition.

## Commissioning

Klaus Union Service GmbH accompanies you from the offer complying with the specifications, via the commissioning of complete plants, to the assurance of plant availability with scheduled maintenance intervals and process optimisations.



## Workshop Repairs

All required chip cutting and processing machines are available to Klaus Union Service for the production and repair of pumps and valves. The following different types of welding processes can be carried out:

- ▶ TIG
- ▶ MIG/MAG
- ▶ E
- ▶ Plasma

Plant-specific modifications and changes of pumps are accompanied, executed and documented by the design department of Klaus Union.



Worldwide  
Close to the  
Customer



## How to find us ...

Klaus Union Service GmbH & Co. KG  
Blumenfeldstr. 18 P.O. Box 10 13 49  
44795 Bochum 44713 Bochum  
Germany Germany

Phone +49 (0) 234 45 95-0  
Fax +49 (0) 234 45 95 7016

E-Mail [service@klaus-union.com](mailto:service@klaus-union.com)  
Service Helpdesk +49 700 55 28 77 37



## Product Range Pumps:

### Pumps with Magnet Drive

- ▶ Centrifugal Pumps acc. to DIN EN ISO 2858 & DIN EN ISO 15783, SLM NV
- ▶ Centrifugal Pumps acc. to ASME B73.3M, SLM AV
- ▶ Centrifugal Pumps for Petrochemical Applications acc. to API 685, SLM APL / SLM APC
- ▶ Centrifugal Pumps for High Pressure Applications, SLM SV/SLM GV
- ▶ Centrifugal Pumps for High Temperature Applications, SLM NHO
- ▶ Self-Priming Centrifugal Pumps, SLM SV
- ▶ Multi-Stage Centrifugal Pumps, Tension-Rod or Barrel-Type Design, SLM GV
- ▶ Submerged Centrifugal Pumps, SLM NVT
- ▶ Twin Screw Pumps acc. API 676, SLM DSP-2C

### Pumps with Shaft Sealing

- ▶ Centrifugal Pumps acc. to DIN EN ISO 2858 & DIN EN ISO 5199, NOV
- ▶ Multi-Stage Centrifugal Pumps, Tension-Rod or Barrel-Type Design, GOV / GOVT
- ▶ Horizontal and Vertical Propeller Pumps, P
- ▶ Bottom-Flange Propeller Pumps, UP
- ▶ Submerged Centrifugal Pumps, TP NO
- ▶ Submerged, Multi-Stage Centrifugal Pumps, TP GO
- ▶ Twin Screw Pumps acc. API 676, DSP-2C / DSP-4C

## Product Range Valves:

- ▶ Globe Valves, T
- ▶ Globe Valves, Y
- ▶ Control Valves
- ▶ Gate Valves, Isomorphous Construction Series
- ▶ Gate Valves, Wedge or Wedge Plates
- ▶ Relief Valves
- ▶ Check Valves
- ▶ Sight Glasses
- ▶ Strainers
- ▶ Filters
- ▶ Bottom Valves
- ▶ Safety Valves

## Klaus Union Service Performance:

- ▶ Workshop / On-Site Repairs
- ▶ Genuine Spare Part Delivery Worldwide
- ▶ Spare Parts Storage
- ▶ Customized Spare Parts Management
- ▶ On-Site Maintenance
- ▶ Installation
- ▶ Retrofitting
- ▶ On-Site Testing / Monitoring
- ▶ Customer Advisory Service
- ▶ Start Up & Commissioning
- ▶ Individual 24 / 7-Service
- ▶ Trouble-Shooting
- ▶ In-House & On-Site Training
- ▶ On-Site Assembly and Disassembly
- ▶ Long-Term Maintenance Contracts
- ▶ Maintenance Planning and Consulting
- ▶ Diagnostics

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