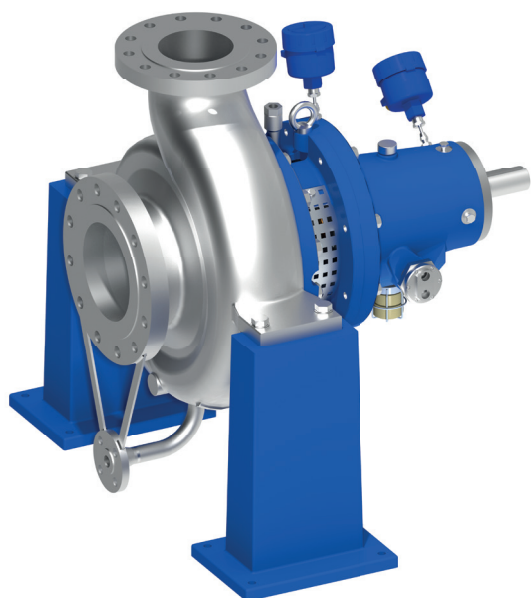


APL



PROCESS CENTRIFUGAL PUMP SERIES APL

WITH SHAFT SEALING
ACC. TO API 610 12th Edition /
ISO 13709:2010

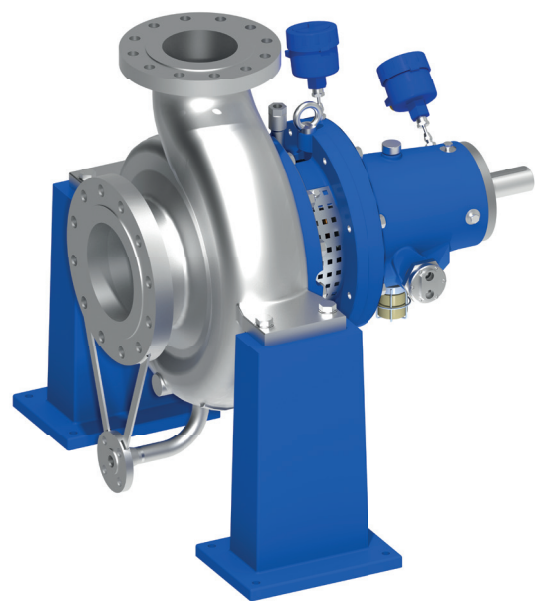


www.klaus-union.com

PROCESS CENTRIFUGAL PUMP

SERIES APL

ACC. TO API 610 12TH EDITION



The KLAUS UNION pump series APL designed for heavy duty applications found in Oil & Gas, at refineries or petrochemical plants is a result of the continuous development of the proven KLAUS UNION centrifugal pumps. The pump builds on our existing portfolio of both, sealed and sealless pumps.

The single stage process pump with radial split casing is designed for centerline mounting (OH2) and features a back pull-out execution as per standard for easy maintenance. It is furthermore compliant with the latest edition of API 610 as well as API 682 (seal chamber dimensioning) for all hydraulic sizes. Multistage pumps series APG for higher differential heads following API standard are available as well.

Pumping of

- ▶ Hydrocarbons
 - ▶ Coolants
 - ▶ Sewage
 - ▶ Salt Solutions
 - ▶ Molton Sulfur
 - ▶ Lyes
- ▶ Heat Transfer Liquids
 - ▶ Liquid Gases
 - ▶ Dyes
 - ▶ Pulp
 - ▶ Acids
 - ... and many more

Typical Applications



Experience
Responsibility
Passion

Performance Range

- ▶ **Flow Rate Q:**

up to 3.500 m³/h
[15,400 gpm / 528,300 bpd]
- ▶ **Delivery Head H:**

up to 220 m
[722 ft]

Higher flow rates and delivery heads upon request

Temperature Range / Pressure Rating

- ▶ **Temperature Range:**

-120 °C up to 450 °C
[-184 °F up to 842 °F]
- ▶ **Pressure Rating:**

PN 40 at 120 °C
[580 psi at 248 °F]

Higher pressure ratings upon request

Materials

| Components | S-8 | A-8 | D-1 |
|--|---------------|---------------|--------------|
| Pump Casing | Carbon Steel | 316 Austenite | Duplex |
| Impeller | 316 Austenite | 316 Austenite | Duplex |
| Wetted Parts | 316 Austenite | 316 Austenite | Duplex |
| Shaft | 316 Austenite | 316 Austenite | Duplex |
| Intermediate Lantern / Bearing Support | Carbon Steel | Carbon Steel | Carbon Steel |

Other materials upon request

Quality Assurance

A major component 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 is a DIN EN ISO 9001 certified company

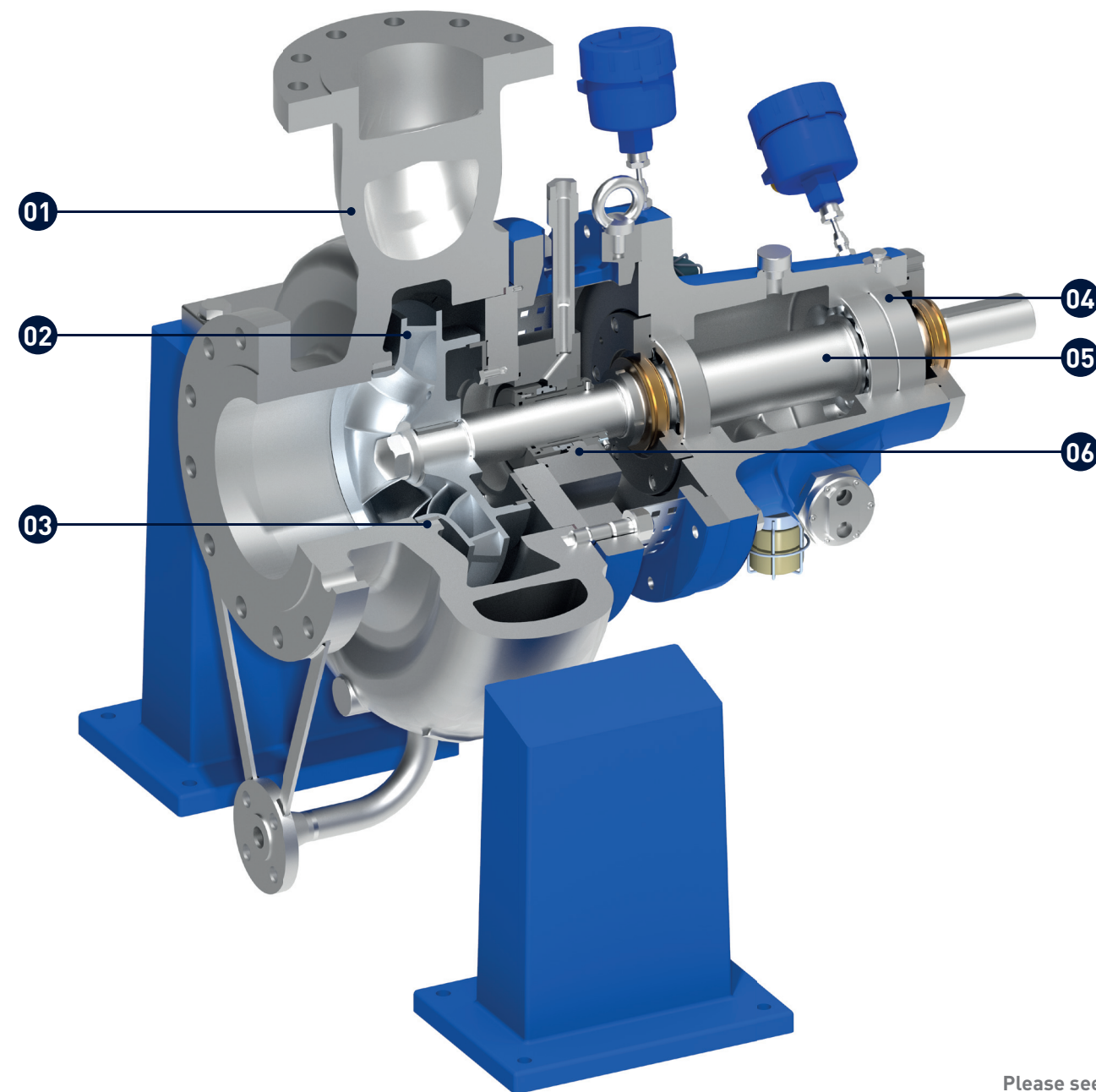


In accordance with
TÜV NORD CERT
procedures,

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

DESIGN DETAILS SERIES APL



Please see
the description
on the following page
→

Design according to API 610 12TH Edition



01 ► Casing

- Centerline supported (OH2) for heavy duty service minimizing shaft misalignment due to temperature variation, extending rotor, bearing and mechanical seal life
- Back pull-out design for easy maintenance (rotating unit can be removed without disturbing casing and driver)
- Pump casing design with nozzles integrally casted; 300lbs as standard, 600lbs and higher available as option
- Standard casing design for double API 610 nozzle load requirements (higher nozzle loads available as an option)
- Double volute casing design in case of larger sizes to minimize radial loads and shaft deflection
- Drain with flanged connection as per standard
- Also available in special materials acc. API 685 H1, H2, T1, A9 and others on request
- Design pressure as per standard: PN 40 @ 120 °C [580 psi @ 248 °F]

02 ► Impeller

- High efficiency, precision cast, single stage radial closed type, dynamically balanced. Giving low vibrations and excellent performance over the entire operating range
- Secured on shaft by a cap nut not exposing shaft threads with positive locking method
- Semi-open and open impellers on request
- Inducer for improved NPSH capabilities over a wide operating range on request

03 ► Wear Rings

- Renewable wear rings on casing and impeller secured with tack welding (set screws optional)

04 ► Bearing

- Antifriction oil lubricated bearings in a carbon steel housing, designed to provide L10 bearing life exceeding API 610 requirements
- Protection of bearing housing by bearing isolators on both sides
- Constant level oiler as per standard, different designs available
- Oil mist lubrication and various cooling possibilities on request
- SPM nipples as provision for vibration monitoring as per standard

05 ► Pump Shaft

- Rugged design for minimum shaft deflection in accordance with API 610, extending bearing and mechanical seal life

06 ► Seal Chamber

- In full compliance with API 610 and API 682

OPTIONAL FEATURES

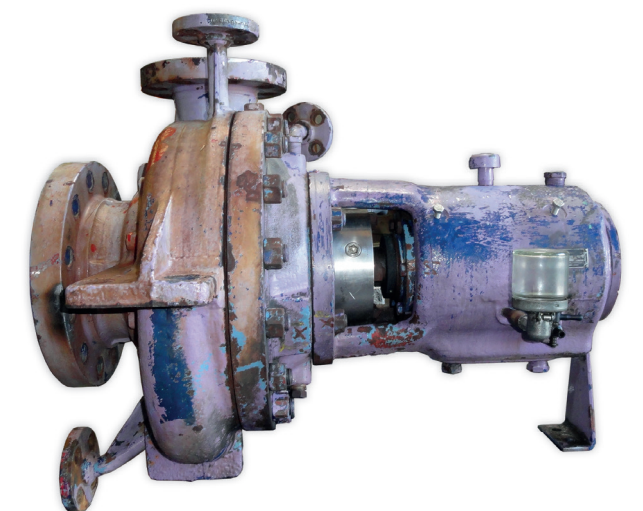
Optional Features

- ▶ **Special corrosion resistant materials**
such as H-1, H-2, T-1, A-9 (acc. API 685) or even more
- ▶ **Non-metallic wear rings**
for abrasive service
- ▶ **Renewable wear ring on impeller rear**
- ▶ **Open / semi-open impeller**
for solid laden liquids
- ▶ **Inducer**
for low NPSH(R) requirements
- ▶ **Heating / cooling facilities**
for pump casing and cover
- ▶ **Casing**
for higher pressure ratings
- ▶ **Additional cooling provision**
for bearing housing (air or water cooled)
for high ambient / product temperatures
- ▶ **Oil mist lubrication**
for bearing housing
- ▶ **Gland packing**
instead of API 682 mechanical seal
(only for hazardous area zone 2 / class 2, div 2, group C/D)
- ▶ **Sealless magnet drive execution**
following API 685 requirements
- ▶ **Oil sump bottle for bearing housing**

Worldwide
**Close to the
Customer**

Retrofit of Centrifugal Pumps (no piping modification necessary)

- ▶ 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 acc. API 610 or API 685
- ▶ Certification of pump compliance acc. to Machinery Directive 2006/42/EG and ATEX 94/9/EG



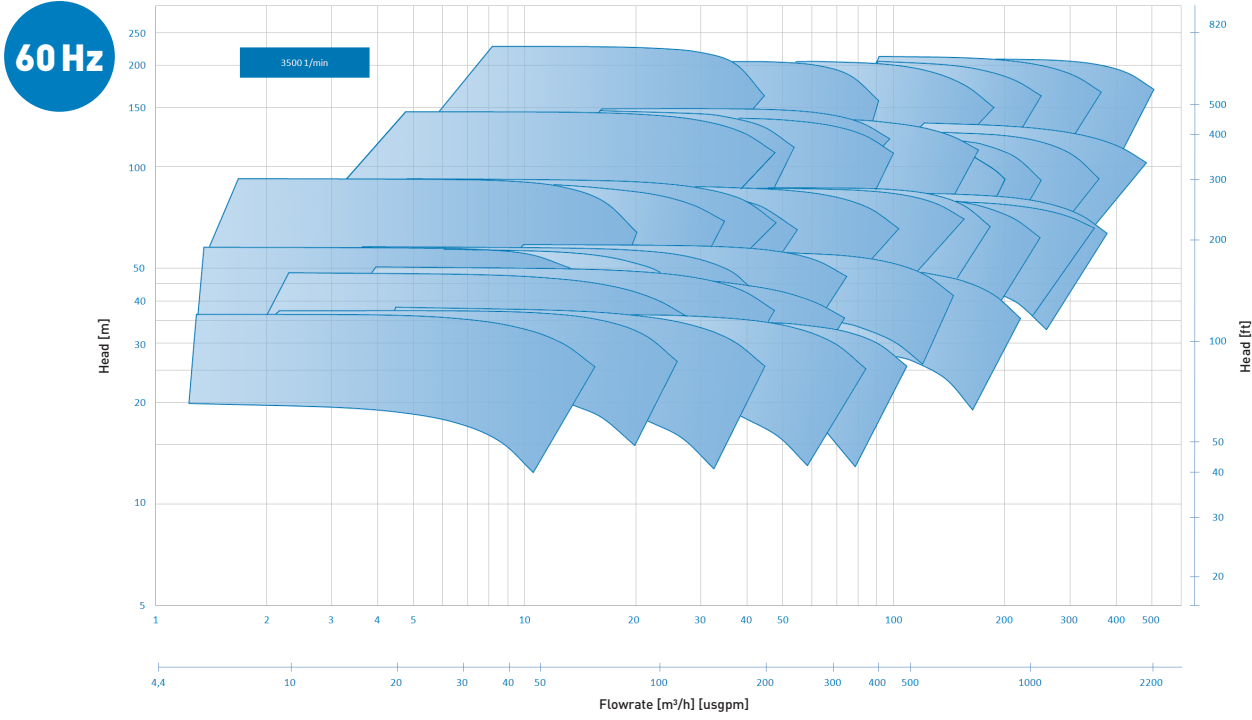
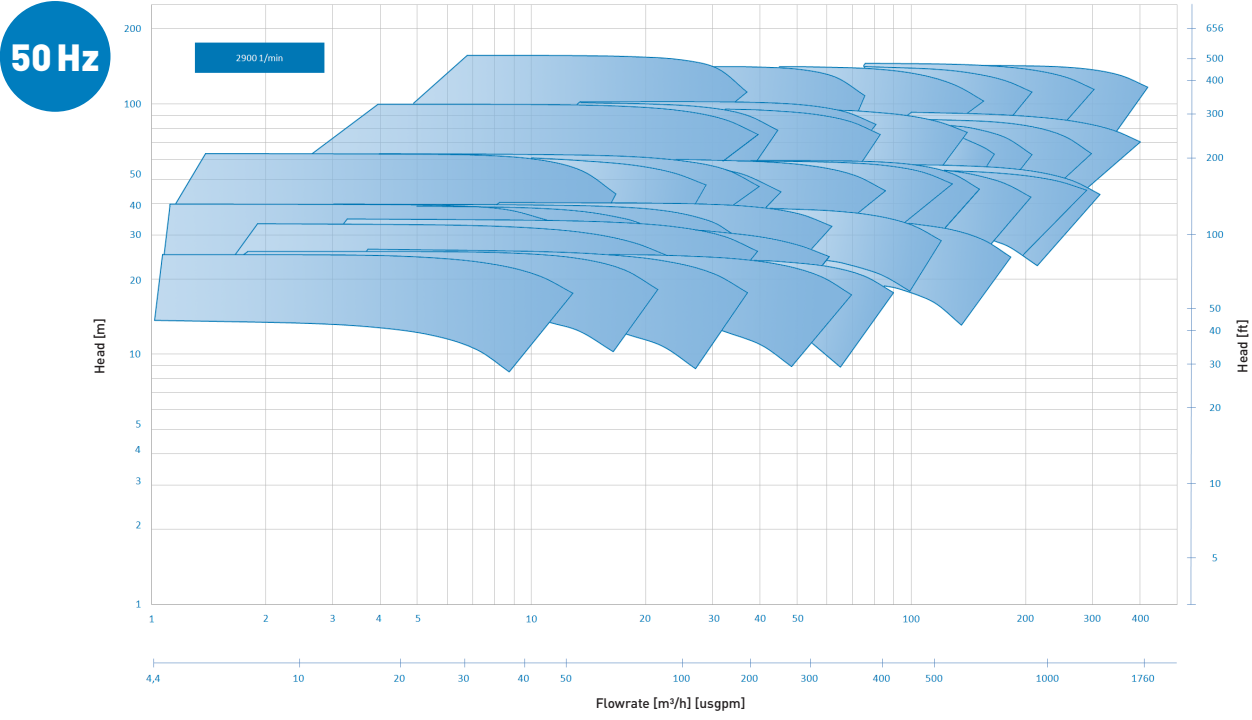
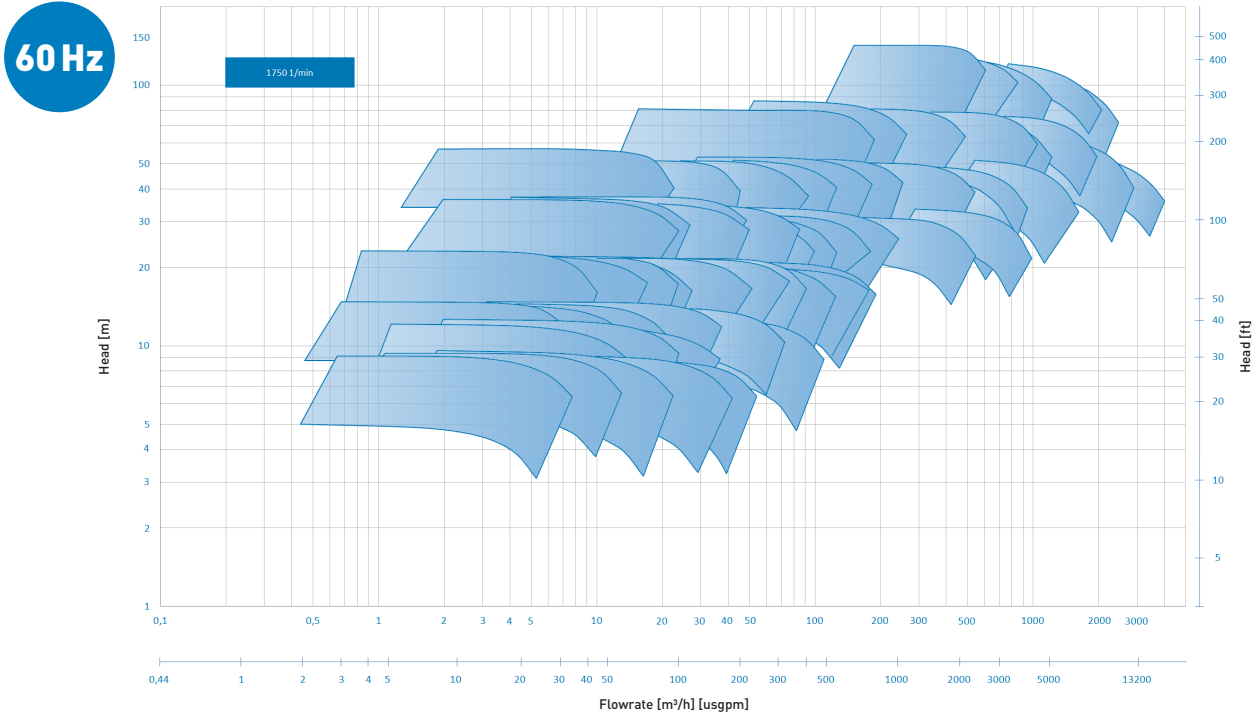
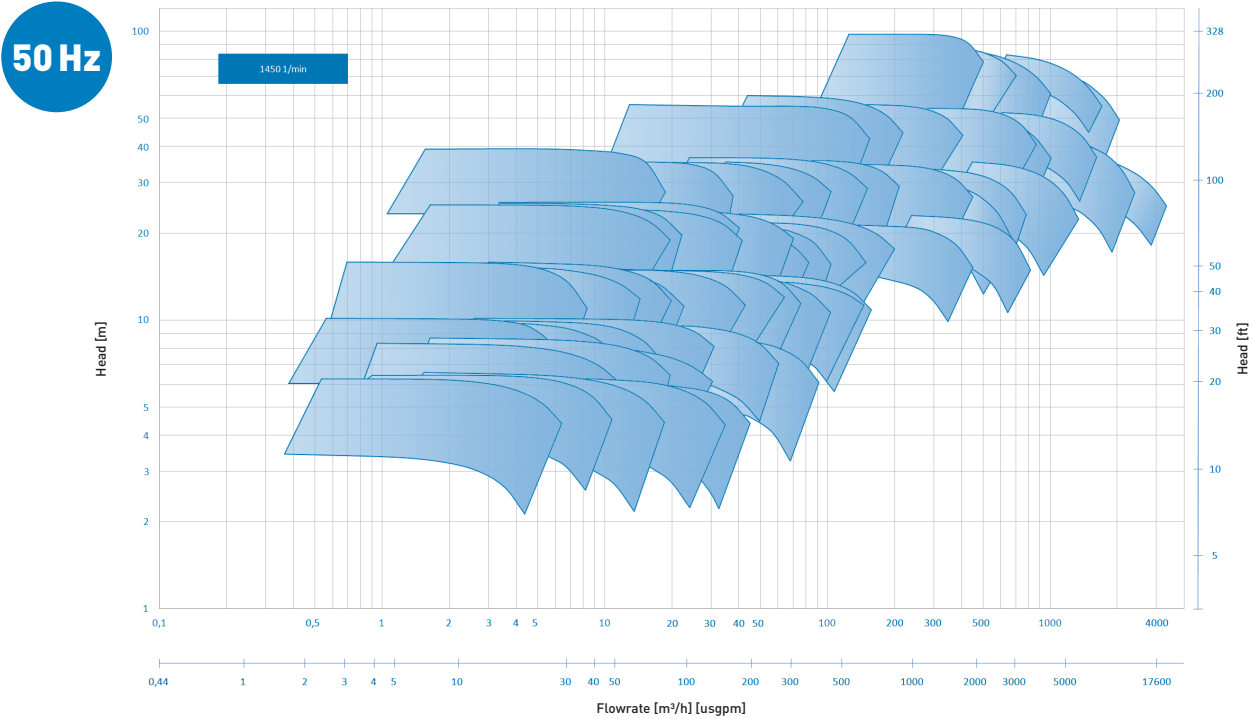
User Advantages

- ▶ 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 API and customer 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 / MTBM



PERFORMANCE CURVES

SERIES APL



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 more than 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 supply 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 global 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.

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



Your Worldwide Partner



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 4.5 MW
 - n = up to max. 3.600 rpm
- ▶ NPSH-measurements
- ▶ Axial thrust measurements
- ▶ Vibration measurements
- ▶ Noise measurements
- ▶ Test run according to ANSI/HI 14.6, DIN EN ISO 9906, API 610 12th Edition, API 685 2nd Edition and API 676 4th Edition

Commissioning

Klaus Union Service GmbH accompanies you from the offer complying with the specifications, during 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 highly qualified design department of Klaus Union.



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 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