

PRODUCT RANGE PUMPS



PRODUCT RANGE PUMPS

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



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, and 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 AICHEMIA in Frankfurt in 1955.

Further trendsetting developments followed, such as the first titanium pump manufactured in Europe or state of the art 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
- ▶ 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, II 2G Ex h IIC T1-T4 Gb)
- ▶ 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



SINGLE-STAGE CENTRIFUGAL PUMP

p. 20/21

Acc. DIN EN ISO 2858 & DIN EN ISO 15783

- ▶ Flow Rate: max. 3,500 m³/h
max. 15,410 USGPM
- ▶ Delivery Head: max. 220 m L.C.
max. 722 ft
- ▶ Temperature Range: -120 °C to +450 °C
-184 °F to +842 °F
- ▶ Pressure Rating: max. PN 400
max. 5,802 psi



MULTI-STAGE SIDE CHANNEL PUMP

p. 28/29

Following DIN EN ISO 15783

- ▶ Flow Rate: max. 42 m³/h
max. 185 USGPM
- ▶ Delivery Head: max. 470 m L.C.
max. 1,542 ft
- ▶ Temperature Range: -120 °C to +250 °C
-184 °F to +482 °F
- ▶ Pressure Rating: max. PN 400
max. 5,802 psi



SINGLE-STAGE CENTRIFUGAL PUMP

p. 22/23

Acc. ASME B73.3-2015

- ▶ Flow Rate: max. 150 m³/h
max. 660 USGPM
- ▶ Delivery Head: max. 100 m L.C.
max. 328 ft
- ▶ Temperature Range: -120 °C to +450 °C
-184 °F to +842 °F
- ▶ Pressure Rating: max. PN 400
max. 5,802 psi



MULTI-STAGE CENTRIFUGAL PUMP

p. 30/31

Ring-Section Design / Barrel Design

Acc. DIN EN ISO 15783 / Following API 685 2nd Ed.

- ▶ Flow Rate: max. 300 m³/h
max. 1,321 USGPM
- ▶ Delivery Head: max. 2,200 m L.C.
max. 7,218 ft
- ▶ Temperature Range: -120 °C to +350 °C
-184 °F to +662 °F
- ▶ Pressure Rating: max. PN 250
max. 3,626 psi



SINGLE-STAGE CENTRIFUGAL PUMP

p. 24/25

Acc. API 685 2nd Ed.

- ▶ Flow Rate: max. 3,500 m³/h
max. 15,410 USGPM
- ▶ Delivery Head: max. 220 m L.C.
max. 722 ft
- ▶ Temperature Range: -120 °C to +450 °C
-184 °F to +842 °F
- ▶ Pressure Rating: max. PN 400
max. 5,802 psi



VERTICALLY SUSPENDED (SUMP) PUMP

p. 32/33

Single- / Multi-Stage

Acc. DIN EN ISO 15783 / Following ASME B73.3-2015 / API 685 2nd Ed.

- ▶ Flow Rate: max. 900 m³/h
max. 3,963 USGPM
- ▶ Delivery Head: max. 200 m L.C.
max. 656 ft
- ▶ Temperature Range: -40 °C to +200 °C
-40 °F to +392 °F
- ▶ Pressure Rating: max. PN 40
max. 580 psi



VERTICAL INLINE CENTRIFUGAL PUMP

p. 26/27

Following DIN EN ISO 2858 & DIN EN ISO 15783 / ASME B73.3-2015 / API 685 2nd Ed.

- ▶ Flow Rate: max. 900 m³/h
max. 3,963 USGPM
- ▶ Delivery Head: max. 220 m L.C.
max. 722 ft
- ▶ Temperature Range: -120 °C to +350 °C
-184 °F to +662 °F
- ▶ Pressure Rating: max. PN 40
max. 580 psi



SINGLE VOLUTE TWIN SCREW PUMP

p. 34/35

Acc. API 676 3rd Ed.

- ▶ Flow Rate: max. 1,800 m³/h
max. 7,925 USGPM
- ▶ Diff. Pressure: max. 40 bar
max. 580 psi
- ▶ Temperature Range: -120 °C to +350 °C
-184 °F to +662 °F
- ▶ Pressure Rating: max. PN 400
max. 5,802 psi

PRODUCT PORTFOLIO

MECHANICALLY SEALED PUMPS

DIN
ASME
API



SINGLE-STAGE CENTRIFUGAL PUMP

p. 36/37

Acc. DIN EN ISO 2858 & 5199 /
API 610 12th Ed. &
ISO 13709 2010

- ▶ Flow Rate: max. 3.500 m³/h
max. 15,410 USGPM
- ▶ Delivery Head: max. 220 m L.C.
max. 722 ft
- ▶ Temperature Range: -120 °C to +450 °C
-184 °F to +842 °F
- ▶ Pressure Rating: max. PN 400
max. 5,802 psi



MULTI-STAGE CENTRIFUGAL PUMP

p. 38/39

Ring-Section Design /
Barrel Design

Acc. DIN EN ISO 5199 /
Following API 610 12th Ed. &
ISO 13709 2010

- ▶ Flow Rate: max. 300 m³/h
max. 1,321 USGPM
- ▶ Delivery Head: max. 2.200 m L.C.
max. 7,218 ft
- ▶ Temperature Range: -120 °C to +350 °C
-184 °F to +662 °F
- ▶ Pressure Rating: max. PN 250
max. 3,626 psi



VERTICALLY SUSPENDED (SUMP) PUMP

p. 40/41

Single- / Multi-Stage

Acc. DIN EN ISO 5199 /
Following API 610 12th Ed. &
ISO 13709 2010

- ▶ Flow Rate: max. 1.600 m³/h
max. 7,045 USGPM
- ▶ Delivery Head: max. 200 m L.C.
max. 656 ft
- ▶ Temperature Range: -50 °C to +250 °C
-58 °F to +482 °F
- ▶ Pressure Rating: max. PN 40
max. 580 psi



SINGLE-STAGE PROPELLER PUMP

p. 42/43

- ▶ Flow Rate: max. 12.000 m³/h
max. 52,835 USGPM
- ▶ Delivery Head: max. 12 m L.C.
max. 39 ft
- ▶ Temperature Range: -120 °C to +250 °C
-184 °F to +482 °F
- ▶ Pressure Rating: max. PN 100
max. 1,450 psi



SINGLE VOLUTE TWIN SCREW PUMP

p. 44/45

Acc. API 676 3rd Ed.

- ▶ Flow Rate: max. 1.800 m³/h
max. 7,925 USGPM
- ▶ Diff. Pressure: max. 40 bar
max. 580 psi
- ▶ Temperature Range: -120 °C to +350 °C
-184 °F to +662 °F
- ▶ Pressure Rating: max. PN 400
max. 5,802 psi



DOUBLE VOLUTE TWIN SCREW PUMP

p. 46/47

Acc. API 676 3rd Ed.

- ▶ Flow Rate: max. 5.000 m³/h
max. 22,000 USGPM
- ▶ Diff. Pressure: max. 100 bar
max. 1,450 psi
- ▶ Temperature Range: -120 °C to +350 °C
-184 °F to +662 °F
- ▶ Pressure Rating: max. PN 150
max. 2,176 psi

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 m³/h and 400 bar. Interchangeability, stock size and servicing equipment are simplified for all users.

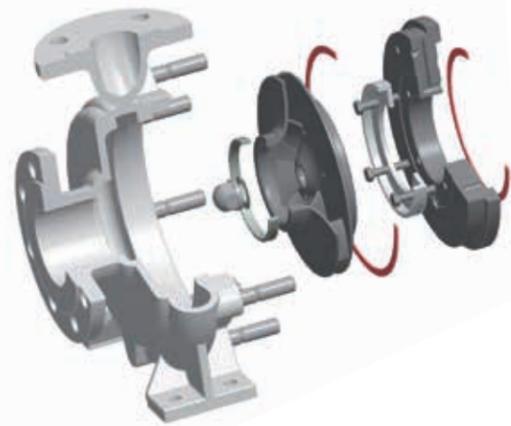


Fig. 1: Pump Hydraulic (Centrifugal Pump), 41 Sizes

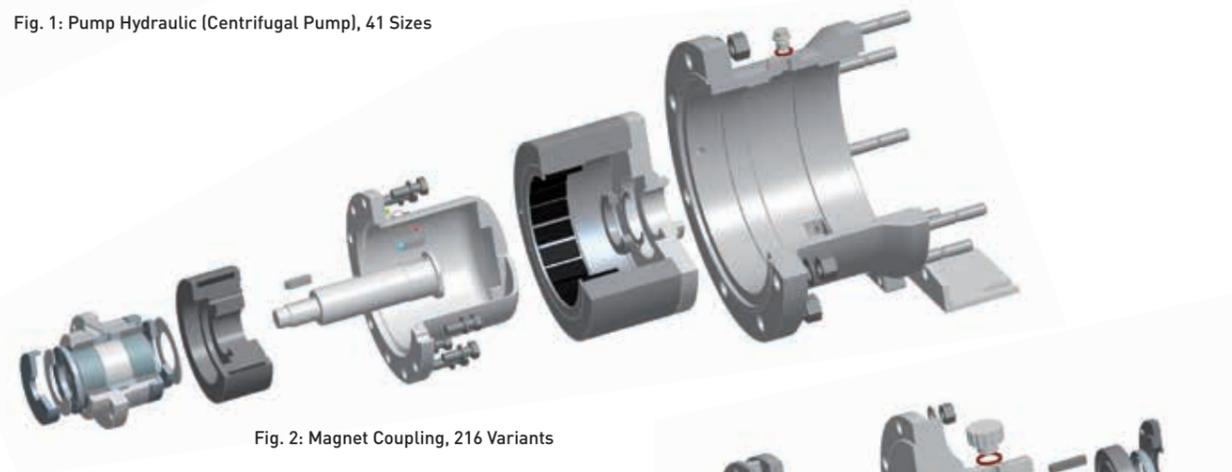


Fig. 2: Magnet Coupling, 216 Variants

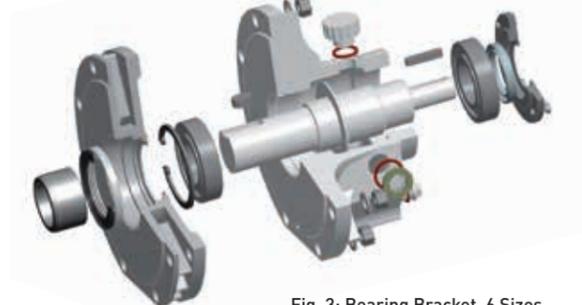


Fig. 3: Bearing Bracket, 6 Sizes

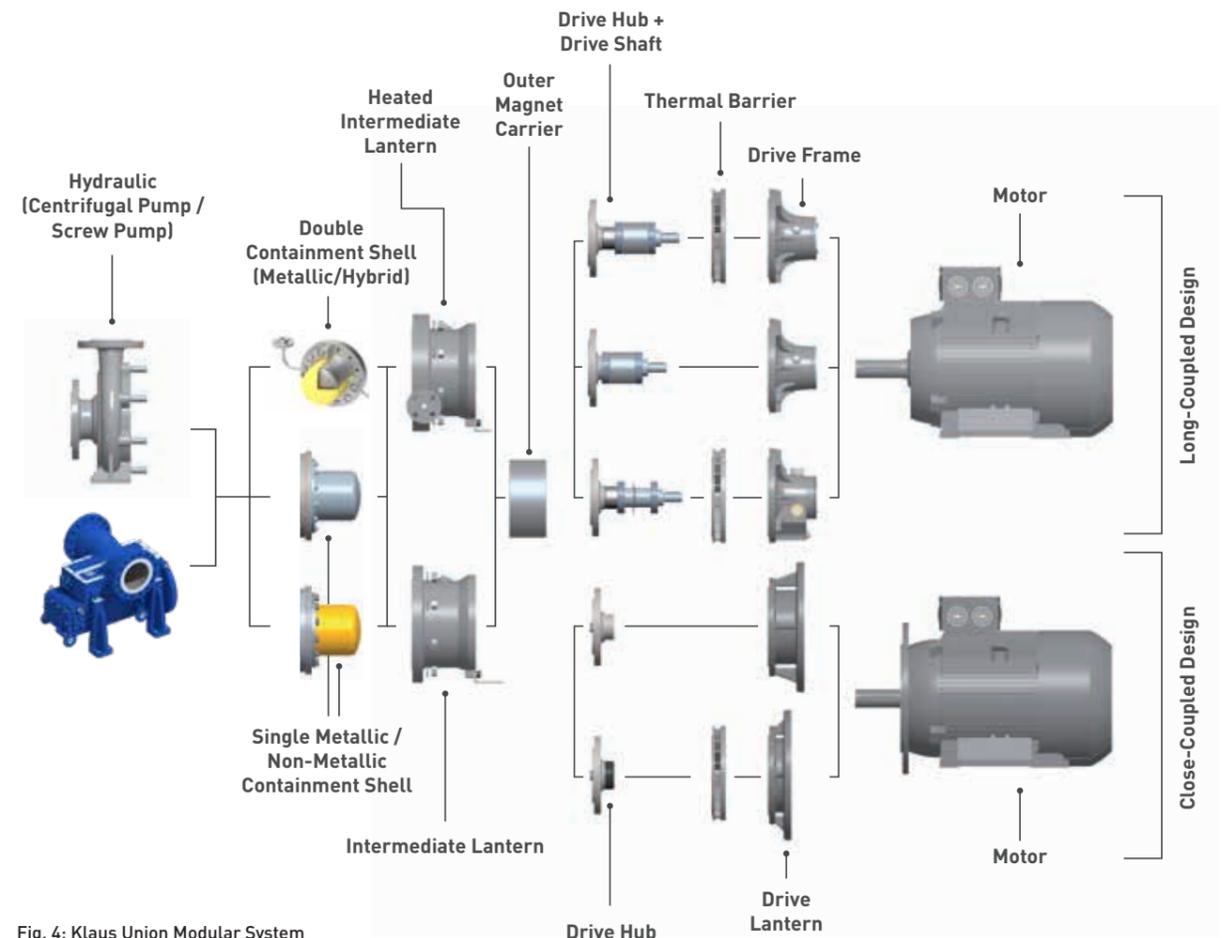


Fig. 4: Klaus Union Modular System

KLAUS UNION MAGNET DRIVE - WHEN LEAKAGE IS NOT AN OPTION

SEALLESS TECHNOLOGY

If pumps are used to handle dangerous products, it is essential to avoid even the smallest leakages into the environment in order to ensure the protection of both people and the atmosphere.

The ideal solution for such a case is pumps with magnet drive. The first of its kind was already introduced by Klaus Union in 1955.

TECHNICAL DESCRIPTION

Figure 5 shows a cross sectional view of a pump with magnet drive. The drive shaft - to transfer the mechanical energy from the drive to the pump hydraulics - is not a single shaft with a gland packing or mechanical seal on it. Instead, the mechanical energy transferred from the drive to the pump shaft is transferred to an outer ring (outer magnet carrier) fitted with permanent magnets. The impeller of the centrifugal pump is firmly connected via the impeller shaft to an inner ring (inner magnet carrier) also fitted with permanent magnets. Due to the rotation of the outer magnet carrier, the inner magnet carrier is rotated synchronously via magnetic forces; the mechanical drive energy is transmitted via the magnetic field.

A containment shell is installed to separate the pumped fluid from its environment. The impeller shaft is supported by fluid-lubricated slide bearings within the pump's hydraulic system. This special design enables hermetic integrity.

There are no dynamic seals between the pumped fluid and the environment from which leaks can escape to the environment. Only two static seals (designed as flat seals or O-rings) are used between pump casing and casing cover and between casing cover and containment shell in the magnetically driven pump. The static seals are maintenance free and therefore the pump is hermetically sealed.

ADVANTAGES VS. MECHANICALLY SEALED PUMPS

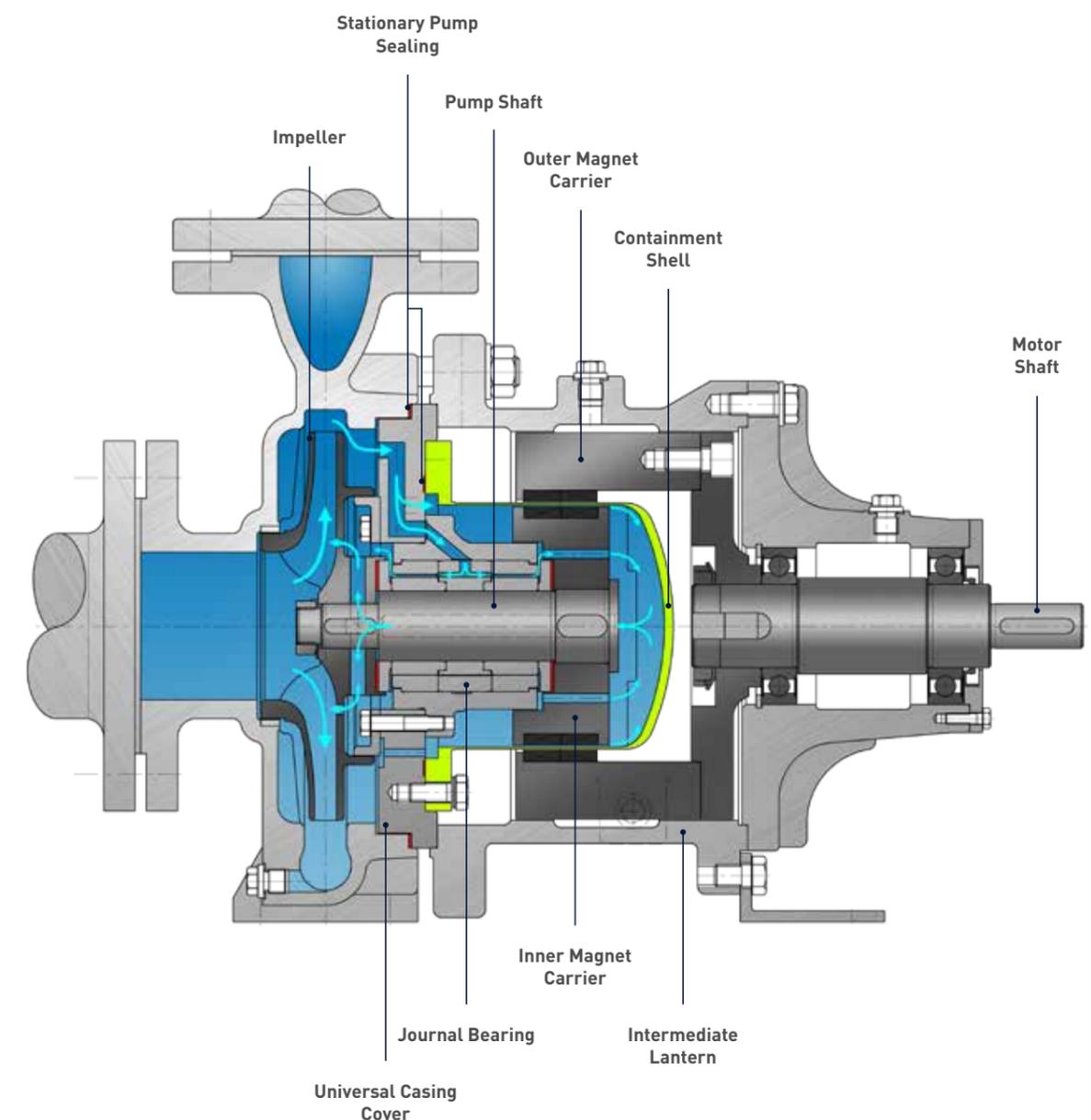
- ▶ Nearly maintenance free
- ▶ Less investment costs and less maintenance costs
- ▶ No instrumentation or special monitoring devices required in standard
- ▶ No utilities required, such as nitrogen or cooling water
- ▶ No leakage to the atmosphere
- ▶ No loss of sealant liquid
- ▶ No wear of the seals at all
- ▶ Low mechanical loads on shaft and bearings
- ▶ High stiffness of the pump shaft

ADVANTAGES VS. CANNED MOTOR PUMPS

- ▶ Standard IEC and NEMA motors can be used
- ▶ Maintenance without disconnecting pump and motor possible
- ▶ Lower investment and repair costs
- ▶ Separate flushing of journal bearing
- ▶ Higher efficiency
- ▶ Use of non-metallic containment shell possible
- ▶ No heat generation of the rotor by electric losses
- ▶ Higher viscosities possible
- ▶ Higher temperatures without cooling possible
- ▶ No special monitoring devices necessary



Fig. 5: Magnet Drive Pump Cutaway // Main Components & Internal Circulation (internal circulation of the fluid →)



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 chemical, petrochemical, and oil & gas 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:



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 2nd Ed. - 7.3

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

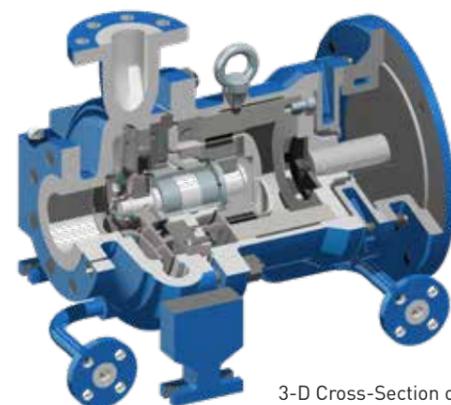


Fig. 6:
3-D Cross-Section of SLM APC
No coupling and coupling guard



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



Fig. 8:
Magnet Drive Centrifugal Pump SLM APC
(Close-Coupled Design)

ENERGY EFFICIENT DESIGN FOR MAGNET DRIVE PUMPS I

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 zero-leakage magnet drive concept, pumps with magnet drive have a huge and significantly growing market share in the chemical, petrochemical, and oil & gas industry.

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

So far, the operation range has been limited due to the specific material characteristics. However, pump applications increasingly require higher operating pressures, temperatures and flow rates whilst still offering maximum efficiency.



Klaus Union accepted this challenge and provides the following application envelope:

NOM. PRESSURE RANGE:

UP TO PN 63

UP TO 914 PSI

TEMPERATURE RANGE:

-200 °C to +400 °C

-328 °F to +752 °F

TRANSMITTABLE POWER:

UP TO 1 MW



Fig. 9: Size Range Zirconium Oxide Containment Shells



MODULAR SYSTEM 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 drive and the bearing bracket. All pump types in this system use an universal casing cover, which easily allows to change the existing containment shells regardless of its material. Within the modular system, containment shells made of technical ceramic are available for every magnet drive size (09-31 E/T/P/U).

Our containment shell design is optimized by the aid of state of the art Finite Element Analysis (FEA). This simulation method allows to detect and analyze accurate approximations of stress 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 below show a strain behaviour (Fig. 1) and a stress analysis (Fig. 2) at a hydrotest at 94,5 bar (1370 psi).

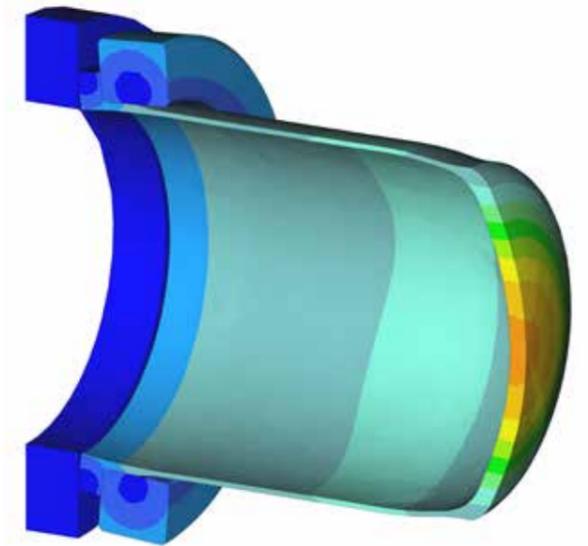


Fig. 10: Displacement Analysis

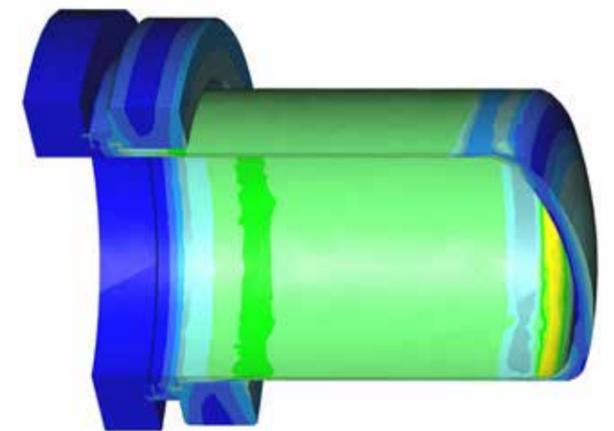


Fig. 11: Stress Analysis

ENERGY EFFICIENT DESIGN FOR MAGNET DRIVE PUMPS II

ADVANTAGES OF CERAMIC CONTAINMENT SHELLS

Containment Shells made of Zirconium Oxide are not magnetizable. Due to this characteristic there are no eddy current losses impacting the pump performance. In consequence, no heat is added to the pumped liquid. This has the following advantages:

- ▶ Enables for dry run capable executions (RTZ-design) and executions without continuous flush flow (OTZ-design).
- ▶ Enables for applications with high gas content.
- ▶ Pumps can handle fluids close to boiling point, 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 bar absolute.
- ▶ High corrosion and erosion resistance; zirconium oxide has a nearly unlimited application range, especially related to lyes and acids.
- ▶ Excellent thermal shock resistance
- ▶ Enhanced energy efficiency

RETROFIT OF PUMPS WITH SHAFT SEAL

- ▶ As there are no eddy current losses, efficiencies 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 OXIDE

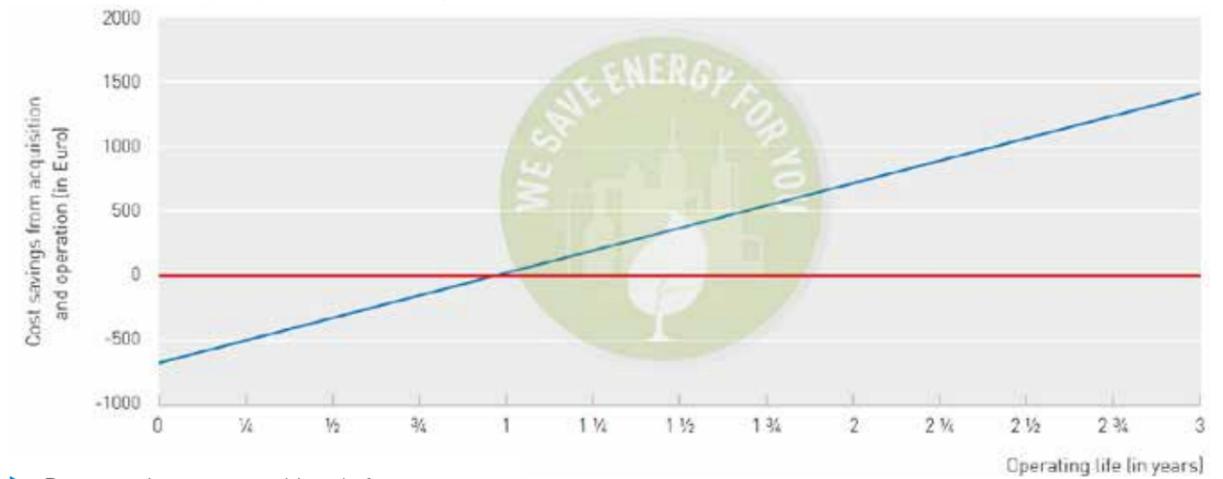
- ▶ Ceramic containment shells are a fundamental part of Klaus Union's modular pump system. Due to the universal casing cover containment shells can be easily and safely mounted or replaced. The operator saves stock capacities and service costs.
- ▶ There is no heat input into the pumped liquid; this significantly increases the process reliability. In consequence, no temperature monitoring is required at the containment shell.
- ▶ Energy consumption can be lowered as there are no performance-impairing eddy currents. In fact, the consumed power can be reduced by 10 to 15 %.
- ▶ Due to shaft power demand, smaller electric motors can be installed.



ENERGY-SAVING POTENTIAL BY ELIMINATING EDDY CURRENT POWER LOSSES

Case study during 8800 operating hours illustrating the energy saving potential

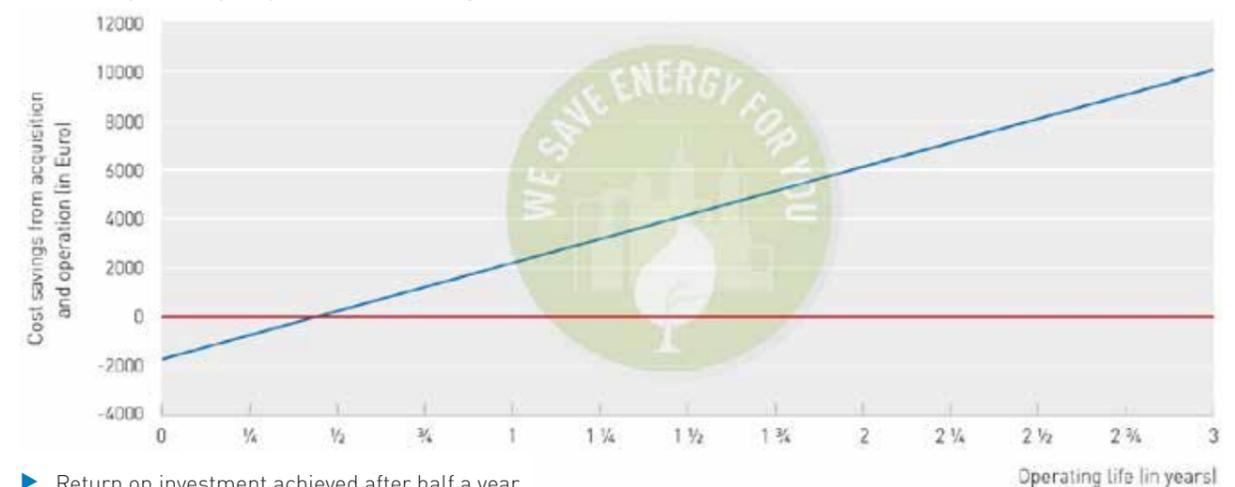
Cost-comparison pump with 10 kW magnet drive



- ▶ 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

HYBRID DOUBLE CONTAINMENT SHELL

HYBRID DOUBLE CONTAINMENT SHELL

Pumping aggressive, explosive and highly toxic liquids requires the highest level of process safety. To protect people and the environment, leakage of the pumped liquid must be avoided - including in the event of a pump failure. For these most critical applications a magnetic drive pump equipped with a monitored, double containment shell still remains the safest solution.

To reduce the heat generated by a purely metallic, double containment shell and at the same time to improve the overall efficiency of the pump, Klaus Union has developed and patented a new hybrid double containment shell.



ADVANTAGES

- ▶ Reduced heat input into the pumped process liquid
- ▶ Increased reliability when pumping liquids close to their boiling point
- ▶ High corrosion resistance
- ▶ Higher efficiency leading to power savings
- ▶ Wider application range than full metal, double containment shells
- ▶ Fully compliant with requirements for secondary containment system as defined by API 685, 2nd Edition, § 3.66 (page 10)
- ▶ Primary and secondary containment integrity is constantly verified by the pressure transmitter
- ▶ Easy and reliable detection of containment breach through a standard pressure transmitter
- ▶ High spare parts availability by using of standard Klaus Union components
- ▶ Ability to flush the area between shells (according API 685, 2nd Edition, § 6.7.9)
- ▶ Available across entire Klaus Union mag-drive pump range
- ▶ Reliable and maintenance friendly construction

MAX. PRESSURE RATING:

40 BAR at 120 °C

580 PSI AT 248 °F

TEMPERATURE RANGE:

-60 °C to +400 °C

-76 °F to +752 °F

(HIGHER ON REQUEST)

MAX. PUMP SPEED:

3.600 RPM

Quality and Know-How

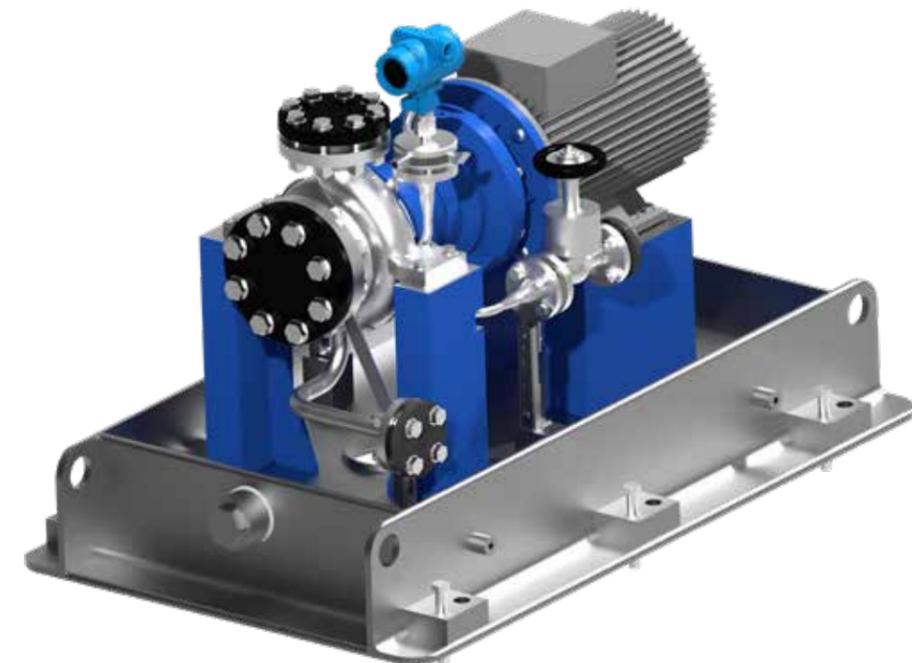


WORKING PRINCIPLE

The hybrid double containment shell combines two separate shells. The inner shell is a highly corrosion resistant metallic containment shell while the outer, secondary shell is a non-metallic containment shell made from heavy duty technical ceramics. The increased electrical resistance of the materials used in this hybrid design reduces the eddy current losses. It improves the efficiency of the pump putting it about on par to traditional metallic, single containment shells. Moreover the risk of vaporization, especially when pumping media close to the boiling point or under other critical operating conditions, is significantly reduced.

The gap between both shells is provided with a vacuum and can be monitored with a standard pressure sensor; typically a pressure transmitter following customer instrumentation standards. In the event of damage to either containment shell the sensor immediately detects the change in pressure and alerts the operator, identifying which shell has been breached. This immediate and detailed information allows the operator to take any necessary steps to avoid any leakage of the dangerous pumped liquid to the atmosphere.

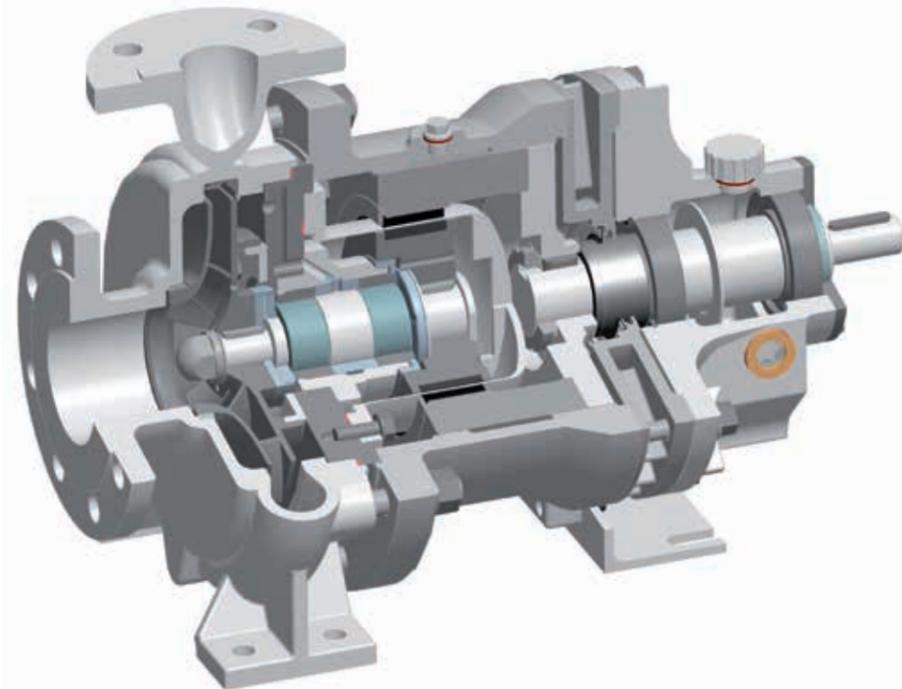
The patented hybrid double containment shell design substantially increases safety and reliability for operators in all kinds of industries reducing operation costs for the most critical applications where leakage is not an option - ever.



SINGLE STAGE CENTRIFUGAL PUMP WITH MAGNET DRIVE

SERIES SLM NV

ACC. DIN EN ISO 2858 & DIN EN ISO 15783



DIN EN ISO

MAX. FLOW RATE:

3.500 M³/H

15,410 USGPM

MAX. DELIVERY HEAD:

220 M L.C.

722 FT

TEMPERATURE RANGE:

-120 °C to +450 °C

-184 °F to +842 °F

MAX. PRESSURE RATING:

PN 400

5,802 PSI

DESIGN

- ▶ Horizontal centrifugal pump, process design
- ▶ Hydraulic performance and dimensions according to DIN EN ISO 2858
- ▶ Design based on DIN EN ISO 15783
- ▶ Permanent & synchronous magnet drive
 - Maintenance-free
 - Separation of liquid chamber and atmosphere by means of containment shell
- ▶ Pressurized partial flush flow (cooling of eddy current losses / lubrication of journal bearings)
- ▶ Materials: steel, stainless steel, duplex steel, nickel-based materials, titanium
- ▶ Bearing bracket with anti-friction bearings, oil-lubricated or greased-for-life
- ▶ Product-lubricated journal bearings; made of silicon carbide (SSiC) or customized materials
- ▶ Rub zones as per standard for increased safety

OPTIONS

- ▶ Close-coupled design (SLM NVB)
- ▶ Centerline mounting OH2
- ▶ Various containment shell executions (metallic / non-metallic, single / double shell)
- ▶ Energy efficient design
- ▶ Various design options when pumping critical liquids (e.g. liquids containing solids)
- ▶ Open impeller
- ▶ Thermal barrier
- ▶ Various heating designs
- ▶ Inducer to significantly improve pump's NPSH(R)
- ▶ Secondary control / secondary control system / secondary containment system acc. API 685 2nd Ed.
- ▶ Temperature protection system
- ▶ Back pull out-unit
- ▶ High viscosity optimized design
- ▶ Magnet drive acc. API 685 2nd Ed.
- ▶ Retrofit
- ▶ Semi Submerged Design
- ▶ Vertical dry mounted arrangement

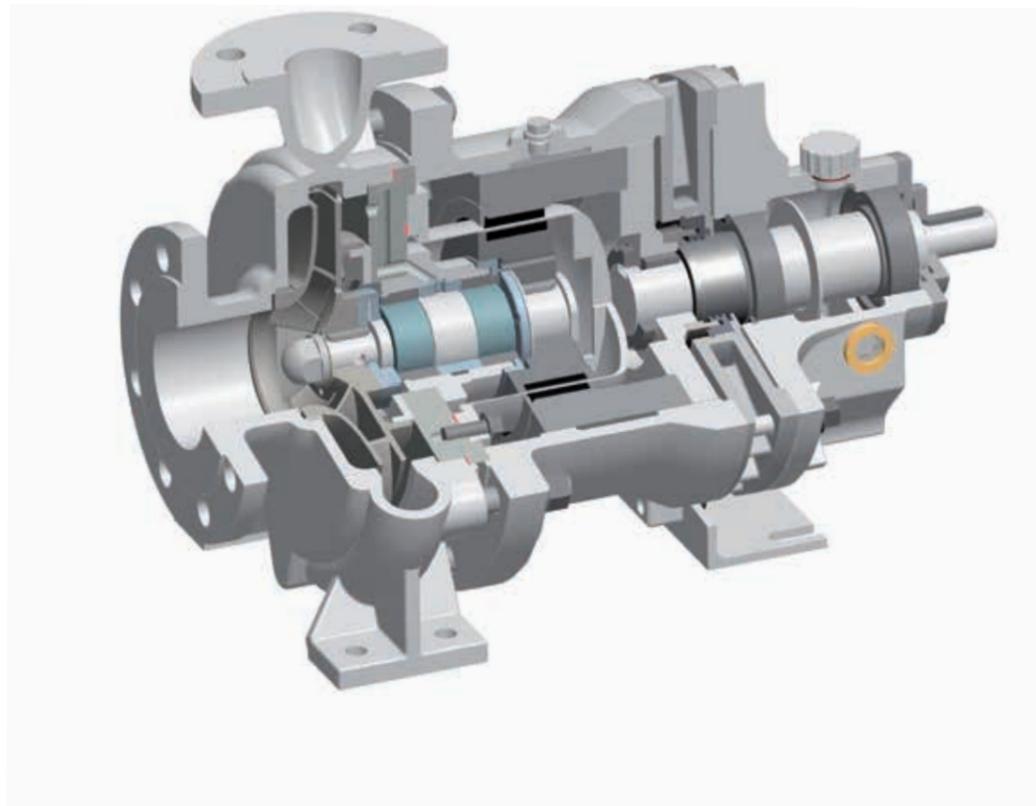
PUMPING OF

- ▶ Acids
- ▶ Lyes
- ▶ Hydrocarbons
- ▶ Heat transfer liquids
- ▶ Coolants
- ▶ Liquid gases
- ▶ Aggressive, explosive, toxic and malodorous liquids
- ▶ Valuable liquids
- ▶ Liquids containing solids
- ▶ And many more

SINGLE STAGE CENTRIFUGAL PUMP WITH MAGNET DRIVE

SERIES SLM AV

ACC. ASME B73.3-2015



ASME



MAX. FLOW RATE:

150 M³/H

660 USGPM

TEMPERATURE RANGE:

-120 °C to +450 °C

-184 °F to +842 °F

MAX. DELIVERY HEAD:

100 M L.C.

328 FT

MAX. PRESSURE RATING:

PN 400

5,802 PSI

DESIGN

- ▶ Horizontal centrifugal pump, process design
- ▶ Hydraulic performance and dimensions according to ASME B73.3-2015
- ▶ Design based on DIN EN ISO 15783
- ▶ Permanent & synchronous magnet drive
 - Maintenance-free
 - Separation of liquid chamber and atmosphere by means of containment shell
- ▶ Pressurized partial flush flow (cooling of eddy current losses / lubrication of journal bearings)
- ▶ Materials: steel, stainless steel, duplex steel, nickel-based materials, titanium
- ▶ Bearing bracket with anti-friction bearings, oil-lubricated or greased-for-life
- ▶ Product-lubricated journal bearings; made of silicon carbide (SSiC) or customized materials
- ▶ Rub zones as per standard for increased safety

OPTIONS

- ▶ Close-coupled design (SLM AVB)
- ▶ Centerline mounting OH2
- ▶ Various containment shell executions (metallic / non-metallic, single / double shell)
- ▶ Energy efficient design
- ▶ Various design options when pumping critical liquids (e.g. liquids containing solids)
- ▶ Open impeller
- ▶ Thermal barrier
- ▶ Various heating designs
- ▶ Inducer to significantly improve pump's NPSH(R)
- ▶ Secondary control / secondary control system / secondary containment system acc. API 685 2nd Ed.
- ▶ Temperature protection system
- ▶ Back pull out-unit
- ▶ High viscosity optimized design
- ▶ Magnet drive acc. API 685 2nd Ed.
- ▶ Retrofit
- ▶ Semi Submerged Design
- ▶ Vertical dry mounted arrangement

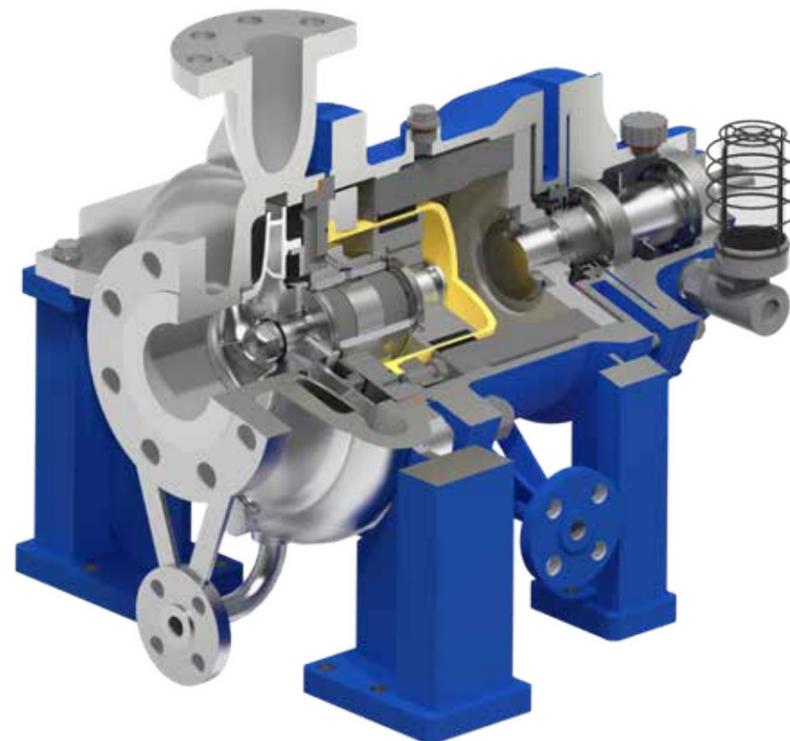
PUMPING OF

- ▶ Acids
- ▶ Lyes
- ▶ Hydrocarbons
- ▶ Heat transfer liquids
- ▶ Coolants
- ▶ Liquid gases
- ▶ Aggressive, explosive, toxic and malodorous liquids
- ▶ Valuable liquids
- ▶ Liquids containing solids
- ▶ And many more

SINGLE STAGE CENTRIFUGAL PUMP WITH MAGNET DRIVE

SERIES SLM AP

ACC. API 685 2ND ED.



MAX. FLOW RATE:

3.500 M³/H

15,410 USGPM

TEMPERATURE RANGE:

-120 °C to +450 °C

-184 °F to +842 °F

MAX. DELIVERY HEAD:

220 M L.C.

722 FT

MAX. PRESSURE RATING:

PN 400

5,802 PSI

DESIGN

- ▶ Horizontal centrifugal pump, process design
- ▶ Hydraulic performance and dimensions with reference to ASME B73.3-2015
- ▶ Technical design according to API 685 2nd Ed.
- ▶ Flanges according to ANSI/ASME B16.5, class 150 (PN 20), class 300 (PN 50)
- ▶ Permanent & synchronous magnet drive
 - Maintenance-free
 - Separation of liquid chamber and atmosphere by means of containment shell
- ▶ Pressurized partial flush flow (cooling of eddy current losses / lubrication of journal bearings)
- ▶ Materials: steel, stainless steel, duplex steel, nickel-based materials, titanium
- ▶ Bearing bracket with oil-lubricated anti-friction bearings
- ▶ Product-lubricated journal bearings; made of silicon carbide (SSiC) or customized materials
- ▶ Rub zones as per standard for increased safety

OPTIONS

- ▶ Close-coupled design (SLM APC)
- ▶ Centerline mounting OH2 (required as per API standard from 175°C)
- ▶ Various containment shell executions (metallic / non-metallic, single / double shell)
- ▶ Energy efficient design
- ▶ Bearing bracket with greased-for-life anti-friction bearings
- ▶ Various design options when pumping critical liquids (e.g. liquids containing solids)
- ▶ Open impeller
- ▶ Thermal barrier
- ▶ Various heating designs
- ▶ Inducer to significantly improve pump's NPSH(R)
- ▶ Secondary control / secondary control system / secondary containment system acc. API 685 2nd Ed.
- ▶ Temperature protection system
- ▶ Back pull out-unit
- ▶ High viscosity optimized design
- ▶ Magnet drive acc. API 685 2nd Ed.
- ▶ Retrofit
- ▶ Semi Submerged Design
- ▶ Vertical dry mounted arrangement

PUMPING OF

- ▶ Hydrocarbons
- ▶ Liquid gases
- ▶ Aggressive, explosive, toxic and malodorous liquids
- ▶ Valuable liquids
- ▶ Heat transfer liquids
- ▶ Coolants
- ▶ Acids
- ▶ Lyes
- ▶ And many more

VERTICAL INLINE CENTRIFUGAL PUMP WITH MAGNET DRIVE

SERIES SLM NVBI

ACC. DIN EN ISO 2858 / 15783

SERIES SLM AVBI

ACC. ASME B73.3-2015

SERIES SLM APCI

ACC. API 685 2ND ED.



DIN EN ISO
ASME
API



MAX. FLOW RATE:

900 M³/H

3,963 USGPM

TEMPERATURE RANGE:

-120 °C to +350 °C

-184 °F to +662 °F

MAX. DELIVERY HEAD:

220 M L.C.

722 FT

MAX. PRESSURE RATING:

PN 40

580 PSI

DESIGN

- ▶ Vertical inline centrifugal pump, close-coupled design (OH3 CC)
- ▶ Hydraulic performance and dimensions following DIN EN ISO 2858 & 15783 / ASME B73.3-2015 / API 685 2nd Edition
- ▶ Permanent & synchronous magnet drive
 - Maintenance-free
 - Separation of liquid chamber and atmosphere by means of containment shell
- ▶ Pressurized partial flush flow (cooling of eddy current losses / lubrication of journal bearings)
- ▶ Materials: steel, stainless steel, duplex steel, nickel-based materials, titanium
- ▶ Rub zones as per standard for increased safety

OPTIONS

- ▶ Various containment shell executions (metallic / non-metallic, single / double shell)
- ▶ Energy efficient design
- ▶ Various design options when pumping critical liquids (e.g. liquids containing solids)
- ▶ Open impeller
- ▶ Thermal barrier
- ▶ Various heating designs
- ▶ Inducer to significantly improve pump's NPSH(R)
- ▶ Secondary control / secondary control system / secondary containment system acc. API 685 2nd Ed.
- ▶ Temperature protection system
- ▶ Back pull out-unit
- ▶ High viscosity optimized design
- ▶ Magnet drive acc. API 685 2nd Ed.
- ▶ Retrofit

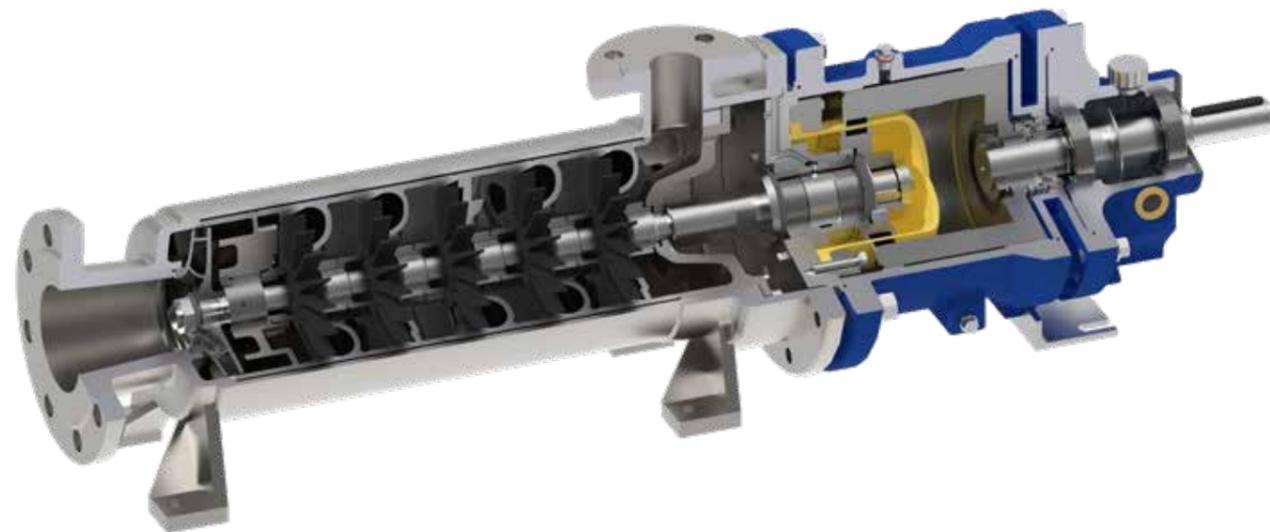
PUMPING OF

- ▶ Acids
- ▶ Lyes
- ▶ Hydrocarbons
- ▶ Heat transfer liquids
- ▶ Coolants
- ▶ Liquid petroleum gases
- ▶ Aggressive, explosive, toxic and malodorous liquids
- ▶ Valuable liquids
- ▶ Liquids containing solids
- ▶ And many more

MULTI-STAGE SIDE CHANNEL PUMP WITH MAGNET DRIVE

SERIES SLM SV

ACC. DIN EN ISO 15783



DIN EN ISO



MAX. FLOW RATE:

42 M³/H

185 USGPM

MAX. DELIVERY HEAD:

470 M L.C.

1,542 FT

TEMPERATURE RANGE:

-120 °C to +250 °C

-184 °F to +482 °F

MAX. PRESSURE RATING:

PN 400

5,802 PSI

DESIGN

- ▶ Horizontal side channel pump, process design
- ▶ Magnet drive based on DIN EN ISO 15783
- ▶ Maximum number of stages: 8
- ▶ Vanes made of duplex, with DLC coating
- ▶ Self-priming
- ▶ Barrel housing design with just two static gaskets
- ▶ Gas handling
- ▶ First low-NPSH stage for improved suction performance
- ▶ Permanent & synchronous magnet drive
 - Maintenance-free
 - Separation of liquid chamber and atmosphere by means of containment shell
- ▶ Pressurized partial flush flow (cooling of eddy current losses / lubrication of journal bearings)
- ▶ Materials: steel, stainless steel, duplex steel, nickel-based materials
- ▶ Bearing bracket with anti-friction bearings, oil-lubricated or greased-for-life
- ▶ Product-lubricated journal bearings; made of silicon carbide (SSiC) or customized materials
- ▶ Rub zones as per standard for increased safety

OPTIONS

- ▶ Close-coupled design (SLM SVB)
- ▶ Centerline mounting OH2
- ▶ Various containment shell executions (metallic / non-metallic, single / double shell)
- ▶ Energy efficient design
- ▶ Various design options when pumping critical liquids (e.g. liquids containing solids)
- ▶ Thermal barrier
- ▶ Various heating designs
- ▶ Inducer to significantly improve pump's NPSH(R)
- ▶ Secondary control / secondary control system / secondary containment system acc. API 685 2nd Ed.
- ▶ Temperature protection system
- ▶ Back pull out-unit
- ▶ High viscosity optimized design
- ▶ Magnet drive acc. API 685 2nd Ed.
- ▶ Retrofit

PUMPING OF

- ▶ Acids
- ▶ Lyes
- ▶ Hydrocarbons
- ▶ Solvents
- ▶ Liquid gases
- ▶ Refrigerants
- ▶ And many more

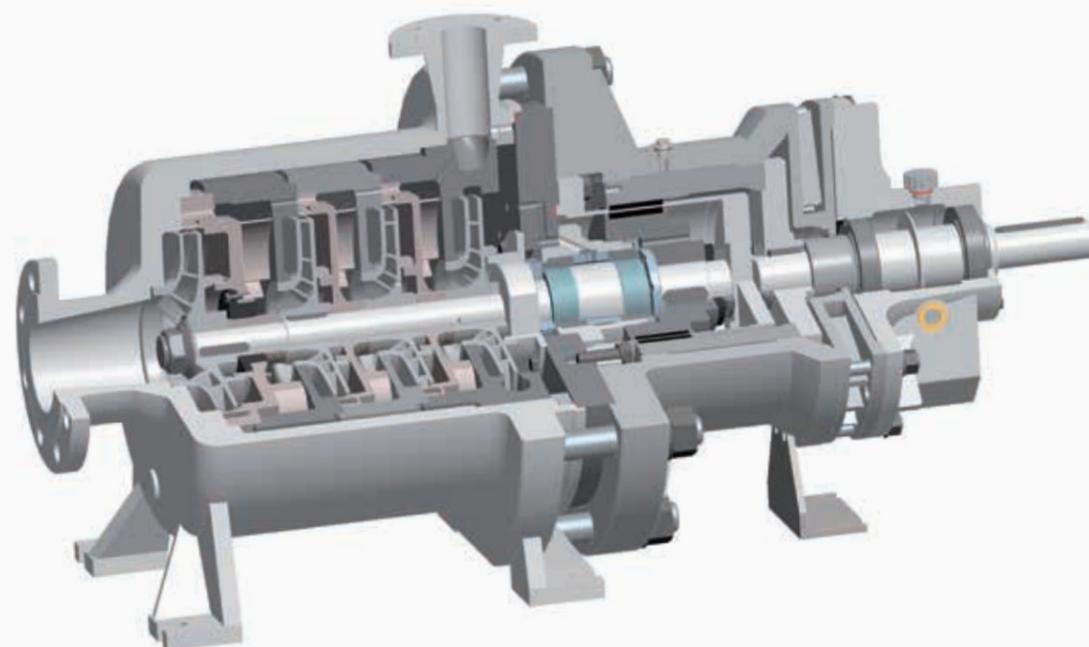
MULTI-STAGE CENTRIFUGAL PUMP WITH MAGNET DRIVE

SERIES SLM GV / GVxT

ACC. DIN EN ISO 15783

SERIES SLM APG

ACC. API 685 2ND ED.



DIN EN ISO API



MAX. FLOW RATE:

300 M³/H

1,321 USGPM

TEMPERATURE RANGE:

-120 °C to +350 °C

-184 °F to +662 °F

MAX. DELIVERY HEAD:

2.200 M L.C.

7,218 FT

MAX. PRESSURE RATING:

PN 250

3,626 PSI

DESIGN

- ▶ Horizontal centrifugal pump, process design
- ▶ Magnet drive based on DIN EN ISO 15783
- ▶ Maximum number of stages: 15
- ▶ First low-NPSH stage for improved suction performance
- ▶ Barrel housing (SLM GVxT / SLM APG) or ring-section design (SLM GV)
- ▶ Permanent & synchronous magnet drive
 - Maintenance-free
 - Separation of liquid chamber and atmosphere by means of containment shell
- ▶ Pressurized partial flush flow (cooling of eddy current losses / lubrication of journal bearings)
- ▶ Materials: steel, stainless steel, duplex steel, nickel-based materials, titanium
- ▶ Bearing bracket with anti-friction bearings, oil-lubricated or greased-for-life
- ▶ Product-lubricated journal bearings; made of silicon carbide (SSiC) or customized materials
- ▶ Rub zones as per standard for increased safety

OPTIONS

- ▶ Close-coupled design (SLM GVB)
- ▶ Centerline mounting OH2
- ▶ Various containment shell executions (metallic / non-metallic, single / double shell)
- ▶ Energy efficient design
- ▶ Various design options when pumping critical liquids (e.g. liquids containing solids)
- ▶ Thermal barrier
- ▶ Various heating designs
- ▶ Inducer to significantly improve pump's NPSH(R)
- ▶ Secondary control / secondary control system / secondary containment system acc. API 685 2nd Ed.
- ▶ Temperature protection system
- ▶ Back pull out-unit
- ▶ High viscosity optimized design
- ▶ Magnet drive acc. API 685 2nd Ed.
- ▶ Retrofit
- ▶ Semi Submerged Design

PUMPING OF

- | | |
|-------------------------|---|
| ▶ Acids | ▶ Liquid gases |
| ▶ Lyes | ▶ Aggressive, explosive, toxic and malodorous liquids |
| ▶ Hydrocarbons | ▶ Valuable liquids |
| ▶ Hot water | ▶ And many more |
| ▶ Heat transfer liquids | |

VERTICALLY SUSPENDED (SUMP) PUMP WITH MAGNET DRIVE

SERIES SLM NVT

ACC. DIN EN ISO 2858 / 15783

SERIES SLM AVT

ACC. ASME B73.3-2015

SERIES SLM APT

ACC. API 685 2ND ED.



SINGLE- &
MULTI-STAGE
DESIGN

DIN EN ISO
ASME
API

MAX. FLOW RATE:

900 M³/H

3,963 USGPM

MAX. DELIVERY HEAD:

200 M L.C.

656 FT

TEMPERATURE RANGE:

-40 °C to +200 °C

-40 °F to +392 °F

MAX. PRESSURE RATING:

PN 40

580 PSI

DESIGN

- ▶ Vertically suspended (sump) pump
- ▶ Single-stage / multi-stage
- ▶ Submerging Depth: max. 6.000 mm
- ▶ Hydraulic performance and dimensions according to DIN EN ISO 2858 / ASME B73.3-2015 / API 685 2nd Ed.
- ▶ Design based on DIN EN ISO 15783
- ▶ Permanent & synchronous magnet drive
 - Maintenance-free
 - Separation of liquid chamber and atmosphere by means of containment shell
- ▶ Pressurized partial flush flow (cooling of eddy current losses / lubrication of journal bearings)
- ▶ Materials: steel, stainless steel, duplex steel, nickel-based materials, titanium
- ▶ Bearing bracket with anti-friction bearings, oil-lubricated or greased-for-life
- ▶ Product-lubricated journal bearings; made of silicon carbide (SSiC) or customized materials
- ▶ Rub zones as per standard for increased safety

OPTIONS

- ▶ Various containment shell executions (metallic / non-metallic, single / double shell)
- ▶ Energy efficient design
- ▶ Various design options when pumping critical liquids (e.g. liquids containing solids)
- ▶ Open impeller
- ▶ Various heating designs
- ▶ Inducer to significantly improve pump's NPSH(R)
- ▶ Secondary control / secondary control system / secondary containment system acc. API 685 2nd Ed.
- ▶ Temperature protection system
- ▶ Pull out-unit
- ▶ High viscosity optimized design
- ▶ Magnet drive acc. API 685 2nd Ed.
- ▶ Retrofit

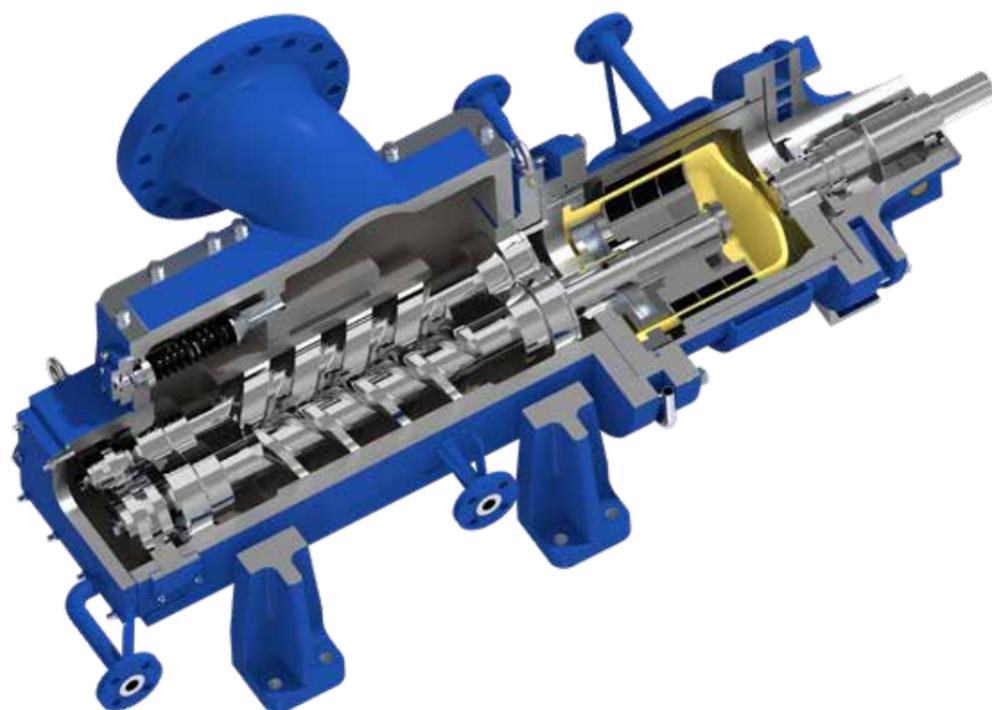
PUMPING OF

- ▶ Acids
- ▶ Lyes
- ▶ Hydrocarbons
- ▶ Heat transfer liquids
- ▶ Aggressive, explosive, toxic and malodorous liquids
- ▶ Valuable liquids
- ▶ Industrial effluent
- ▶ And many more

SINGLE VOLUTE TWIN SCREW PUMP WITH MAGNET DRIVE

SERIES SLM DSP-2C

ACC. API 676 3RD ED.



DIN EN ISO API



MAX. FLOW RATE:

1.800 M³/H

7,925 USGPM

TEMPERATURE RANGE:

-120 °C to +350 °C

-184 °F to +662 °F

MAX. DIFFERENTIAL PRESSURE:

40 BAR

580 PSI

MAX. PRESSURE RATING:

PN 400

5,802 PSI

DESIGN

- ▶ Single volute twin screw pump, process or tank farm design
- ▶ Design based on API 676, 3rd Ed. and DIN EN ISO 14847
- ▶ Axial split modular casing (larger sizes with radial split casings)
- ▶ Permanent & synchronous magnet drive
 - Maintenance-free
 - Separation of liquid chamber and atmosphere by means of containment shell
- ▶ Pressurized partial flush flow (cooling of eddy current losses)
- ▶ Materials: steel, stainless steel, duplex steel, nickel-based materials, titanium
- ▶ Bearing bracket with anti-friction bearings, oil-lubricated or greased-for-life
- ▶ Spare parts of magnetic coupling and bearing brackets are interchangeable with centrifugal pump series

OPTIONS

- ▶ Close-coupled design (SLM DSP-2CB)
- ▶ Centerline mounting OH2
- ▶ Various containment shell executions (metallic / non-metallic, single / double shell)
- ▶ Energy efficient design
- ▶ Various design options when pumping critical liquids (e.g. liquids containing solids)
- ▶ Low & high viscosity optimized design
- ▶ Thermal barrier
- ▶ Various heating designs
- ▶ Secondary control / secondary control system / secondary containment system acc. API 685 2nd Ed.
- ▶ Temperature protection system
- ▶ Back pull out-unit / cartridge unit
- ▶ Differential pressure limiting valve using Klaus Union Valve Series Internals
- ▶ Magnet drive acc. API 685 2nd Ed.
- ▶ Retrofit
- ▶ Semi Submerged Design (SLM DSP-2CT)
- ▶ Vertical dry mounted arrangement (SLM DSP-2CBI)

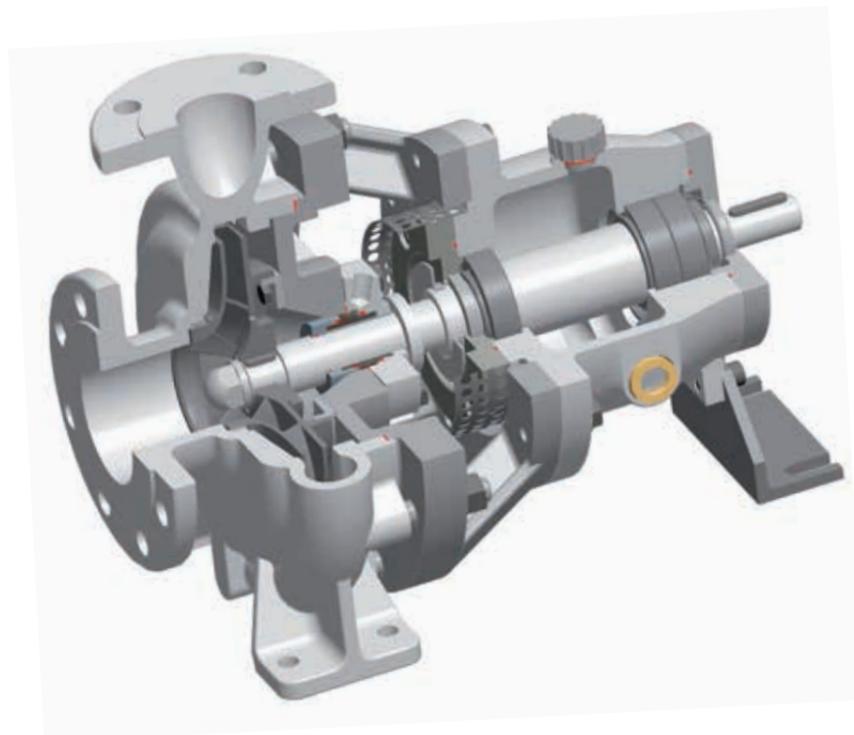
PUMPING OF

- | | |
|-------------------------------|---|
| ▶ Hydrocarbons | ▶ Aggressive, explosive, toxic and malodorous liquids |
| ▶ Bitumen / asphalt | ▶ Valuable liquids |
| ▶ Tar | ▶ Liquids containing solids |
| ▶ Fuel oils (light and heavy) | ▶ Acids |
| ▶ Polymers | ▶ Lyes |
| ▶ High-viscosity liquids | ▶ And many more |

SINGLE-STAGE CENTRIFUGAL PUMP WITH MECHANICAL SEAL

SERIES NOV
ACC. DIN EN ISO 2858

SERIES APL
ACC. API 610 12TH ED.



DIN EN ISO API



MAX. FLOW RATE:

3.500 M³/H

15,410 USGPM

TEMPERATURE RANGE:

-120 °C to +450 °C

-184 °F to +842 °F

MAX. DELIVERY HEAD:

220 M L.C.

722 FT

MAX. PRESSURE RATING:

PN 400

5,802 PSI

DESIGN

- ▶ Horizontal centrifugal pump, process design
- ▶ Hydraulic performance and dimensions according to DIN EN ISO 2858 / API 610 12th Ed.
- ▶ Design according to DIN EN ISO 5199
- ▶ Shaft sealing space for installation of mechanical seals according to DIN EN 12756 / API 682 4th Ed. or stuffing box packings
- ▶ Materials: steel, stainless steel, duplex steel, nickel-based materials, titanium
- ▶ Bearing bracket with oil-lubricated anti-friction bearings

OPTIONS

- ▶ Centerline mounting
- ▶ Various design options when pumping critical liquids (e.g. liquids containing solids)
- ▶ Open impeller
- ▶ Various heating designs
- ▶ Inducer to significantly improve pump's NPSH(R)
- ▶ Back pull out-unit
- ▶ Retrofit
- ▶ Semi submerged design

PUMPING OF

- ▶ Acids
- ▶ Lyes
- ▶ Hydrocarbons
- ▶ Heat transfer liquids
- ▶ Coolants
- ▶ Liquid gases
- ▶ Sewage
- ▶ Colouring matters
- ▶ Salt solutions
- ▶ Pulp
- ▶ And many more

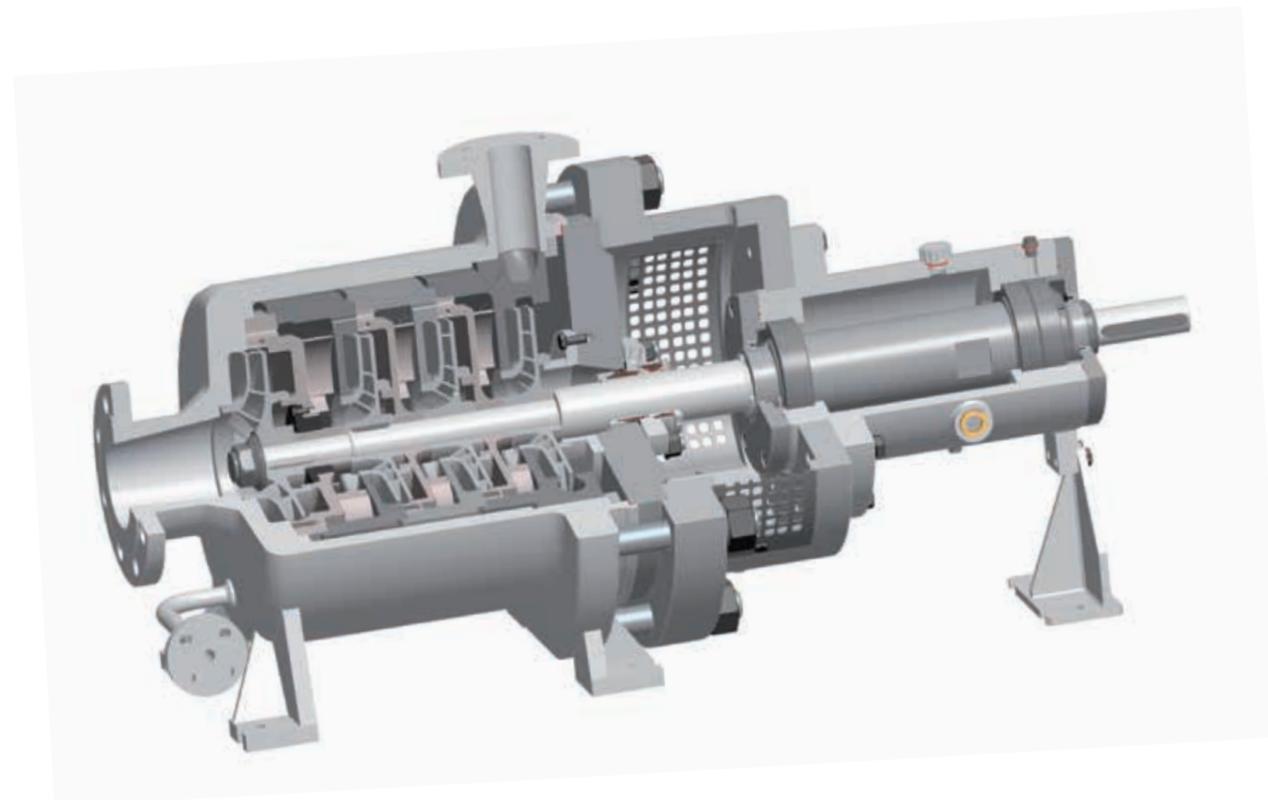
MULTI-STAGE CENTRIFUGAL PUMP WITH MECHANICAL SEAL

SERIES GOV / GOVT

ACC. DIN EN ISO 5199

SERIES APG

ACC. API 610 12TH ED. &
ISO 13709 2010



DIN EN ISO API

MAX. FLOW RATE:

300 M³/H

1,321 USGPM

TEMPERATURE RANGE:

-120 °C to +350 °C

-184 °F to +662 °F

MAX. DELIVERY HEAD:

2.200 M L.C.

7,218 FT

MAX. PRESSURE RATING:

PN 250

3,626 PSI

DESIGN

- ▶ Horizontal centrifugal pump, process design
- ▶ Technical design based on DIN EN ISO 5199 or acc. API 610 12th Ed. & ISO 13709 2010
- ▶ Impeller arrangement in series, maximum number of stages: 15
- ▶ Barrel housing (GOVT / APG) or ring-section design (GOV)
- ▶ First low-NPSH stage for improved suction performance
- ▶ Shaft sealing space for installation of mechanical seals according to DIN EN 12756 / API 682 4th Ed. or stuffing box packings
- ▶ Materials: steel, stainless steel, duplex steel, nickel-based materials, titanium
- ▶ Bearing bracket with oil-lubricated anti-friction bearings

OPTIONS

- ▶ Centerline mounting
- ▶ Various design options when pumping critical liquids (e.g. liquids containing solids)
- ▶ Various heating designs
- ▶ Inducer to significantly improve pump's NPSH(R)
- ▶ Back pull out-unit
- ▶ Retrofit
- ▶ Semi submerged design

PUMPING OF

- ▶ Liquid gases
- ▶ Acids
- ▶ Lyes
- ▶ Hydrocarbons
- ▶ Hot water
- ▶ Heat transfer liquids
- ▶ And many more

VERTICALLY SUSPENDED (SUMP) PUMP WITH MECHANICAL SEAL

SERIES TP NO

ACC. DIN EN ISO 2858 / 5199

SERIES APT

ACC. API 610 12TH ED. &
ISO 13709 2010

**SINGLE- &
MULTI-STAGE
DESIGN**



DIN EN ISO API



MAX. FLOW RATE:

1.600 M³/H

7,045 USGPM

TEMPERATURE RANGE:

-50 °C to +250 °C

-58 °F to +482 °F

MAX. DELIVERY HEAD:

200 M L.C.

656 FT

MAX. PRESSURE RATING:

PN 40

580 PSI

DESIGN

- ▶ Vertically suspended (sump) pump
- ▶ Single-stage / multi-stage
- ▶ Submerging depth: max. 6.000 mm
- ▶ Hydraulic performance according to DIN EN ISO 2858
- ▶ Design based on DIN EN ISO 5199 or acc. API 610 12th Ed. & ISO 13709 2010
- ▶ Shaft sealing space for installation of mechanical seals according to DIN EN 12756 / API 682 4th Ed. or stuffing box packings
- ▶ Materials: steel, stainless steel, duplex steel, nickel-based materials, titanium
- ▶ Product-lubricated journal bearings; made of silicon carbide (SSiC) or customized materials

OPTIONS

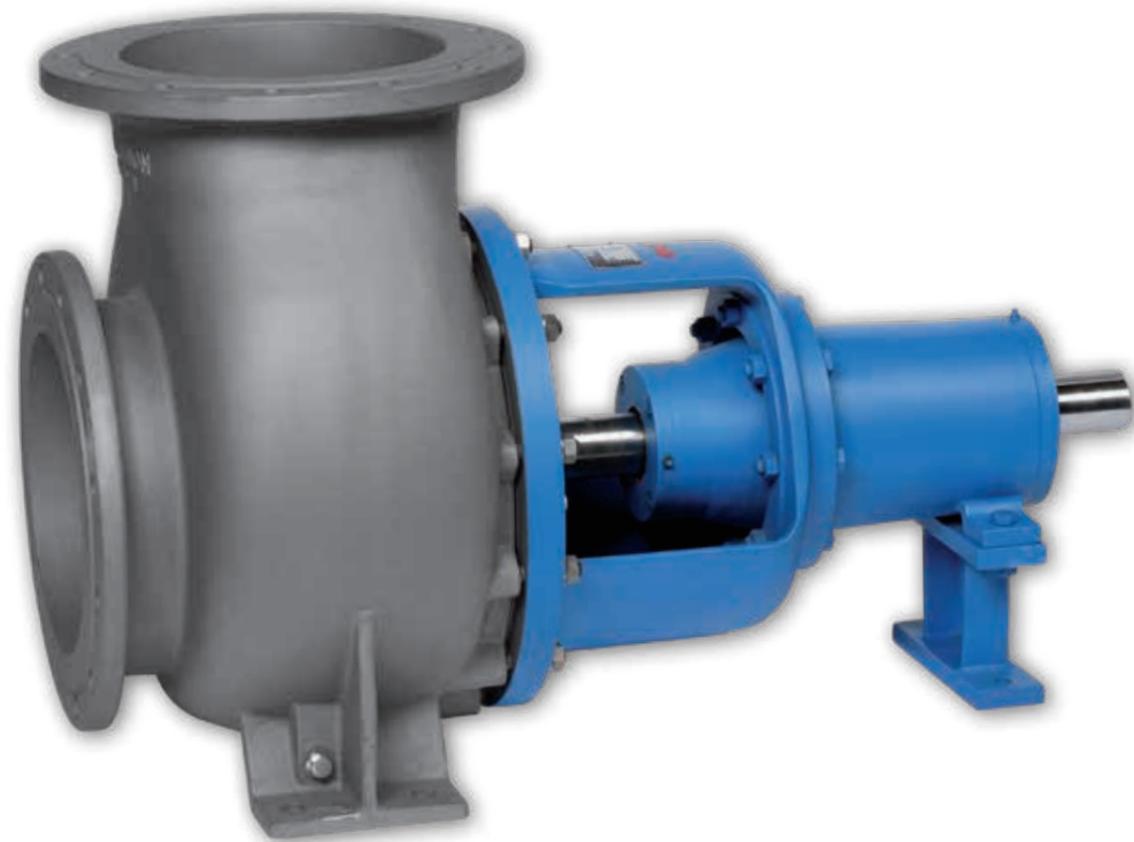
- ▶ Multi-stage design (TP G0)
- ▶ Various design options when pumping critical liquids (e.g. liquids containing solids)
- ▶ Open impeller
- ▶ Various heating designs
- ▶ Inducer to significantly improve pump's NPSH(R)
- ▶ Retrofit

PUMPING OF

- ▶ Acids
- ▶ Lyes
- ▶ Hydrocarbons
- ▶ Heat transfer liquids
- ▶ Liquid gases
- ▶ And many more

HORIZONTAL AXIAL FLOW PROPELLER PUMP WITH MECHANICAL SEAL

SERIES P



DIN EN ISO

MAX. FLOW RATE:

12.000 M³/H

52,835 USGPM

TEMPERATURE RANGE:

-120 °C to +250 °C

-184 °F to +482 °F

MAX. DELIVERY HEAD:

12 M L.C.

39 FT

MAX. PRESSURE RATING:

PN 100

1,450 PSI

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, duplex steel, nickel-based materials, titanium
- ▶ Bearing bracket with oil- or grease-lubricated anti-friction bearings
- ▶ Pumping direction freely selectable
- ▶ Modification of performance possible by means of adjusting propeller blades

OPTIONS

- ▶ Special execution with magnet drive
- ▶ Various design options when pumping critical liquids (e.g. liquids containing solids)
- ▶ Various heating designs
- ▶ Shaft sealing space for installation of mechanical seals according to API 682 4th Ed.
- ▶ Back pull out-unit
- ▶ Retrofit
- ▶ Semi submerged design

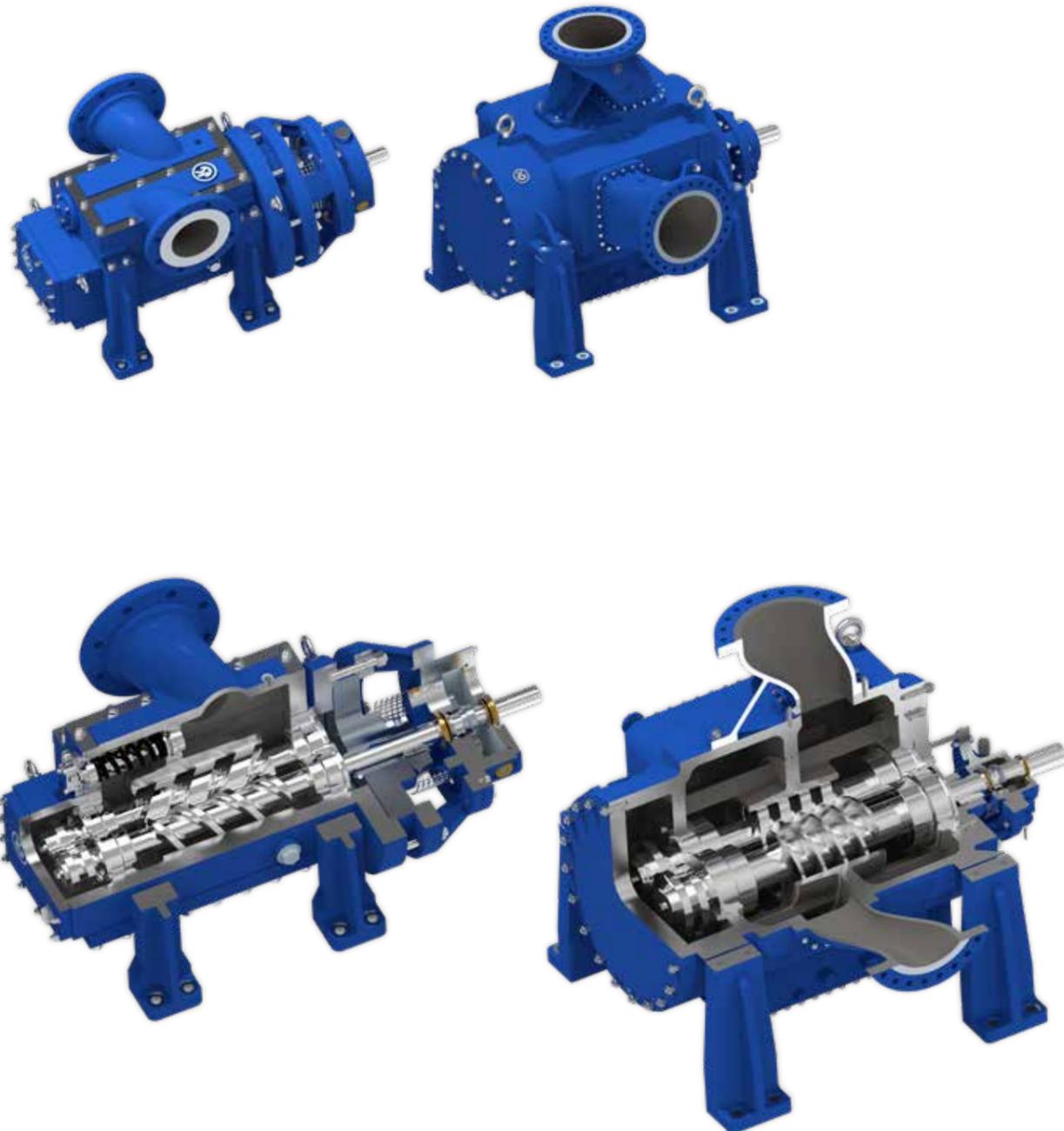
PUMPING OF

- ▶ Acids
- ▶ Lyes
- ▶ Paper and cellulose mash
- ▶ Brine (evaporation plants)
- ▶ Mineral fertilisers (liquid)
- ▶ Sea water
- ▶ Cooling water
- ▶ Dyes
- ▶ And many more

SINGLE VOLUTE TWIN SCREW PUMP WITH MECHANICAL SEAL

SERIES DSP-2C

ACC. API 676 3RD ED.



API



MAX. FLOW RATE:

1.800 M³/H

7,925 USGPM

TEMPERATURE RANGE:

-120 °C to +350 °C

-184 °F to +662 °F

MAX. DIFFERENTIAL PRESSURE:

40 BAR

580 PSI

MAX. PRESSURE RATING:

PN 400

5,802 PSI

DESIGN

- ▶ Single volute twin screw pump, process or tank farm design
- ▶ Technical design based on API 676, 3rd Ed.
- ▶ Axial split modular casing (Larger sizes with radial split casings)
- ▶ Shaft sealing space for installation of mechanical seals according to API 682 4th Ed. or stuffing box packings
- ▶ Materials: steel, stainless steel, duplex steel, nickel-based materials, titanium
- ▶ Bearing bracket with oil-lubricated or greased-for-life anti-friction bearings

OPTIONS

- ▶ Other shaft sealing possibilities such as lip seals or stuffing box packings
- ▶ Various design options when pumping critical liquids (e.g. liquids containing solids)
- ▶ Low & high viscosity optimized design
- ▶ Various heating designs
- ▶ Back pull out-unit / cartridge unit
- ▶ Differential pressure limiting valve Klaus Union valve Series internals
- ▶ Retrofit
- ▶ Semi submerged design (DSP-2CT)

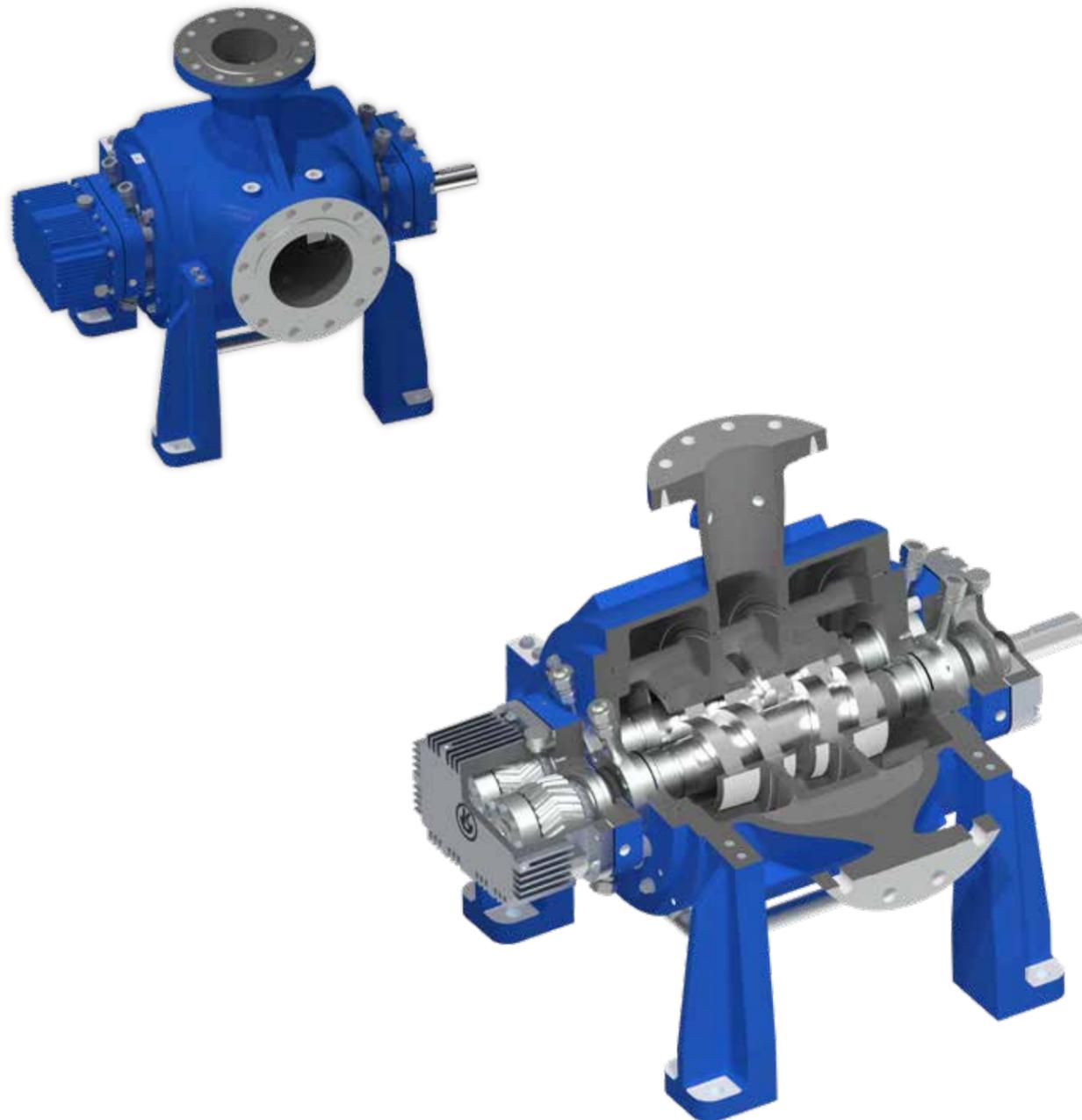
PUMPING OF

- ▶ Hydrocarbons
- ▶ Bitumen / asphalt
- ▶ Tar
- ▶ Fuel oils (light and heavy)
- ▶ Polymers
- ▶ High-viscosity liquids
- ▶ Aggressive, explosive, toxic and malodorous liquids
- ▶ Valuable liquids
- ▶ Liquids containing solids
- ▶ Acids
- ▶ Lyes
- ▶ And many more

DOUBLE VOLUTE TWIN SCREW PUMP WITH MECHANICAL SEAL

SERIES DSP-4U / 4C

ACC. API 676 3RD ED.



API



MAX. FLOW RATE:

5.000 M³/H

22,000 USGPM

TEMPERATURE RANGE:

-120 °C to +350 °C

-184 °F to +662 °F

MAX. DIFFERENTIAL PRESSURE:

100 BAR

1,450 PSI

MAX. PRESSURE RATING:

PN 150

2,176PSI

DESIGN

- ▶ Horizontal, double volute twin screw pump
- ▶ Drive torque transfer by timing gear located outside of pumping chamber
- ▶ Materials: steel, stainless steel, duplex steel, nickel-based materials, titanium
- ▶ Rotors manufactured from single piece bar stock
- ▶ Bearings located outside of pumping chamber
- ▶ Inline or side in / top out
- ▶ Improved NPSH / NPIP
- ▶ Casted design

OPTIONS

- ▶ Centerline mounting
- ▶ Various design options when pumping critical liquids (e.g. liquids containing solids)
- ▶ Various heating designs
- ▶ Cartridge unit (DSP-4C)
- ▶ Differential pressure limiting valve
- ▶ Retrofit

PUMPING OF

- ▶ 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
- ▶ And many more

CUSTOM MATERIALS OF CONSTRUCTION

Steel			
Castings DIN/EN	[AISI / ASTM]	Rolled Material DIN/EN	[AISI / ASTM]
1.0619 / GP240GH	[A216 WCB]	1.0038 / S235JR	[A283M]
1.6220 / G20Mn5	[A352]	1.0460 / P250GH	[A105]
		1.7225 / 42CrMo4	[A331, A505, A519, A646]
		1.7227 / 42CrMoS4	[A331, A505, A519, A646]
		1.8550 / 34CrAlNi7-10	[A355-89]
Stainless Steel			
Castings DIN/EN	[AISI / ASTM]	Rolled Material DIN/EN	[AISI / ASTM]
1.4308 / GX5CrNi 19-10	[304L]	1.4122 / X39CrMo 17-1	[-]
1.4408 / GX5CrNiMo 19-11-2	[A351 CF8M]	1.4404 / X2CrNiMo 17-12-2	[316L]
1.4409 / GX2CrNiMo19-11-2	[CF3M]	1.4462 / X2CrNiMoN 22-5-3	[S31803]
1.4470 / GX2CrNiMoN 22-5-3	[UNS J92205]	1.4541 / X6CrNiTi 18-10	[SS321]
		1.4571 / X6CrNiMoTi 17-12-2	[316Ti]
Nickel-Based Materials			
Castings DIN/EN	[AISI / ASTM]	Rolled Material DIN/EN	[AISI / ASTM]
9.4170 / G-Ni95	[CZ100]	1.4539 / X1NiCrMoCu 25 20 5	[904L]
9.4365 / G-NiCu30Nb	[A494 M35-1]	2.4068 / Ni99	[N02201]
9.4539 / GX2NiCrMoCu25-20-5	[A743 CN3M]	2.4360 / NiCu30Fe	[N04400]
9.4600 / G-NiMo29Cr	[N3M, N7M]	2.4600 / NiMo29Cr	[B564, B335]
9.4610 / G-NiMo16Cr16	[CW2M]	2.4610 / NiMo16Cr16Ti	[N06455]
9.4660 / GX1NiCrMoCuN35-20	[A743 CN7M]	2.4660 / NiCr20CuMo	[B473, N08020]
Titanium			
Castings DIN/EN	[AISI / ASTM]	Rolled Material DIN/EN	[AISI / ASTM]
3.7031 / G-Ti2 (Ti Grade 2)	[-]	3.7035 / Ti2	[B348, B338, B861, B265]
3.7032 G-Ti2Pd (TiPd Grade 7)	[-]	3.7165 / Ti6Al4V	[B348, B265]

Further materials upon request



Klaus Union RETROFIT

RETROFIT OF CENTRIFUGAL PUMPS W/O NECESSARY MODIFICATION

- ▶ Record & evaluation of existing pump parameters & dimensions
- ▶ 3D-laserscan for precise pump & installation measurements
- ▶ Entire pump engineering within the boundaries of an existing installation
- ▶ Conversion of old pumps to latest state-of-the-art high efficient pumps
- ▶ Certification of pump compliance acc. to Machinery Directive 2006/42/EG and ATEX 94/9/EG



USER ADVANTAGES

- ▶ Significant reduction of facility emissions by employing enhanced sealing technologies
- ▶ Alteration of non-compliant pump systems into latest state-of-the-art installations and conformity to the relevant and current EU-directives (Machinery and ATEX)
- ▶ Updated pump installations to most recent standards
- ▶ No change of existing piping, baseplates or drives
- ▶ Reduction of OPEX due to significant energy savings through the use of highly efficient hydraulics
- ▶ Considerable increase of MTBF

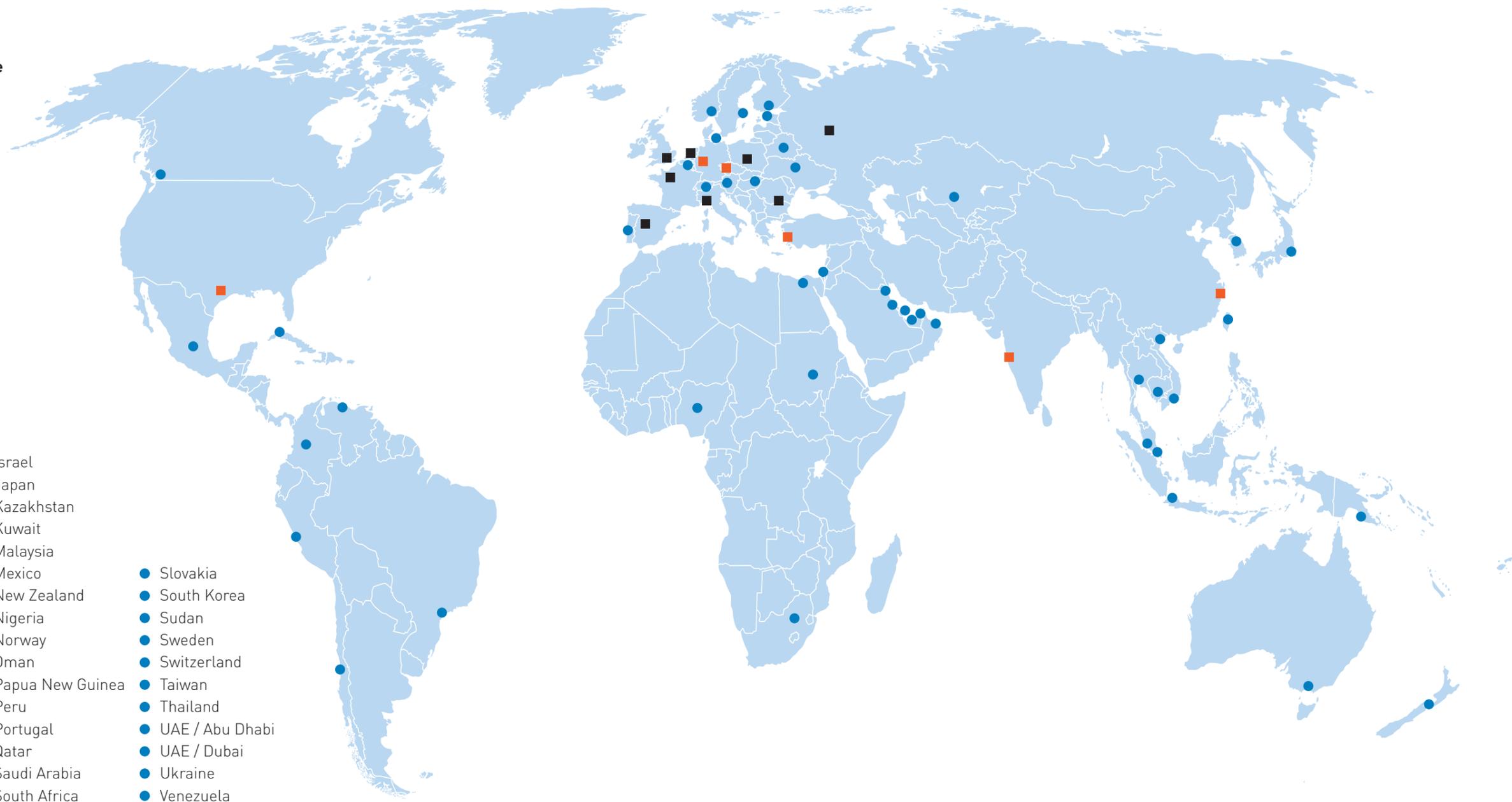
KLAUS UNION GLOBAL PRESENCE



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

- Germany/ Bochum
- China/ Ningbo
- Czech Republic/ Krnov
- India/ Pune
- Turkey/ Izmir
- USA/ Houston
- England
- France
- Italy
- The Netherlands
- Poland
- Romania
- Russia
- Spain

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



KLAUS UNION SERVICE

KLAUS UNION WORLDWIDE SERVICE

Following our service philosophy „your worldwide partner“, Klaus Union works with subsidiaries, approved representatives and service partners worldwide.

Since the founding of Klaus Union Service GmbH in 2006 our efforts focus on providing service and support for our customers quickly and comprehensively. As an independent service company with exceptionally strong customer focus, we provide full service, using state of the art technologies and experience. Klaus Union Service draws on 75 years of process engineering with pumps, valves and agitator drives.

We provide service and planning advice, clearly arranged documentation and other required services, including the delivery of spare parts on short lead times.

Our individual service and maintenance contracts provide safety and certainty with your specific needs and location in mind. Through our worldwide network of partners we have highly trained maintenance staff worldwide along with fully equipped workshops to provide service, training and onsite services.

Quality is at the centre of all we do. Quality assurance measures certified to international standards are implemented across our company and sub suppliers providing the best product and service possible.



Worldwide
Close to the
Customer



OUR RANGE OF SERVICES

We will analyse your technical problem and provide a technically inspired solution to solve the issue and get you back in service. Areas that we can look at is equipment reliability and availability, maintenance planning, risk management, equipment upgrades and other operational reviews.

We work with our customers by engaging with all stakeholders to provide the best solutions that benefit your business.

As part of the Klaus Union family Klaus Union Service GmbH has access to all Klaus Union knowledge and state of the art technology.

Providing expertise in logistics worldwide we are provide high availability and fast delivery of all key spare parts. We are always working on improving our systems to keep them best in class and provide you with fast service to keep your equipment online.

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 up to DN 1200. Testing of the repaired pumps with appropriate test reports gives you optimum plant safety and availability.

- ▶ Testing range:
 - Q = 0.1 m³/h up to 5.000 m³/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 2nd 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 optimisation.



WORKSHOP REPAIRS

Klaus Union Service uses state of the art manufacturing machinery 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
Service Helpdesk +49 700 55 28 77 37



Product Range Pumps:

Magnet Drive Pumps

- ▶ Centrifugal Pumps according to DIN EN ISO 2858 & DIN EN ISO 15783
- ▶ Centrifugal Pumps according to ASME B73.3-2015
- ▶ Centrifugal Pumps according to API 685 2nd Edition
- ▶ Multi-Stage Centrifugal Pumps (Barrel-Type Design available)
- ▶ Side Channel Pumps following DIN EN ISO 15783
- ▶ Twin Screw Pumps, Single Volute, according to API 676 4th Edition
- ▶ Pumps in Close-Coupled Design
- ▶ Pumps for High Pressure Applications
- ▶ Pumps for High Temperature Applications
- ▶ Self-Priming Pumps
- ▶ Vertically Suspended (Sump) Pumps, Single- / Multi-Stage and Twin Screw Design
- ▶ Vertical Inline Pumps

Mechanically Sealed Pumps

- ▶ Centrifugal Pumps according to DIN EN ISO 2858 & DIN EN ISO 5199
- ▶ Centrifugal Pumps following API 610 12th Edition & ISO 13709 2010
- ▶ Multi-Stage Centrifugal Pumps (Barrel-Type Design available)
- ▶ Propeller Pumps, Horizontal / Vertical / Bottom-Flange
- ▶ Side Channel Pumps
- ▶ Twin Screw Pumps, Single / Double Volute, according to API 676 4th Edition
- ▶ Pumps for High Pressure Applications
- ▶ Pumps for High Temperature Applications
- ▶ Self-Priming Pumps
- ▶ Vertically Suspended (Sump) Pumps, Single- / Multi-Stage and Twin Screw Design
- ▶ Vertical Inline Pumps

Product Range Valves:

- ▶ Globe Valves, T-Pattern
- ▶ Globe Valves, Y-Pattern
- ▶ Control Valves
- ▶ Gate Valves, Isomorphous Construction Series
- ▶ Gate Valves, Wedge or Wedge Plates
- ▶ Check Valves
- ▶ Butterfly Valves, Metal Seated
- ▶ Control Butterfly Valves, Metal Seated

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

Klaus Union GmbH & Co. KG

Blumenfeldstraße 18 | 44795 Bochum | Germany

Phone: +49 (0) 234 4595-0 | Fax: +49 (0) 234 4595-7000 | E-Mail: info@klaus-union.com

www.klaus-union.com