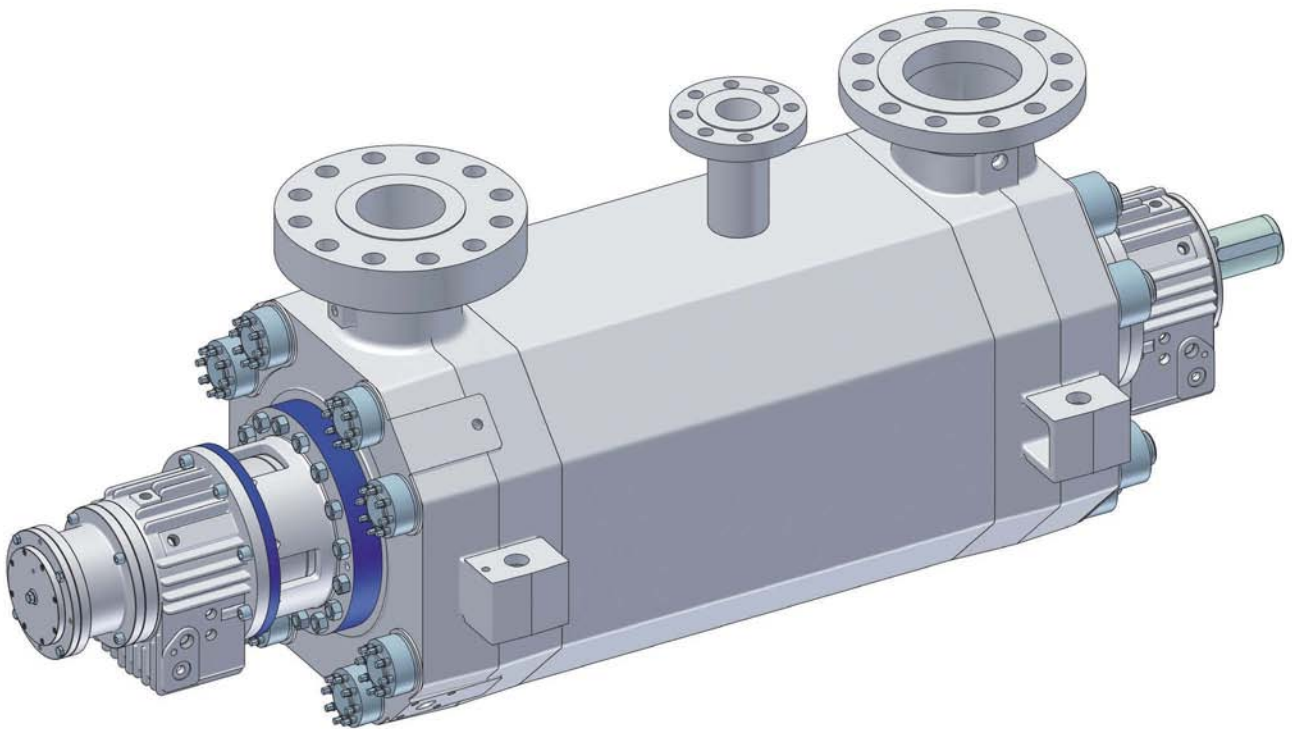


MD High Pressure Stage Casing Pump



The Heart of Your Process

Sulzer Pumps

Sulzer Pumps is a world leader in reliable products and innovative pumping solutions. Our advanced research and development, detailed process and application knowledge together with a comprehensive understanding of market demands keeps us consistently at the leading edge of technical development. Our global network of modern manufacturing and packaging facilities together with sales offices, service centers and representatives located close to major markets provide fast responses to customer needs.

Sulzer Pumps has a long history of providing innovative pumping solutions to business partners in the following industries:

- Oil and Gas
- Hydrocarbon Processing
- Pulp and Paper
- Power Generation
- General Industry
- Chemical Process Industry
- Water and Wastewater

MD Global Manufacturing Facilities



Bruchsal, Germany



Jundiai, Brazil



Navi Mumbai, India



Dalian, China

Extensive Knowledge for the Power Industry

Sulzer Pumps offers products for all types of power plants: nuclear, steam, combined cycle, geothermal and solar power. We offer all types of boiler feed, cooling water, condensate extraction pumps and pumps for auxiliary services. Our customers benefit from customized solutions covering a broad spectrum of pumping applications. Our focus is on improving our customers' profitability by setting new standards in efficiency and reliability.



MD Design

The MD pump is primarily designed for power applications, especially boiler feed. Sulzer MD pumps are horizontal, radially split, centerline mounted, multistage ring section pumps. MD pumps are suitable for pumping clean or slightly polluted, hot or cold water. MD pumps are designed to operate up to 210 °C (410 °F).



MD high pressure boiler feed pump with motor

Two main designs are available:

- balance disk with self contained bearing
- balance drum with axial thrust bearing

Centerline mounting is used to allow operation at high temperatures. Stage casings are held together by external tie bolts and sealed by confined o-rings.

The pump is optimized to reduce the bearing span and to assure stable dynamic performance. The 12% chrome steel material allows high corrosion resistance for boiler feed pump services. The pump is suitable for cold start without pre-warming.



MD pump with balance disk and Permavor® lift-off device

MD Design Features and Benefits

Arrangement with Disk/Counter Disk and Self-Contained Bearing

Balance Disk

- The balance disk balances all generated thrust and does not require a thrust bearing.
- For frequent start/stop operations a Permavor® lift-off device is recommended preventing contact wear between the disk and counter disk.

Permavor® Lift-Off Device

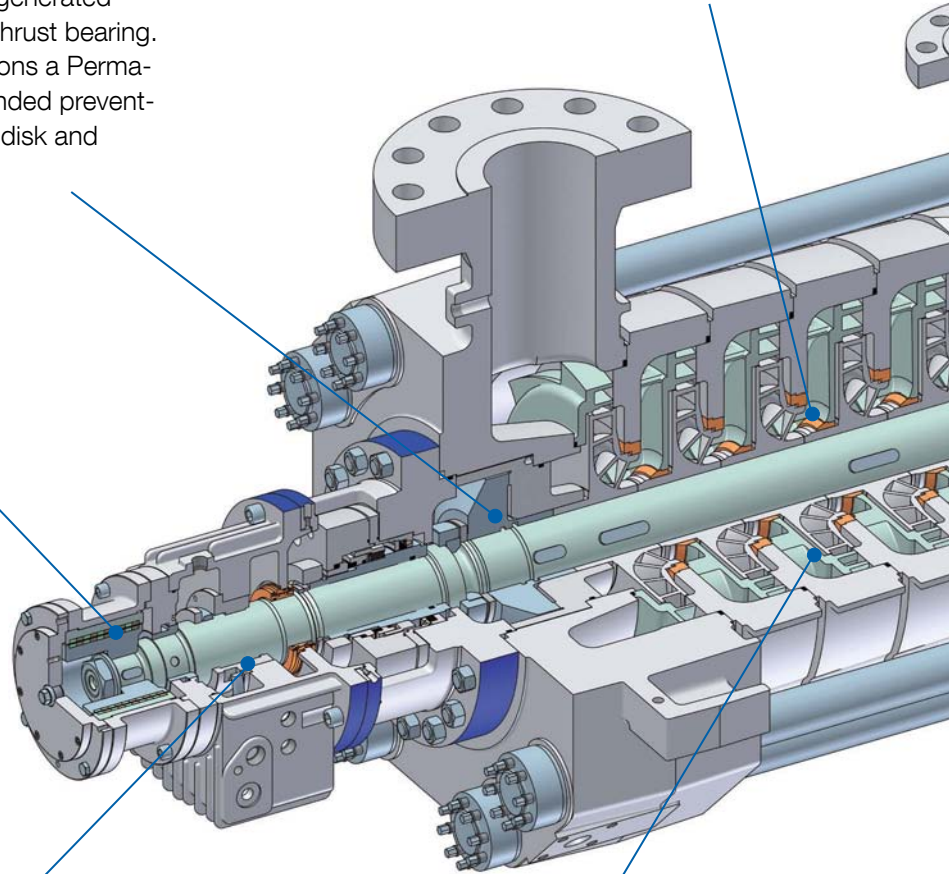
- Sulzer's Permavor® lift-off device prevents contact and wear of the disk and counter disk during operation at low speed.
- It provides an extra thrust bearing for operation at low speed without any requirements for extra lubrication or cooling.

Bearings

- Radial bearings are either single row roller anti-friction with splash oil lubrication or sleeve type with ring oil or forced feed lubrication.
- The design of the bearing housing is optimized to allow a large oil sump with optimum cooling (external ribs).
- Water cooling is available, if required.

Wear Rings

- Stationary wear rings for casings and interstage bushings are standard.
- Replaceable impeller wear rings are optional.



Impeller

- Impellers are enclosed, single suction design, keyed to the shaft.
- Double suction first stage for low NPSHr is available for larger sizes.
- Several hydraulic sets per pump size guarantee high efficiencies and low operating costs over a wide operating range.

Intermediate Take Off

- Up to two interstage bleed-off connections are possible.
- An optimized design for reduced head losses/large take-off flows is available on certain sizes.

Seal Chamber

- Seal chamber is designed for single mechanical seals from major manufacturers.

Shaft

- Ample diameter to transmit the required torque and minimize deflection.
- It is fully machined over its length with large radii for lower stress.

Shaft Extension

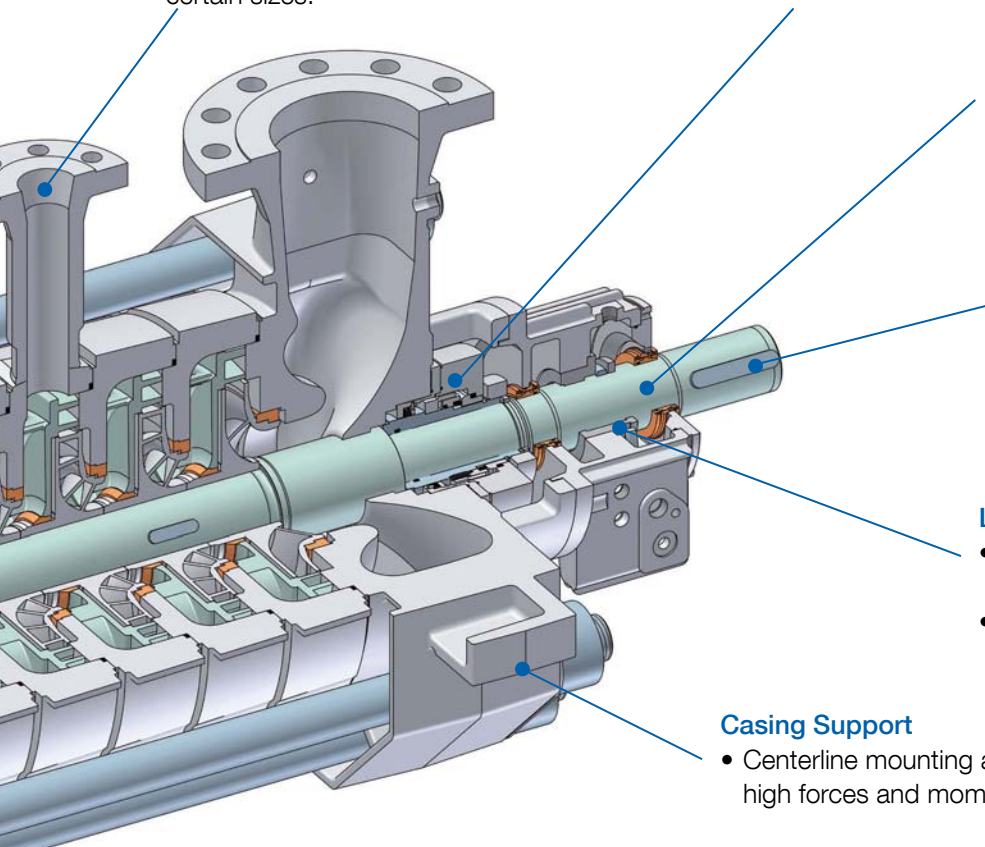
- Straight bore shaft extension for spacer couplings.
- Taper bore shaft ends are available for shaft diameters > 60 mm (2.5 inches).

Lubrication

- Lubrication with oil ring and large oil sump (self-contained bearing).
- No external lube oil supply required.

Casing Support

- Centerline mounting absorbs high forces and moments.

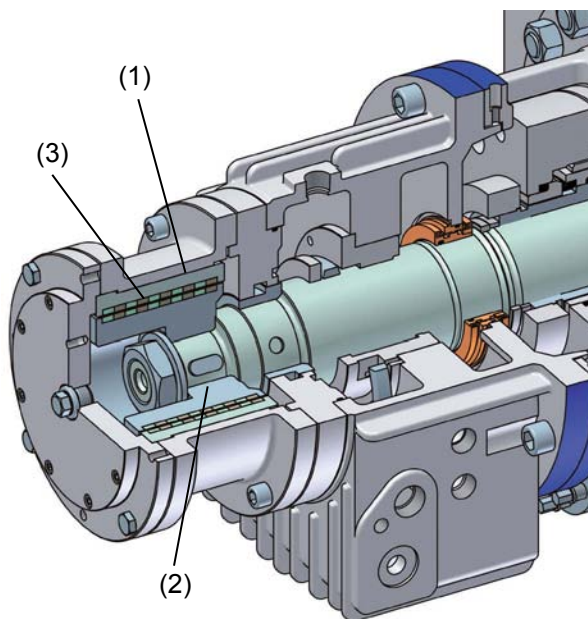


Permanent Magnetic Lift-Off Device Permavor®

The exclusive Permavor® lift-off device prevents touching and wear of the disk/counter disk during operation at low speed, such as start up and shut down.

No eddy currents, no heat generation and mechanical contact during operation will occur. Permavor® provides an extra thrust bearing for operation at low speed without the requirement for extra lubrication or cooling normally associated with mechanical lift-off designs. Due to the contact-free operation, the service life is virtually unlimited.

The Permavor® device is located at the non-driven end of the bearing housing and shaft. The inner magnet carrier (2) and outer magnet carrier (1) are equipped with permanent magnet rings (3). The magnetic rings generate the axial lift-off force.



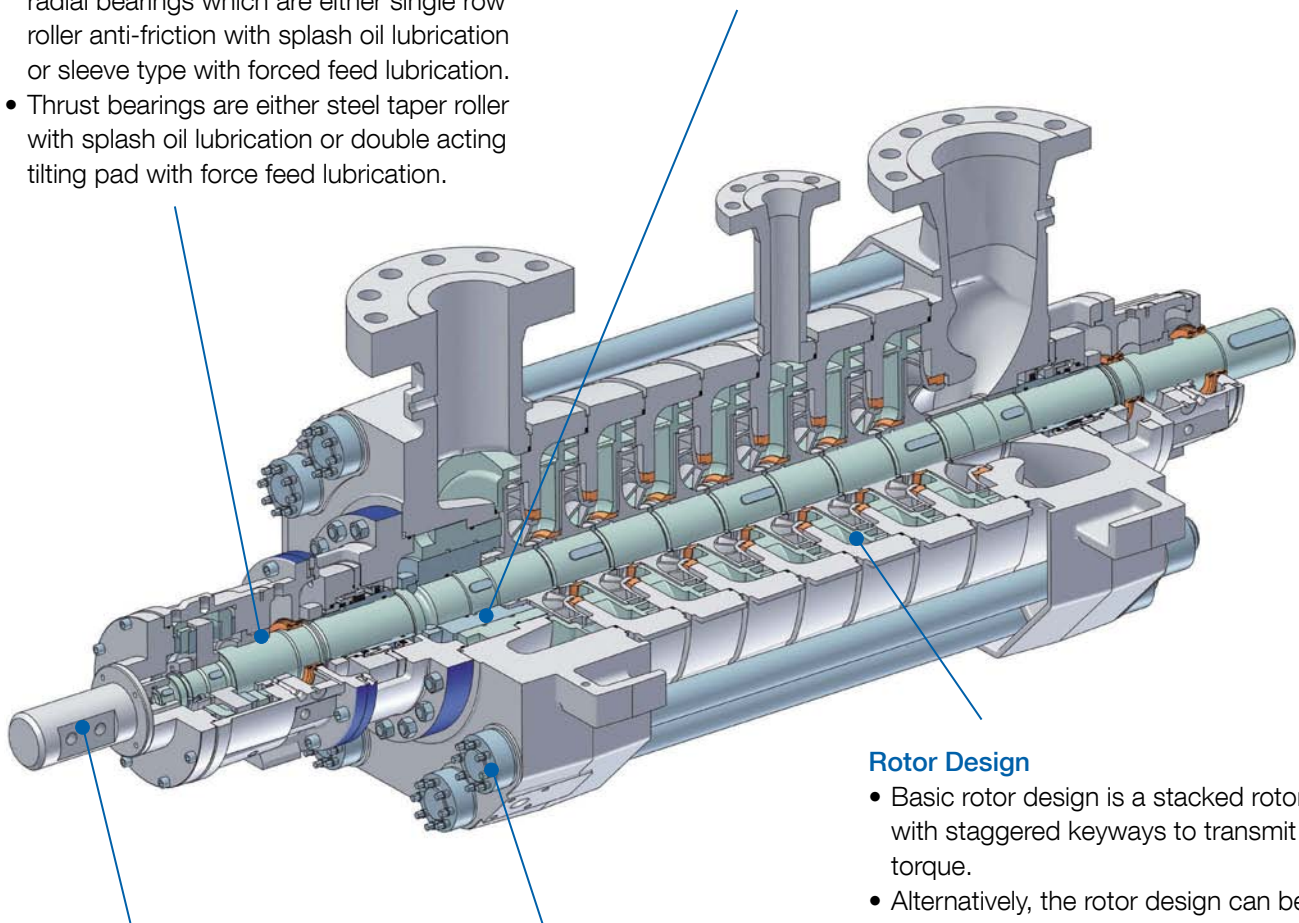
MD Design Features and Benefits Arrangement with Balance Drum

Bearings

- Pumps designed with balance drum utilize radial bearings which are either single row roller anti-friction with splash oil lubrication or sleeve type with forced feed lubrication.
- Thrust bearings are either steel taper roller with splash oil lubrication or double acting tilting pad with force feed lubrication.

Balance Drum

- Axial thrust compensated by balance drum, residual axial thrust taken by ample sized thrust bearing.



Bearings

- For sleeve/tilting pad (pivot shoe) bearings a shaft driven oil pump can be supplied.
- Lube systems with various options are available where needed.

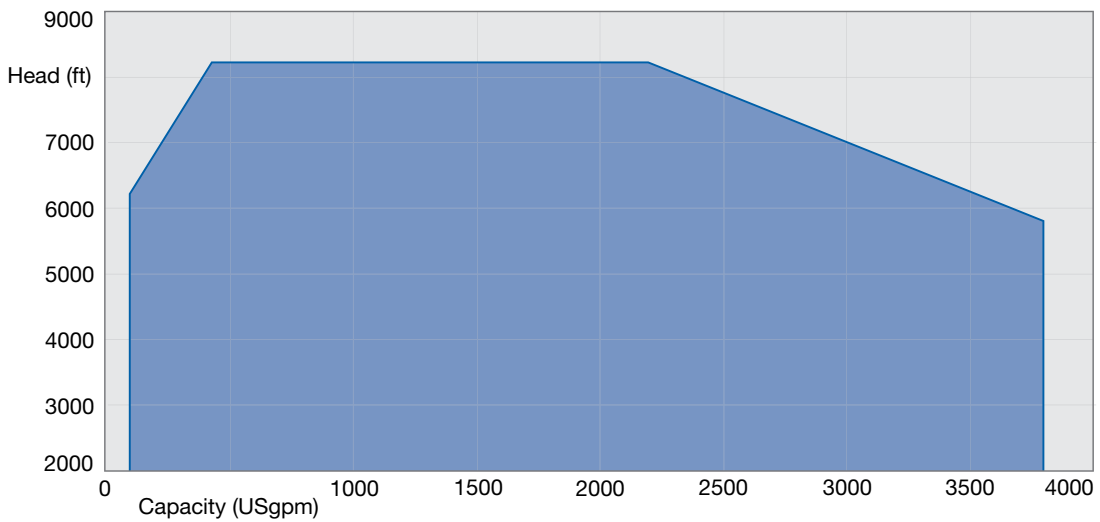
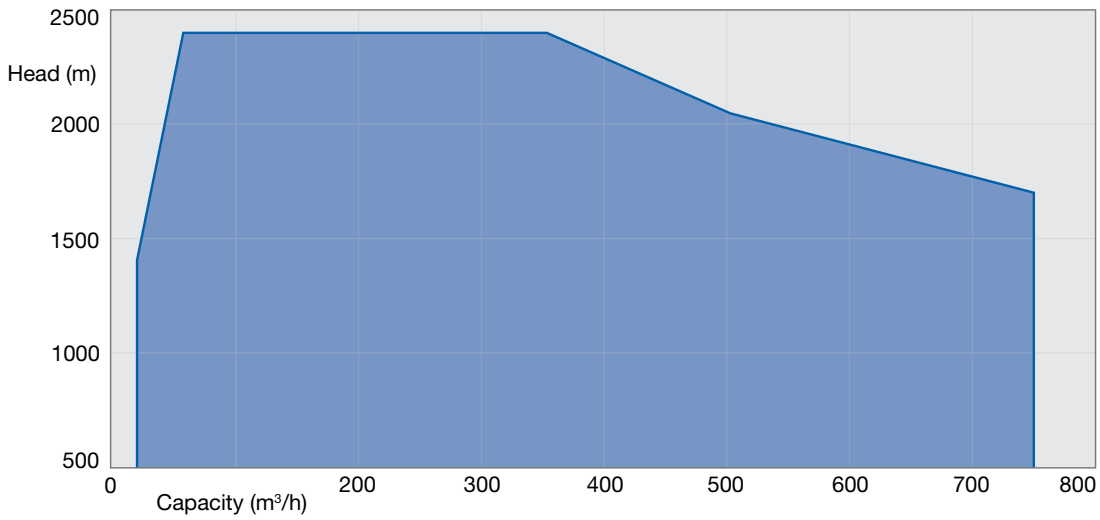
Rotor Design

- Basic rotor design is a stacked rotor with staggered keyways to transmit torque.
- Alternatively, the rotor design can be single stage fixation where each impeller is axially secured by split rings.
- Impellers have a light interference fit and the shaft is stepped at each stage for ease of assembly/disassembly.

Nuts

- Multiple screw mechanical tensioners are used on larger pumps.
- Mechanical tensioners allow simple tightening and loosening and provide high security against loosening (no specific tooling is required).

MD Performance Ranges



Operating Data

	50 Hz	60 Hz
Pump sizes	50 to 200 mm	2 to 8 inches
Capacities	30 to 750 m³/h	160 to 3,800 USgpm
Heads	up to 2,400 m	up to 8,200 ft
Pressures	up to 270 bar	up to 3,900 psi
Temperatures	up to 210 °C	up to 410 °F

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