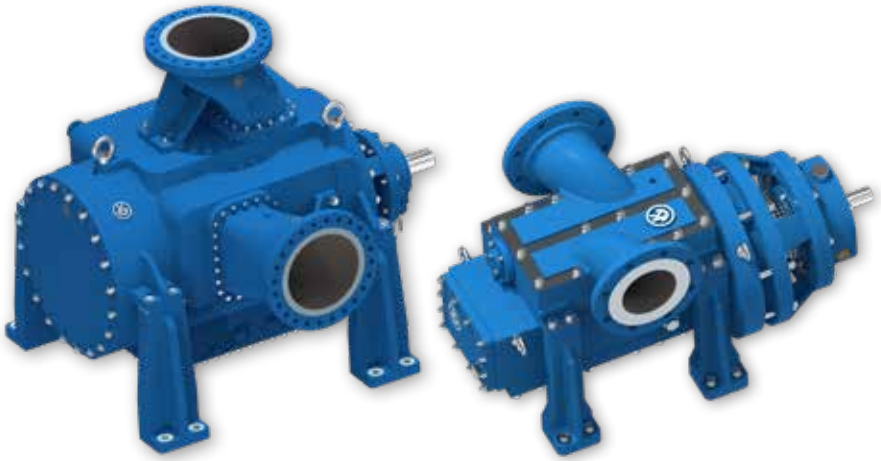
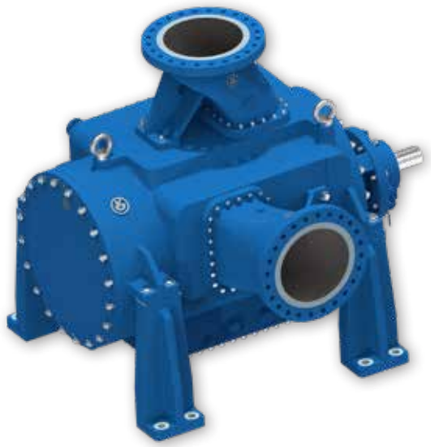
SINGLE VOLUTE TWIN SCREW PUMP SERIES DSP-2C

WITH SHAFT SEALING
ACC. TO API 676



TWIN SCREW PUMP SERIES DSP-2C ACC. API 676



Klaus Union supplies magnetic coupled twin screw pumps for more than 25 years.
For demanding applications with mechanical seals Klaus Union offers a series of twin screw pumps, the DSP-2C complementing our well known DSP-4C and magnet driven SLM DSP-2C twin screw pump ranges.

The mechanical sealed twin screw pumps DSP-2C are engineered following API 676 regulations and offer the usual Klaus Union Twin screw pump features such as rugged design, maintenance friendly „PLUG & PUMP" Cartridge Design as well as high quality casted casings of carbon steel, stainless steel or even higher grade materials.

The pumps are designed to accept standard cartridge seals (fully interchangable with centrifugal pump seals) to reduce spare parts and stock costs for customers, as well as to ensure fast availability of spare mechanical seals all over the world. If requested by the customer the pumps can also accept fully API 682 compliant mechanical seals.

Alternatively the standardized gland area makes it easy to install gland packing or lip seal arrangements.

The optional available pressure limiting valve (PLV) using Klaus Union valve product line proven design and internals can protect the pump hydraulic against overpressure and is executed with return to suction as a standard. If requested the pump casings are executed with connection to directly mount standard API 526 grade safety valves on them.

Experience
Responsibility
Passion

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

Performance Range

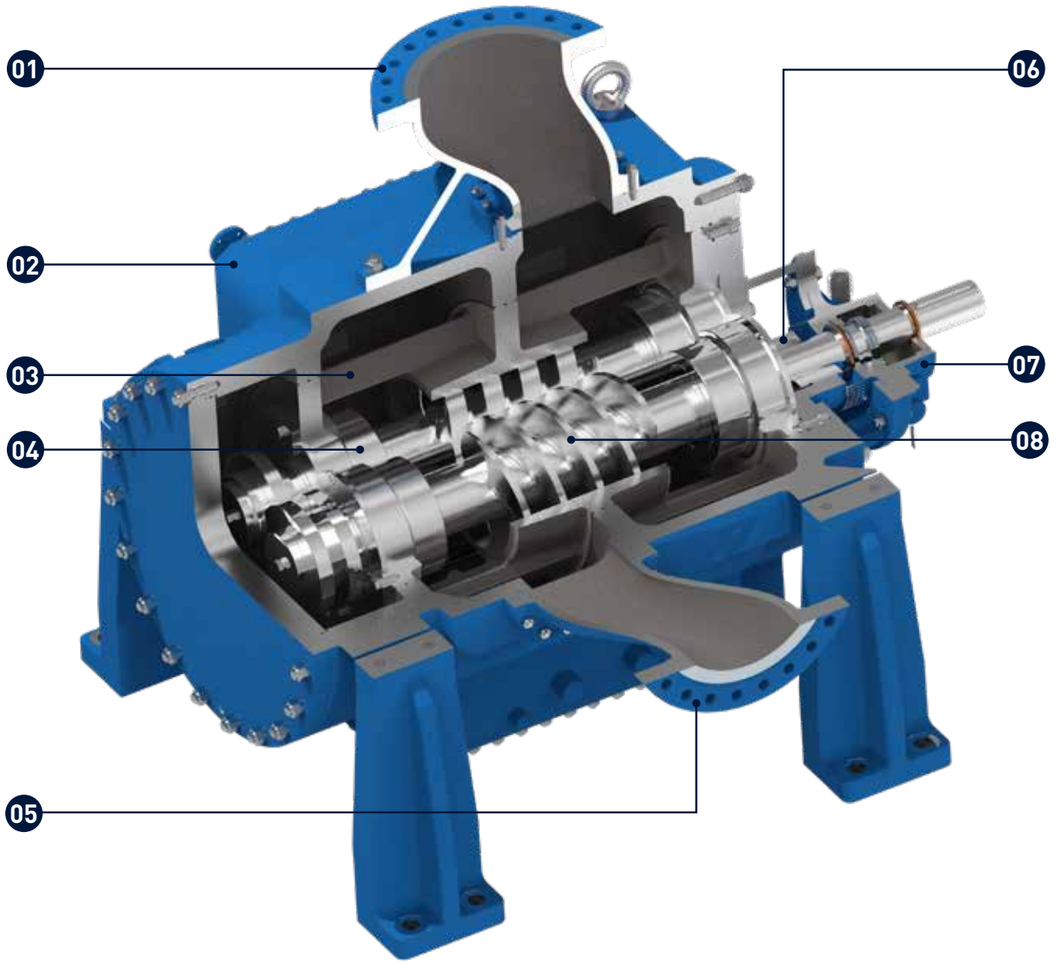
- **Flow Rate:** Q = up to 1.800 m³/h
- **Diff. Pressure:** ΔP = up to 40 bar

Higher flow rates upon request

Pressure Ratings/Temperature Range

- **Standard Construction:** PN 25 at 120 °C
- **Temperature Range:** -120 °C up to 350 °C
- **Pressure Rating:** up to PN 400

DESIGN DETAILS DSP-2C



The description can be found on the following page →

Design
According to API 676

01 ▶ **Adaptable Discharge Casing**
to fit project requirements for nominal diameter, rating and execution. Engineered for smooth flow.

02 ▶ **Middle Casing**
with high Liquid Retention for Stripping Pumps. Radial Split casing with foot or centerline mounting to provide maximum flexibility for customer interfaces. Designed to PN 25 at 120 °C.

03 ▶ **Casted Casing Insert (Liner)**
in Heavy Duty Design.

04 ▶ **Radial Slide Bearings**
optimized to meet customer application needs for maximum overall pump lifetime.
Designed acc. to decades of experience in supplying heavy duty pumps with slide bearings.

05 ▶ **Adaptable Suction Casing**
to fit Project Requirements for Nominal Diameter, Rating and Execution. Engineered for Low Inlet Losses.

06 ▶ **Cartridge Mechanical Seal**
with seal chamber compliant with ANSI B73.1 / API 610 / API 682, subjected only to inlet pressure as a standard.

07 ▶ **Bearing Carrier**
with high performance bearings following API 676 Edition recommendations.
Bearings available grease lubricated (both lifetime greased or regreaseble) as well as oil lubricated as per customer preferences.

08 ▶ **Pump Screws**
from single piece bar stock, low pulsating design with optimized screw profile for minimized power consumption.

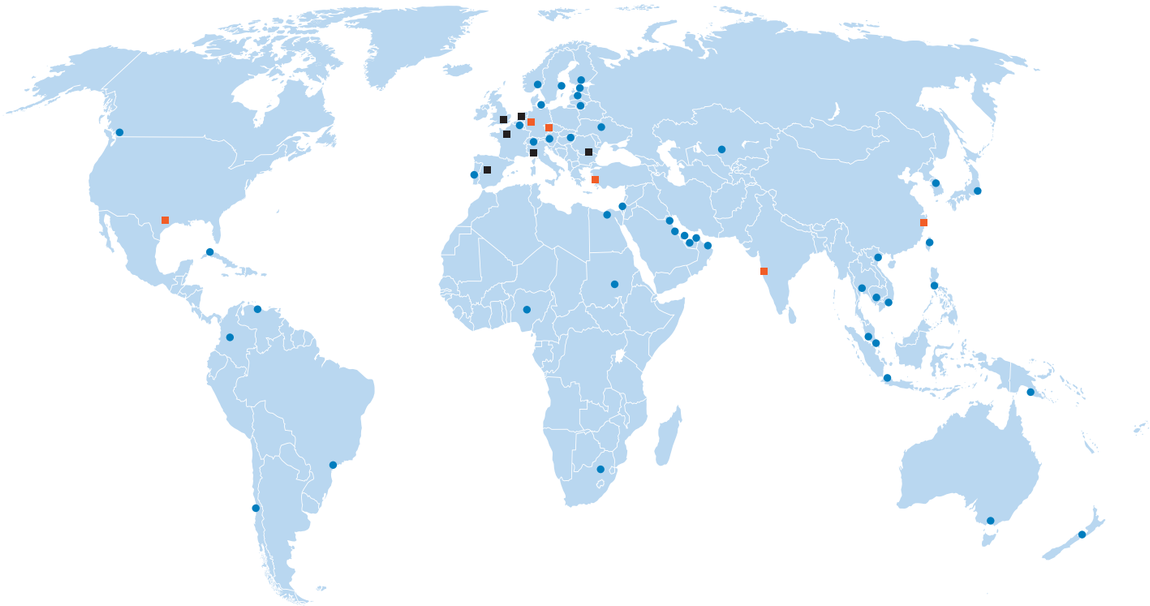
KLAUS UNION
TECHNOLOGY AND INNOVATION

Performance Data	
Flow Rate	max. 1.800 m^3/h
Differential Pressure	max. 40 bar
Viscosity	max. 100.000 mm^2/s (cSt)
Temperature	max. 350°C (662°F)

Higher flow rates upon request

Construction Material	
Pump Casing	Cast Carbon Steel 1.0619 (similar to A216WCB) Cast Stainless Steel 1.4408 (similar to A351 CF8M) Duplex Stainless Steel 1.4470 (A 890 4A / UNS J92205) Super Duplex Stainless Steel 1.4469 (A 890 / UNS J93372)
Liner	Cast Carbon Steel 1.0619 (similar to A216WCB) Cast Stainless Steel 1.4408 (similar A351 CF8M) Duplex Stainless Steel 1.4470 (A 890 4A / UNS J92205) Super Duplex Stainless Steel 1.4469 (A 890 / UNS J93372) Wear Resistant Coating
Screws	Carbon Steel 1.8550, nitrated Stainless Steel 1.4542 (similar to UNS S17400), hardened Duplex Stainless Steel 1.4462 (A182-F51 / UNS S31603), hardened Martensitic Stainless Steel 1.4122, nitrated Wear Resistant Coating
Shaft Seals	Standard Cartridge Seals depending on the actual operating conditions following ANSI B73.1 / API 610 / API 682

Upon request, Klaus Union Screw Pumps, Series DSP-2C, can be supplied also in Hastelloy, Inconel, other high nickle alloys or Titanium.



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

Klaus Union Center of Competence | **Klaus Union Subsidiary** | **Klaus Union Sales Office**

SINGLE VOLUTE TWIN SCREW PUMP SERIES SLM DSP-2C

SEALLESS WITH MAGNET DRIVE
ACC. TO API 676

TWIN SCREW PUMP SERIES SLM DSP-2C ACC. API 676

Utilizing the well known maintenance free Klaus Union magnetic drive system, the SLM DSP-2C provides a robust and trouble free solution for the customers' needs.

The Klaus Union pump series SLM DSP-2C is a single volute twin screw pump, engineered acc. to API 676, latest edition. It uses the same field proven, robust and highly flexible Klaus Union modular system of magnetic drives as the Klaus Union centrifugal pumps. This allows for full spare parts interchangeability between the magnetic drive systems for Klaus Union Centrifugal Pumps and Twin Screw Pumps.

The axial split modular casing design allows the pump to be adapted to the customers' needs without limiting spare parts interchangeability between pumps. This keeps the spare parts and life cycle costs for the twin screw pumps to a minimum.
Of course the pumps also feature the famous "PLUG & PUMP" Cartridge Design to minimize service downtimes.

The construction without shaft seal but with magnet drive guarantees that the pump is leak free, in accordance with the TA-Luft specification (German Technical Instruction on Air Quality Control), and maintenance-free in operation, compared to the version with mechanical seal.

The leak-free pumps are particularly suitable for pumping toxic, aggressive, flammable and other enviromentally harzardous liquids in:

→ Refineries → On-/Offshore → Petrochemical → Chemical

The Klaus Union pump series SLM DSP-2C can be supplied with its own bearing bracket with grease or oil lubricated bearings, or in close-coupled design. In case of grease lubricated bearings lifetime greased bearings are the standard, however regreaseable executions are available on request.

The optional available pressure limiting valve (PLV), using Klaus Union valve product line proven design and internals, can protect the pump hydraulic against overpressure and is executed with return to suction as a standard.
If requested, the pump casing can be equipped with a connection to directly mount a standard API 520/526 grade safety valve.

Performance Range

- **Flow Rate:** Q = up to 1.800 m³/h
- **Diff. Pressure:** ΔP = up to 40 bar

Pressure Ratings/Temperature Range

- **Standard Construction:** PN 25 at 120 °C
- **Temperature Range:** -120 °C up to 350 °C
- **Pressure Rating:** up to PN 400

Construction Materials

Pump Casing	Cast Carbon Steel; Cast Stainless Steel; Duplex Stainless Steel; Super Duplex Stainless Steel
Liner	Cast Carbon Steel; Cast Stainless Steel; Duplex Stainless Steel; Super Duplex Stainless Steel; Wear Resistant Coating
Screws	Carbon Steel, nitrated; Stainless Steel, hardened; Duplex Stainless Steel, hardened; Wear Resistant Coating; Martensitic Stainless Steel, nitrated
Containment Shell	Hastelloy C, Titanium, Alloy 718, Zirconium Oxide

Upon request, Klaus Union Screw Pumps, Series SLM DSP-2C, can be supplied also in Hastelloy, Inconel, other High Nickel Alloys or Titanium.

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.

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TÜV NORD CERT GmbH ISO 9001

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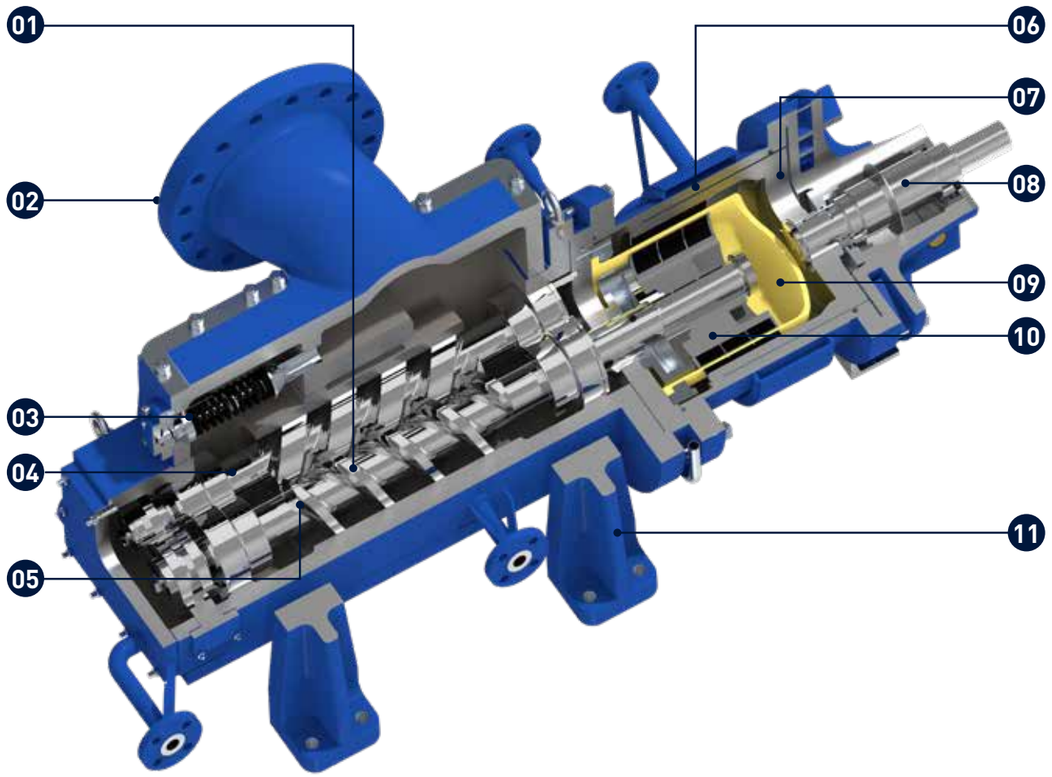
DESIGN DETAILS SERIES SLM DSP-2C



The description can be found on the following page →

Design **According to API 676**

01 ▶ **Pump Screws**
located side by side (horizontally), machined from a single piece bar stock, low pulsating design with optimized screw profile for minimized power consumption.

02 ▶ **Adaptable Suction/Discharge Casing**
to fit project requirements for nominal diameter, rating and execution. Engineered for smooth flow.

03 ▶ **Flat Gasket**
Compliant with technical instructions on air quality control (TA-Luft).

04 ▶ **Radial Slide Bearings**
optimized to meet customer application needs for maximum overall pump lifetime.

05 ▶ **Large Diameter Balancing Lines**
to prevent clogging due to solids or polymerizing fluids.

06 ▶ **Intermediate Lantern**
with magnet drive rub ring and assembly / disassembly guidance.

07 ▶ **Magnetic Coupling**
Parts interchangeable with centrifugal pump magnetic couplings. Available in API 685 compliant design on request.

08 ▶ **Bearing Carrier**
with high performance bearings following API 676 recommendations.
Bearings available oil or grease lubricated (lifetime greased or regreaseable).

09 ▶ **Single Containment Shell**
with leakage monitoring and drain (secondary control/system) on request.
Optional: Double containment shell with pressure monitoring (secondary containment system).

10 ▶ **Inner Magnet Carrier**
with additional mechanical rub ring.

11 ▶ **Centerline Mounting**
as a standard. High shaft stability, even during change of operating temperature.
Feet adaptable to customer requirements.
Close-coupled design possible with same casing.

THE MODULAR SYSTEM FOR SEALLESS TWIN SCREW PUMPS

Pump Casing

The design of pump casing has been calculated with the help of the finite element method (FEM) for 25 bar maximum internal pressure at 120 °C (for stainless steel) and a nozzle load corresponding to twice the values specified in API 676.
The corrosion allowance of 3 mm stipulated acc. to API 676 has been taken into consideration as well.

The pumps are available with flanges acc. DIN EN 1092-1, PN 16 or PN 25 as well as ANSI/ASME B16.5 Class 150 and Class 300. Higher pressure ratings can be realized on request.

Centerline Mounting

The pump casing is equipped with centerline mounting as a standard. While this is common for centrifugal pumps most screw pumps today still come with a traditional foot mounted arrangement.
The centerline mounting gives the customer several benefits:

- Minimum shaft dislocation during temperature cycles of the process
- Ease of maintenance - the pump hydraulic cartridge can be disassembled without disturbing motor or piping
- Good accessibility for heat tracing and/or temperature insulation
- Upgrading of existing SLM DSP-2C with modules to provide additional features (heating, external balancing lines, etc.) without impact on the core hydraulic unit
- High flexibility to accomondate customer requirements for interface dimensions by raising or lowering the pump.

Hydraulically Balanced Design

Large diameter balancing lines ensure the hydraulic balancing of the pump during all operating conditions. For crystalizing products the balancing lines can be supported by additional external balancing lines to avoid clogging and consequential damage to the pump and magnetic coupling. Ports for verifying proper operation of the balancing systems by means of suitable instruments are available on request.

Slide Bearings

Radial slide bearings, utlizing proven designs and experiences gained in our heavy duty, high load centrifugal pump slide bearings, carry the rotors inside the pumped fluid and are lubricated by the pumped fluid.

Close-Coupled Design

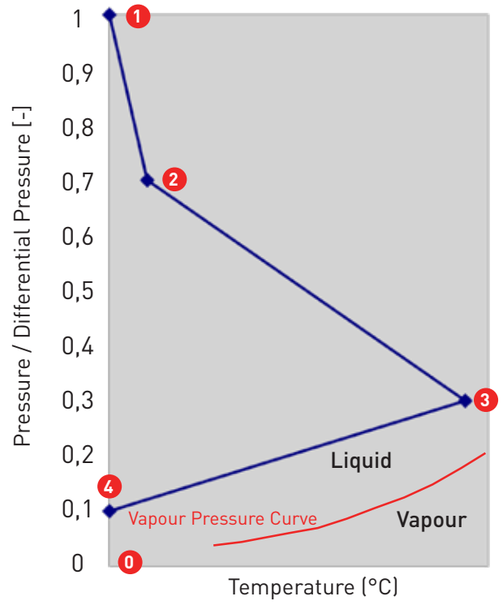
The SLM DSP-2C is also available in a close-coupled version (SLM DSP-2CB).
The Closed-coupled Design offers significant cost savings because of the following advantages:

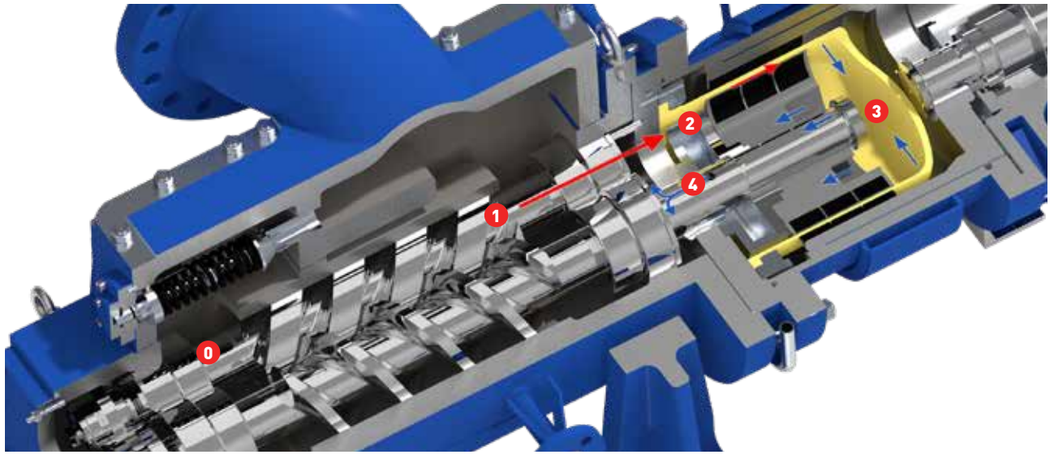
- No alignment between pump and motor required
- No coupling and coupling guard
- No ball bearings
- Pump completely free of scheduled maintenance
- No oil lubrication necessary
- Lower noise level
- Base plates for close-coupled design do not need to be rigid acc. to API 685 § 7.3

Magnet Drive as per API 685 § 9.1.3./6.1.9

The magnet drive is configured concentrically and transmits torque without slip via the field of the permanent magnets. The thermally stable samarium-cobalt material (Sm2Co17) withstands operating temperatures of up to 400 °C.

A pressurised flush flow is taken off at a high pressure location in the hydraulic system and fed to the magnet drive, where it provides for the necessary heat dissipation. The pressurised flush flow ensures that the temperature rise in the containment shell area does not lead to evaporation of the pumped liquid (see Figure below).

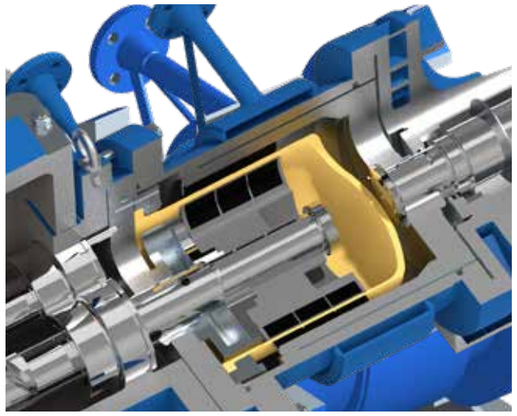




STANDARDS & OPTIONAL PACKAGES ACC. TO API 685

Single Containment Shell with Drain at the Intermediate Lantern

The standard version of the SLM DSP-2C pump is equipped with a single containment shell.
The intermediate lantern is equipped with a labyrinth system to the atmosphere and a drain connection (D2). A pressure gauge or a liquid sensor can be utilized as a leakage detector.



Optional Packages:

- Special / customized baseplates
- Various heating options adapted to customer and application requirements
- Flushing connections
- High Pressure Design for increased inlet pressure systems (up to 400 bar)
- Instruments to verify proper operation of pump and early failure detection
- Mag Drive Systems optimized for highest viscosities
- High Efficiency magnetic coupling systems optimized to customer operating needs

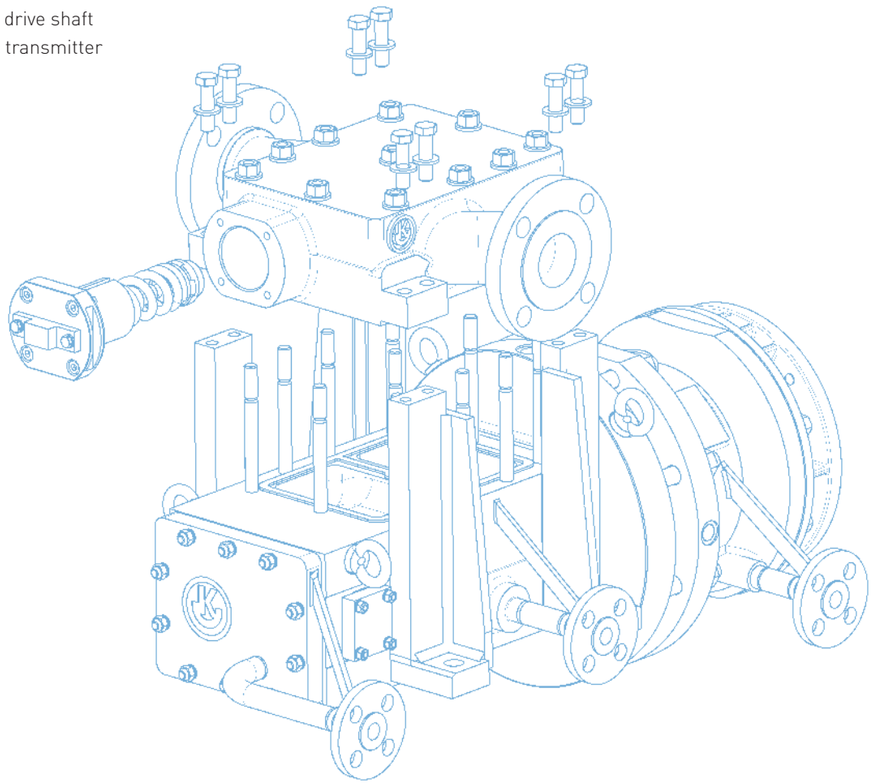
Basic Monitoring (TE3 + JE)
- TPX Temperature monitoring system (TE3)
- Load controller (JE)

Secondary Control as per API 685 § 3.67 (JE + LE1 + D2)
- Single containment shell
- Pump power monitoring (JE)
- Liquid detection in vertical section of the discharge piping system (LE1)
- Secondary, welded drain connection on intermediate lantern with flange/ blinded backup bearing seal on drive shaft (D2)
- Backup mechanical seal on drive shaft

Secondary Control System as per API 685 § 3.68 with Liquid Sensor (LE2)
- Welded drain connection on intermediate lantern with flange/blinded
- 3-way adapter on drain connection
- Backup mechanical seal on drive shaft
- Monitoring device, liquid detector (LE2)

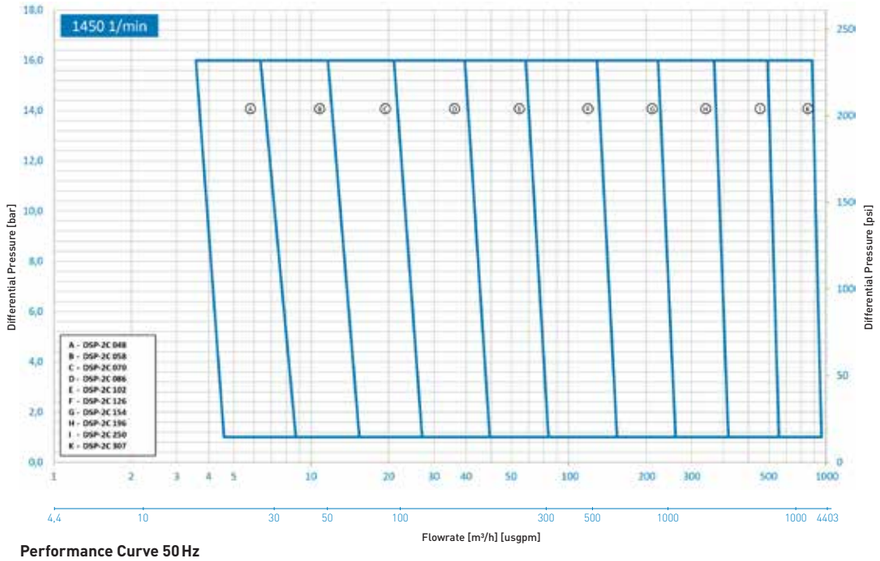
Secondary Control System as per API 685 § 3.68 with Pressure Sensor (PE)
- Welded drain connection on intermediate lantern with flange/blinded
- 3-way adapter on drain connection
- Backup mechanical seal on drive shaft
- Monitoring device, pressure transmitter (PE)

Secondary Containment System as per API 685 § 3.66 (PE + TE3)
- Double containment shell
- Monitoring device on containment shell manifold, pressure sensor (PE)
- No second shell connection, as flushing of shells can be achieved by pressing flush liquid into manifold and will drain into the inner shell
- Drain hole in intermediate lantern plugged (welded or threaded)
- TPX Temperature monitoring system (TE3)

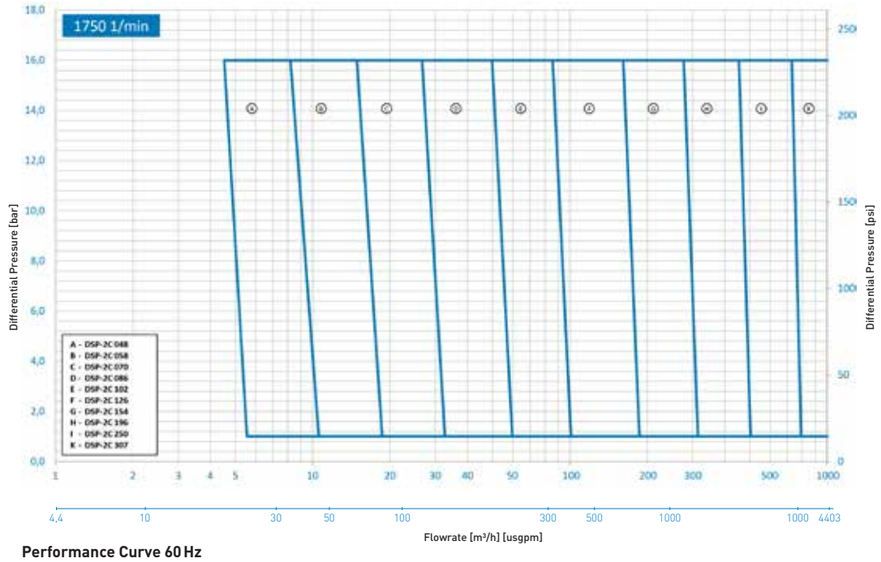


PERFORMANCE CURVES SERIES SLM DSP-2C

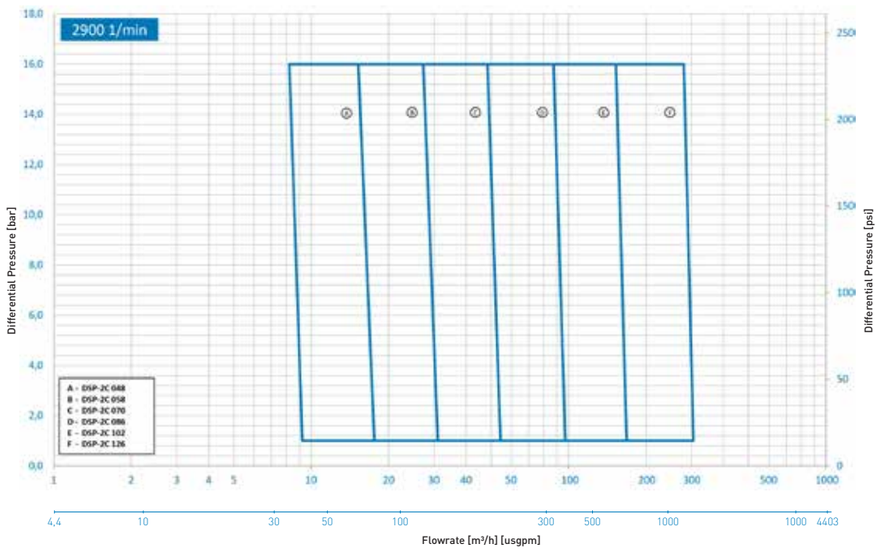
Performance Curve 50 Hz



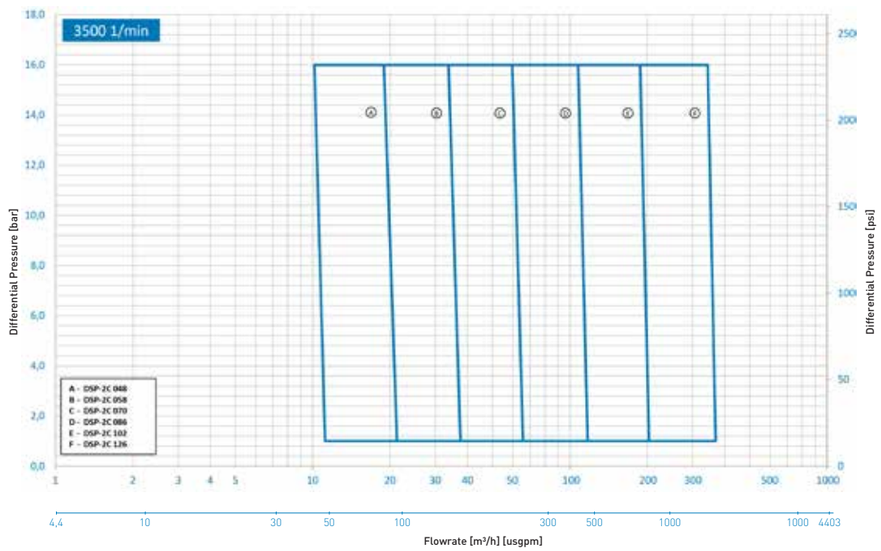
Performance Curve 60 Hz



Performance Curve 50 Hz



Performance Curve 60 Hz



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
- Centrifugal Pumps according to API 685
- Multi-Stage Centrifugal Pumps (Barrel/Ring-Section Design)
- Side Channel Pumps following DIN EN ISO 15783
- Twin Screw Pumps, Single Volute, according to API 676 and DIN EN ISO 14847
- 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 & ISO 13709
- Multi-Stage Centrifugal Pumps (Barrel/Ring-Section Design)
- Propeller Pumps, Horizontal / Vertical / Bottom-Flange
- Side Channel Pumps
- Twin Screw Pumps, Single / Double Volute, according to API 676 and DIN EN ISO 14847
- 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

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