



Specialist for Pumping Technology

INNOVATION
EFFICIENCY
QUALITY



SCE-M

API 685 Process Pump with Permanent Magnetic Drive

For more than 60 years the name Ruhrpumpen™ has been synonymous worldwide with innovation and reliability for pumping technology

Ruhrpumpen is an innovative and efficient centrifugal pump technology company that offers a wide range of quality products to our clients. Ruhrpumpen is committed to global excellence with a complete range of Pumps, Fire Pump Packages and related products, such as Decoking Systems and Tools to support the core markets, namely Oil & Gas, Petrochemical, Power, Heavy Industry Applications, Mining and Water Services.

The broad product line complies with the most demanding quality specifications and goes beyond stringent industry standards such as API, ANSI, Hydraulic Institute, Underwriter's Laboratories, Factory Mutual and ISO 9001.

Ruhrpumpen is a vertically integrated company with its own foundry, machine shop, pump manufacturing plants and service centers. With strategically located manufacturing plants, operating offices and service centers in many parts of the world, Ruhrpumpen is truly a global pump company which also has the strength to focus on the local necessities of each client.

The SCE-M Pump

With the development of the new range of API 685, latest Edition, Process Pumps with Permanent Magnetic Drive, type SCE-M, Ruhrpumpen strikes new paths especially for the design of the Journal Bearings, Magnetic Drive System and Axial Thrust Balancing.

The SCE-M pump according to API 685, latest Edition, is based on the worldwide proven hydraulic design of the SCE according to API 610 latest Edition. As a 100 % leakage free pump, the SCE-M is the ideal completion to the API 610 pumps for the majority of applications in all refineries and petrochemical plants. Complex, costly and intensive monitoring mechanical seal units can be avoided. The SCE-M is maintenance-free in operation and meets the requirements of the TA-Luft specification (German Technical Instruction on Air Quality Control) and also the high technical and economic demands of refineries and petrochemical industry.

The SCE-M pump range covers the complete performance range of single-stage centrifugal pumps. Inline pumps, multistage pumps and pumps for high pressure applications with magnetic drive do complete the delivery program.

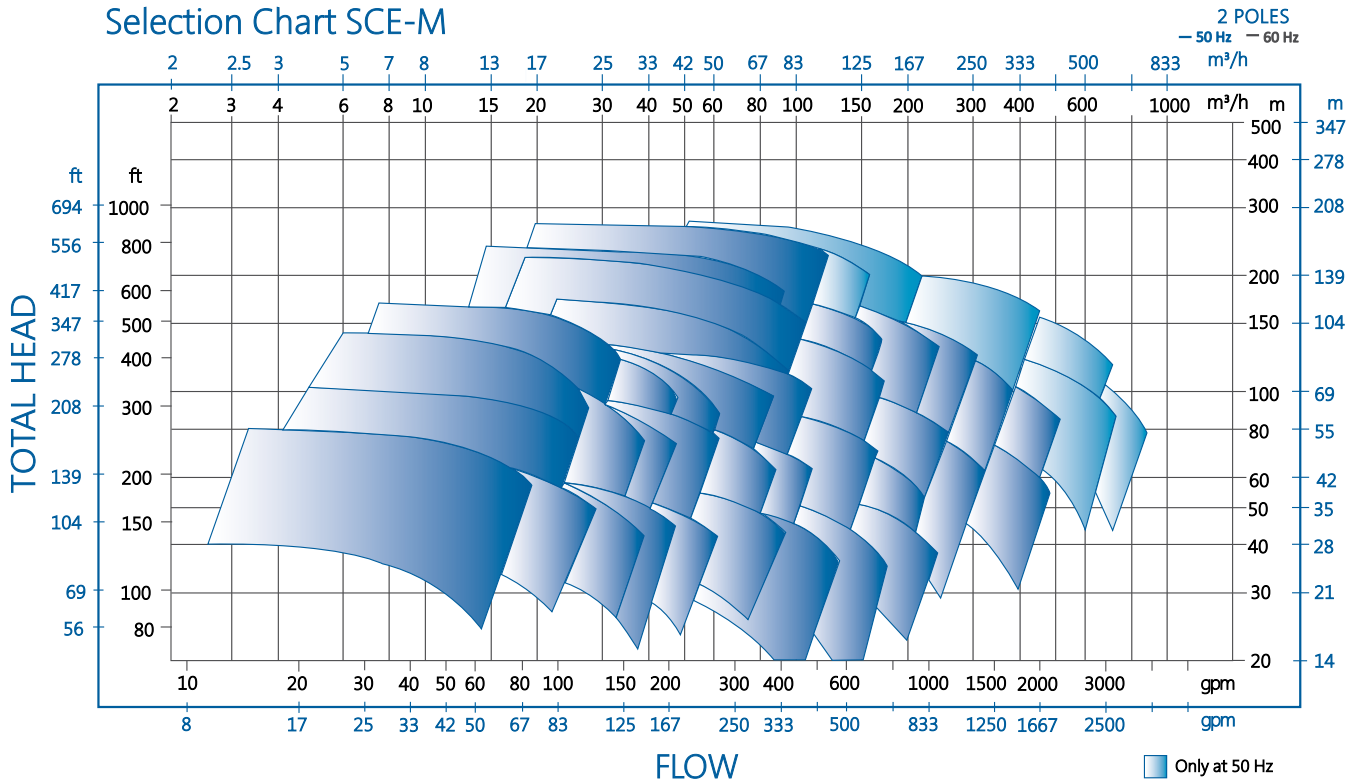
With over 130 hydraulic combinations available for the SCE-M pump, almost all customer requirements are met. Also, with the additional flexibility offered by having 3 different impellers for each pump size enhanced performance and optimized efficiencies can be attained. We have the latest engineering techniques and tools such as 3D Modeling and Finite-Element Analysis to assure our customers of the best product quality.



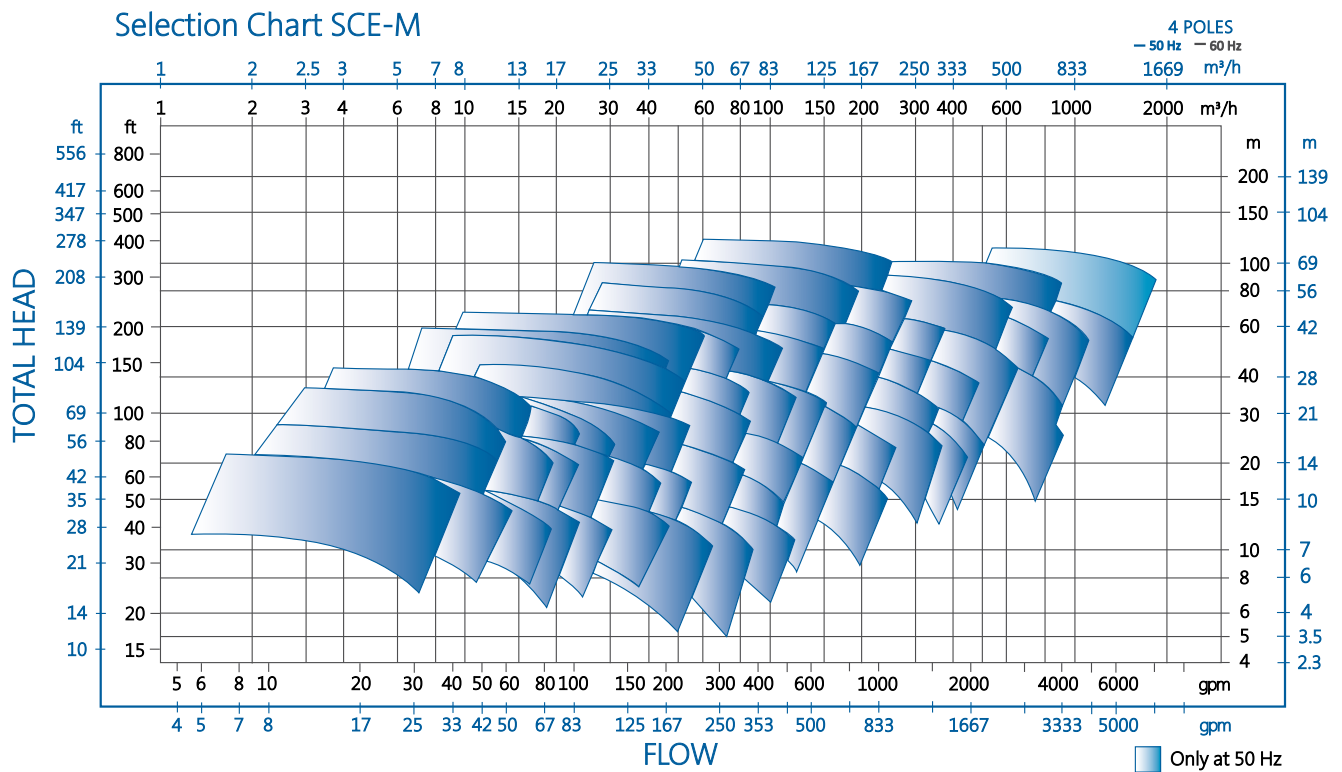
SCE-M
Process Pump with Permanent
Magnetic Drive

Performance Range

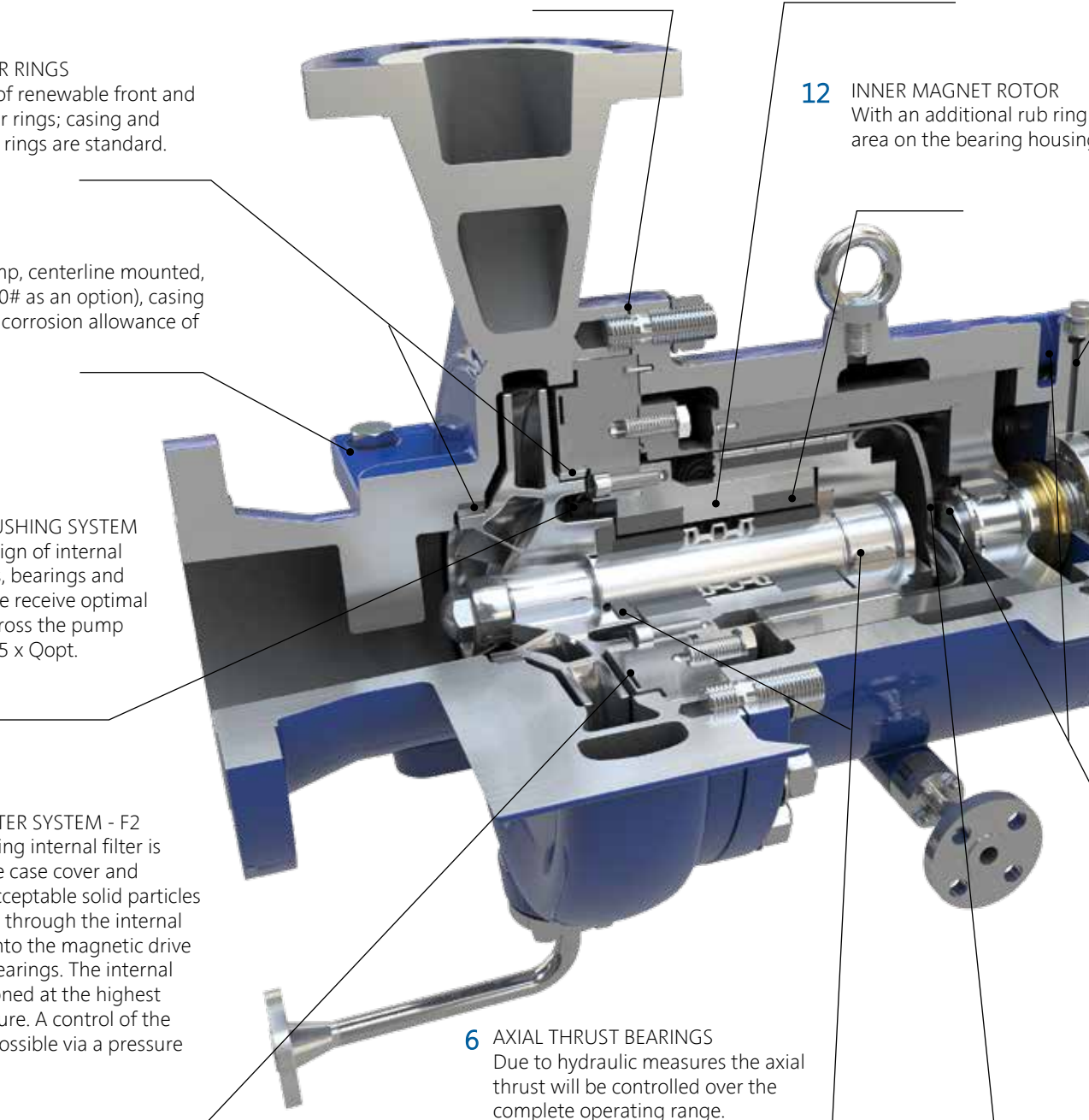
Selection Chart SCE-M



Selection Chart SCE-M



Characteristics

- 
- 1 CASING GASKET**
The casing/casing cover is a controlled compression, metal-to-metal contact. The non-asbestos spirally wound gasket is made of stainless steel/graphite foils and is totally enclosed ensuring sealing without misalignment.
 - 2 RENEWABLE WEAR RINGS**
Full complement of renewable front and back impeller wear rings; casing and casing cover wear rings are standard.
 - 3 VOLUTE CASING**
Volute casing pump, centerline mounted, 300# Nozzles, (600# as an option), casing drain with flange, corrosion allowance of 3 mm is included.
 - 4 INTERNAL FLUSHING SYSTEM**
By careful design of internal flow passages, bearings and magnetic drive receive optimal lubrication across the pump curve up to $1,5 \times Q_{opt}$.
 - 5 INTERNAL FILTER SYSTEM - F2**
The self cleaning internal filter is located on the case cover and prevents unacceptable solid particles from entering through the internal flow system into the magnetic drive and journal bearings. The internal filter is positioned at the highest internal pressure. A control of the operation is possible via a pressure control.
 - 6 AXIAL THRUST BEARINGS**
Due to hydraulic measures the axial thrust will be controlled over the complete operating range.
 - 7 CONTAINMENT SHELL**
The containment shell separates 100% leakage-free the product chamber from the atmosphere and creates the static sealing between the inner and outer magnet rotor. The containment shell is self-venting and fully drainable.
 - 12 INNER MAGNET ROTOR**
With an additional rub ring area on the bearing housing.
 - 13 JOURNAL BEARINGS**
Spherical design for universal, multiple applications. Axial and radial bearings are made of silicon carbide (SSiC) in standard design.

Images for general arrangement use only, not certified for construction.

11 VIBRATION/TEMPERATURE

Bearing bracket and intermediate housing are provided with pre-determined permanent locations to inspect vibration and oil/bearing temperature.

10 BEARING BRACKET

Is designed with effective and proven flooded oil system and cooling fins for optimal and effective bearing lubrication. Antifriction bearings are robustly designed to provide L10 bearing life exceeding the API 685 requirements. Oil (standard) or oil mist lubrication (optional) is possible. Increased bearing bracket stiffness for heavy duty service guarantees low vibration levels, ensuring safety and reliability.

9 INTERMEDIATE HOUSING

The center lined intermediate lantern is designed with a renewable non-sparking ring and a renewable non-sparking ring as fit-up aid for assembly/disassembly.

8 CERAMIC INSULATION AND THERMAL BARRIER

To avoid a heat transfer from the end of the containment shell to the front side of the drive shaft, and to the end of the outer magnet rotor, the bottom of the containment shell is insulated with a high temperature-resistant ceramic (1200°C=2192°F). Thermal barrier cast to the bearing bracket, the temperature rise is dissipated over the bearing bracket flange by the cooling fins, preventing excessive heat transfer to the anti-friction bearings, and extending bearing life.

SCE-M PERFORMANCE DATA

Capacity	up to 2,200 m ³ /h	9,690 U.S. gpm
Head	up to 330 m	1,080 ft
Pressure	up to 40 bar	580 psig
Temperature	-120 °C to 450 °C	-184 °F to 840 °F
Flange size	according to ASME B16.5	Class #300

For Pump operation outside this range, please contact a Ruhrpumpen representative.

DESCRIPTION

- Heavy Duty Centrifugal Process Pump with Permanent Magnetic Drive
- Designed to meet full API 685 pump standards latest edition
- Horizontal overhung, Single Stage
- Centerline Mounted Casing and Intermediate Housing
- Back-pull-out
- Radially Split
- End Suction
- Top Discharge
- Single Suction
- Quality Assurance. All Ruhrpumpen facilities are certified according to ISO 9001

APPLICATIONS

- Petroleum Refining, Production and Distribution
- Petrochemical
- Refineries
- Heavy-duty Chemical
- Gas Industry Services
- Power Plants
- Utilities

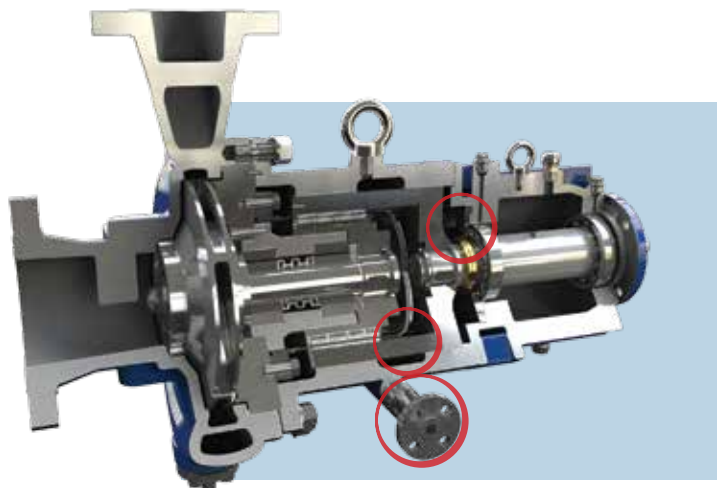
Special Configuration and Optional Features

A) Secondary Control System

The SCE-M pump in the standard design is equipped with a single containment shell, rated for the Maximum Allowable Working Pressure (MAWP).

The intermediate housing, as a secondary pressure casing, is rated for the same pressure as the pressure casing and is equipped with a labyrinth system to the atmosphere. When a secondary control is required, additionally to the labyrinth system, designed as a throttle, a spiral on the outer magnet rotor, rotating in opposite direction restricts the escaped liquid in the intermediate housing in case of a containment shell failure.

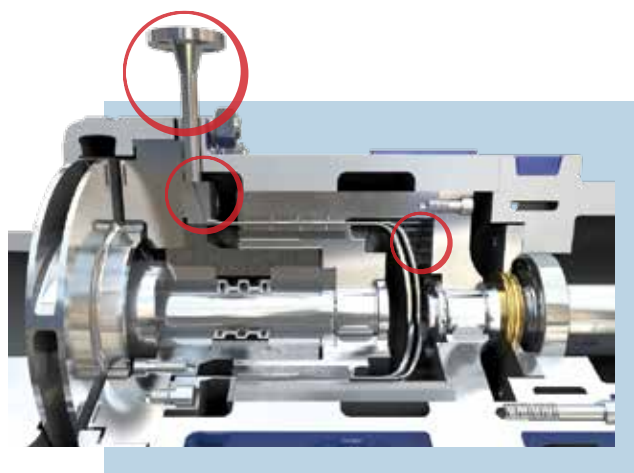
The presence of liquid or the increased pressure can be detected by a monitoring system. The liquid drainage can be controlled through the draining pipe.



B) Secondary Containment System

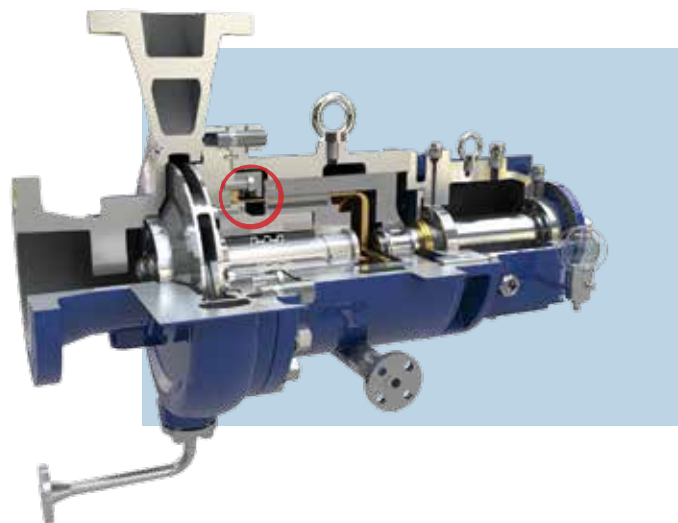
Over the internal containment shell an outside secondary containment shell in special configuration is located, to provide full secondary containment, which allows a higher pressure with the same wall thickness. This design is in accordance with API 685. To guarantee the leak tightness of the system a vacuum is created between the two cans, which can be controlled by a pressure monitoring. If the containment shell is damaged from outside atmosphere pressure can be indicated, if the containment shell is damaged from inside system pressure can be indicated.

All features are fully in accordance with API 685, latest Edition.



Z - Ceramic Zirconium Oxide Containment Shell

By using a non-metallic containment shell, e.g. made of Zirconium Oxide, the magnetic losses are eliminated, therefore the efficiency of the pump is increased significantly. Great energy savings can be achieved, especially at high pump performances. The containment shells made of Zirconium Oxide are designed for a maximum pressure of 40 bar (580 psi) at 120°C and can be used up to an operating temperature of 250°C (482°F). The fastening via a locking ring guarantees a trouble free assembly and disassembly, by ensuring the Zirconium Oxide containment shell flange is only subject to optimum compressive stress.



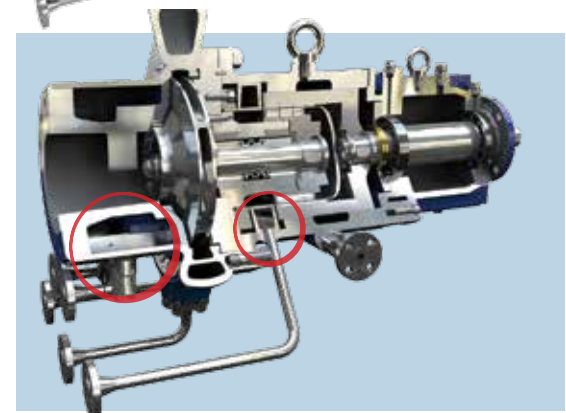
F1 - Main Stream Filter

The main stream filter is assembled on the discharge flange of the pump. In case of a solid containing mainstream, clean fluid is provided for the internal flows to the journal bearings and the magnetic drive for lubrication and cooling. The main stream filter is self cleaning. The internal flows can be measured by pressure and flow monitoring.



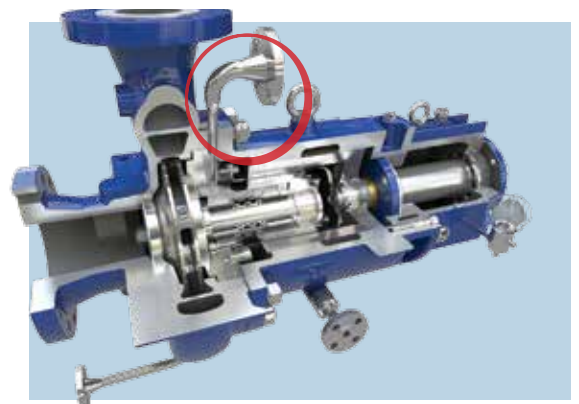
H1 AND H2 – Casing And Intermediatehousing Heating

The pumps can be equipped with a heating jacket at the casing (H1) and/or at the intermediate housing (H2). Both heated areas can be operated independently, or can be connected with a bypass-pipeline. The heating jackets are designed as standard for 16 bar (232 psi) at 200°C (392°F) (steam) or for 6 bar (87 psi) at 350°C (662°F) (heat transfer oil). Both heated areas can also be used for cooling.



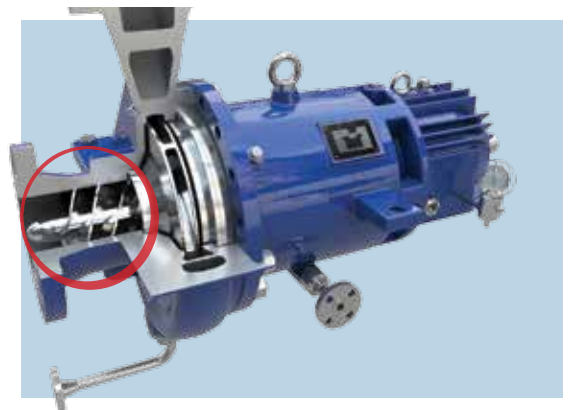
E1 AND E2 – External Flushing Lubrication

By using an external flushing (E1) the magnetic drive and the journal bearings can be fed with clean product for cooling and lubrication. The leakage rate into the casing can be reduced to approx. 10 l/h, depending on the specific heat capacity of the liquid and the size of the magnetic drive system, by using a none-metallic containment shell. In that case the front bearing bush does not have a lubrication groove and is working as a throttle, also the recirculation bore hole in the pump shaft is closed. The external sacrificial flush (E2) is also suitable for short-term flushing or for external venting of the magnetic drive. The internal flow is open.



Inducer

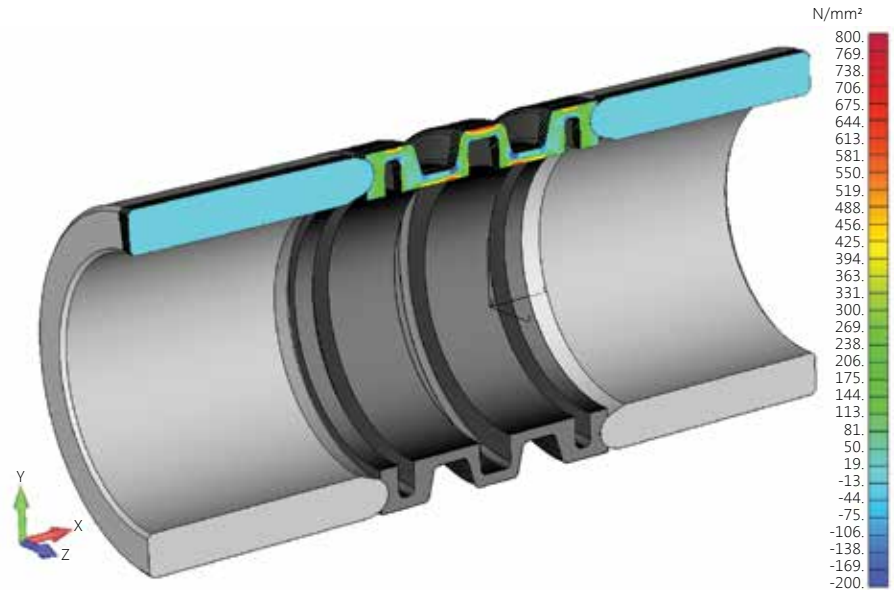
At very low NPSHa values the values for the NPSHr pump can be significantly reduced by use of an inducer. Hereby the pump characteristic will not be changed. A later assembly in the pump is normally possible without major modifications.



Journal Bearing Design

The axial and double radial Journal bearing made of “pure” Sintered Silicon Carbide (SSiC) in standard design is designed with the following features:

- Spherical locking sleeve for axial and radial centering.
- Bearing sleeves with a sphere for axial and radial centering.
- Radial centering of the bearing sleeves in the axial thrust bearings in the same material (SSiC/SSiC) results in the same expansion factor over the complete temperature application range.
- Bearing bushes with double interference fit assembly to avoid axial torsion and radial displacement.
- No edge loads induced by radial loads at the surface of the bearing sleeves and the bearing bushes.

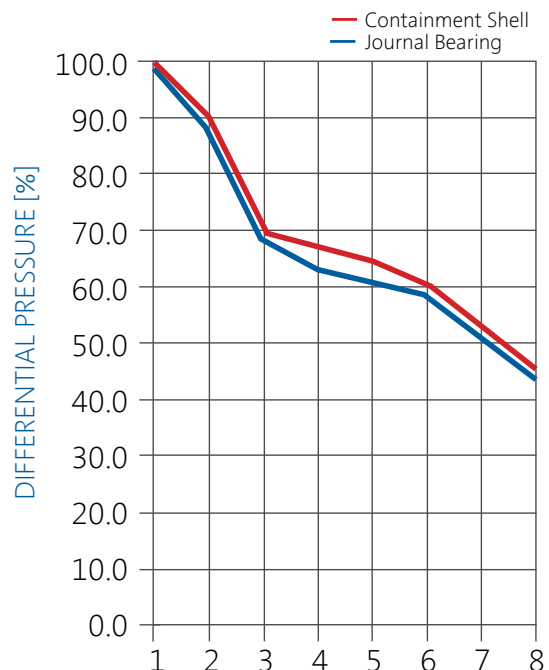


The geometry of the locking sleeve has been calculated with the help of the finite element method (FEM). The exercise was to guarantee the power transmission by the initial load between the rotating parts with different thermal characteristics of the materials (different expansion coefficient between SSiC and stainless steel 1:4), at temperatures up to 350°C (662°F).

Due to the geometry the pre-loaded locking sleeve compensates the differences of the linear expansion caused by the material and thermal between “pure” Sintered Silicon Carbide (SSiC) and the pump shaft made of stainless steel in axial and radial direction. The centering of the rotating bearing parts is always guaranteed.

Internal Flows And Pressures

A reliable and well-defined pressurization within the flushing system for the magnetic drive and the journal bearings is extremely important for the operation and integrity of the pump. The pressure for both the magnetic drive and internal bearing flush flows is taken from the point of highest pressure location (2) and is fed directly into the magnetic drive and the journal bearings.

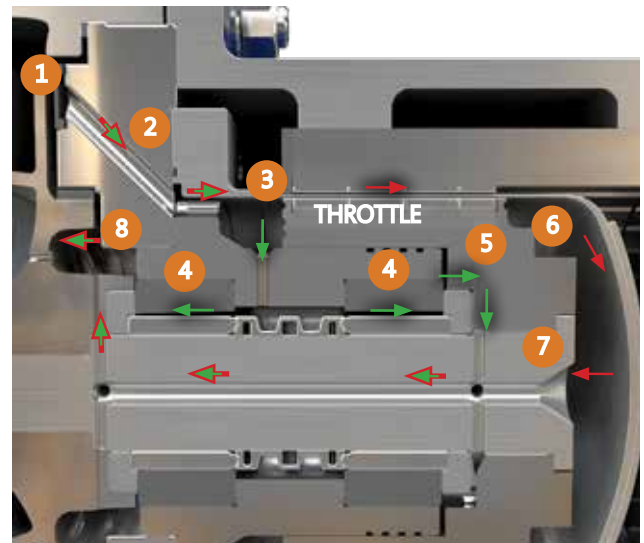


Internal Flows And Pressures

The well-defined pressurized internal flush flow into the journal bearings (3) guarantees the necessary heat dissipation and the lubrication within these bearings (4). It is of high importance, that the internal flush flow (5) is fed via a drilling system from a high-pressure point to a low-pressure point (7) into the drilled shaft. The internal flush flow in the front bearing bush is returned by the axial thrust bearing into the pressure chamber (8) behind the impeller.

The well-defined pressurized internal flush flow, which is fed into the area of magnetic drive, guarantees the necessary heat dissipation of the magnetic losses.

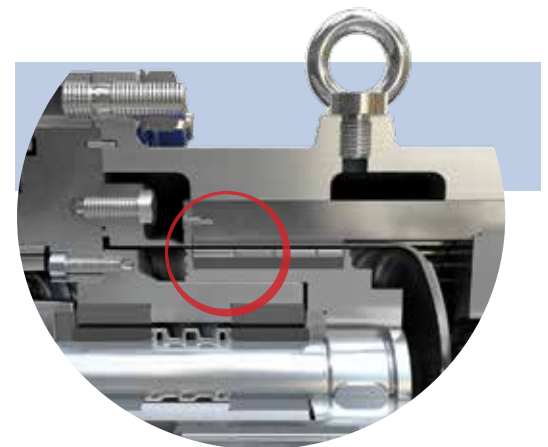
Both these internal flush flows join in the drilled shaft (7) and are also fed by the drilling system into the pressure chamber (8) behind the impeller. This guarantees that this optimized flushing system prevents the vaporization of the product in the pump. The internal flush flow will be fed by the impeller balancing holes from a location of higher pressure into the blades of the impeller.



Magnetic Drive System

The magnet drive system transmits the torque without slip by a permanent magnetic field. The magnets made of thermally stable samarium cobalt material (Sm₂Co₁₇) are suitable in standard for a maximum allowable operating temperature of 250°C (300°C). Special magnetic drive systems based also on Sm₂Co₁₇ material are suitable for an operating temperature up to 450°C.

The central assembly of the magnetic drive system over the journal bearing avoids moment loadings on the journal bearing, thus avoiding eccentric loading of the inner magnet carrier during start-up and shut-down.



Axial Thrust Balance

By optimizing the annular areas within the internal flush system the axial thrust will be minimized over the complete operating range up to $Q_{opt.} \times 1.5$. The residual thrust stabilizes the pump rotor axially and is absorbed by the axial thrust bearings. These measures ensure, that products close to the vapor pressure can be handled without limitation, without the risk of vaporization at the axial thrust bearings.

Test Lab

Ruhrpumpen's test capabilities cover the full flow and head range of our pumps and we can test up to 27,000 Hp (20 MW), in both 50 and 60 Hz.

With the strictest standards, the following test types can be performed:

- Performance test
- NPSH
- Vibration Analysis
- Noise level
- Bearing temperature
- Hydrostatic
- Submergence



Materials of Construction

Combinations according to API 685, Table H.1

INDIVIDUAL PARTS	S-6	S-8	A-8
Volute Casing	Carbon Steel	Carbon Steel	316 AUS
Impeller	12% CR	316 AUS	316 AUS
Containment Shell	Hastelloy C	Hastelloy C	Hastelloy C
Inner Magnet Rotor	316 AUS	316 AUS	316 AUS
Pump Shaft	AISI 4140	316 AUS	316 AUS
Drive Shaft	AISI 4140	AISI 4140	AISI 4140
Intermediate Housing	Carbon Steel	Carbon Steel	Carbon Steel
Bearing Bracket	Carbon Steel	Carbon Steel	Carbon Steel

Other material combinations such as A9, D-1, D-2, H-1, H-2 and T-1 are also available.

Other Ruhrpumpen Products

Horizontal Process Pump



Axially split, horizontal multi-stage centrifugal pump. Near centerline mounted. Heavy duty process design according to API 610 latest edition (Type BB3).

Refinery, Oil Fields, Petrochemical, and Chemical Applications.

ANSI Vertical In-Line Close Coupled Pump



Back pull-out design, CI/SS impeller, packing box cover, casing-flanged suction, front wear rings, manual vent plug.

Chemical, Petrochemical, Petroleum, Coal, Fiber, Pulp and Paper, Food and Beverage, Pharmaceutical Fats and Oils, Soap, Paint, Automotive.

Horizontal Process Pump Two Stage



Radially split, horizontal center line mounted centrifugal pump. Single suction, radial, closed impeller.

Heavy duty process design according to API 610 latest edition (Type BB2).

Refineries, Oil Fields, Reverse Osmosis, Chemical and Petrochemical Plants.

Vertical Barrel Pump



Low NPSH "Shockless Entry" first stage impeller (single or double suction), Single or multi-stage.

Heavy duty process design according to API 610 latest edition (Type VS6).









Condensate, Power Plants, Municipal, Hydrocarbons, Pipeline and Refineries.



With every project you can count on **QUALITY, SERVICE, EXPERTISE, INNOVATION** and **COMPETITIVENESS**.
Because we have a commitment with each customer, the community and the world.
We are Ruhrpumpen the specialist for pumping technology!



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More Information:

