MC-PLB High Pressure Stage Casing Pump with Product Lubricated Bearings

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

Sulzer Pumps offers products for all types of power plants – nuclear reactor, fossil fired, geothermal, concentrated solar power, combined cycle, large and small industrial power plants.

We offer boiler feed pumps for subcritical and supercritical fossil fuel plants, cooling water pumps, condensate extraction pumps and pumps for auxiliary services.

Providing technical expertise in a broad spectrum of pumping applications benefits our customers. Engineering and implementing reliable, cost effective pumping solutions to meet the demands of a continually evolving power generation industry is our focus.

We have a successful track record of improving our customers’ profitability by setting new standards in efficiency in reliability. Millions of people around the world are benefiting from a more reliable power supply as a result.

Extensive Knowledge in Products and Processes

MC-PLB Global Manufacturing Facilities

Bruchsal, Germany

Dalian, China

Jundiai, Brazil

Navi Mumbai, India
MC-PLB Design

MC-PLB type pumps are horizontal, radially split, ring section pumps with modular design.

MC-PLB pumps are suitable for pumping clean or slightly polluted, hot or cold, chemically neutral or aggressive liquids.

The design is ideal for:
- Boiler feed duties up to 180 °C, pre-warming not required
- Condensate service in power stations and industrial plants
- Desalination (Reverse Osmosis)
- Auxiliary services within combined-cycle and industrial power plants.

State-of-the-Art Technology

Traditionally multistage centrifugal pumps are equipped with oil-lubricated antifriction or sleeve bearings. The use of ceramic and special surface coatings nowadays allows to directly lubricate sleeve bearings by the product: These bearings are no longer placed outside the pump, they are integrated into the pump and directly lubricated by the pumped product.

First pumps with these kind of bearings were installed by Sulzer in the early 80’s and are running for years with excellent results.

Many pumps have been installed since then and the continuous, positive feedback from our customers have confirmed that this technology is a major step towards a reduction in maintenance and an increase in operational reliability.
MC-PLB Design Features and Benefits

Intermediate Take-Off
- Up to two interstage bleed-off connections are possible

Hydraulic
- Several impeller sets per pump size
- Good adaptability to operating point
- Optimum efficiency rate
- Low operating costs

Axial Thrust Compensation
- Balancing disc/counter disc
- No residual axial thrust

Product-Lubricated Radial Sleeve Bearings
- Located inside the pump, shorter bearing span
- Wear-resistant and maintenance free by material combination SiC/SUMESOL
Casing Wear Rings
- Maintain high efficiency during pump life
- Low maintenance cost, high availability and short down times
- PEEK Impeller wear rings are optional – especially recommended on Duplex materials

Shaft Sealing
- Only one mechanical shaft seal
- No cooling required up to 150 °C

Shaft
- Critical speed is higher than operating speed; small shaft deflection
- Areas subject to wear are protected
- Running speeds up to 4,000 rpm

Casing Support
- Foot mounted is standard
- Centerline mounted is available for large sizes or high temperatures

O-rings
- Casing sealing by confined o-rings therefore unaffected by rapid temperature variations and high pressures

Rotor Design
- The stacked rotor design enables easy assembly and disassembly
Unlike conventional pumps, which are fitted with bearings in a separate bearing housing, the MC-PLB is equipped with product lubricated bearings. Since the bearings are in-built in the pump and lubricated by the pump media, no external lubrication is necessary. There is no need for an additional lubrication system, and the pump does not require any vibration or bearing temperature monitoring. This saves both initial and operating costs for the pump set.

The MC-PLB high-pressure pump has just one mechanical seal, which minimizes spare parts costs.

Advantages of Product Lubricated Bearing Design

Sulzer Pumps and Sulzer Metco, Sulzer’s surface specialists, combine their experience and technology to provide the best combination of characteristics for product lubricated bearings:

• Product lubricated bearing sleeves are coated with SUME® SOL 220S, a blend of HVOF (High Velocity Oxygen Fuel) sprayed tungsten carbide with solid-phase lubricant.

With a balance disk the axial force is completely compensated, no axial thrust bearing is required. Due to the smaller balancing leakage flow, total efficiency of the pump is higher compared to the balance drum.

Due to elimination of conventional bearing bracket, the shaft becomes shorter which results in low vibrations and improved reliability.

The MC-PLB pump is well suited for frequent starts and stops - the balance counter disk is fitted with a wear resistant PEEK ring (polyether ether ketone – a carbon-fibre-reinforced polymer).

Robust and maintenance free – due to Sulzer’s high end SUME® SOL coating on bearing sleeve.

Advantages of Product Lubricated Bearing Design

Compact design due to internal, product-lubricated bearings. Shorter bearing span (reduced by 20-30%) ensure smooth running, low noise and improved reliability.

No Axial Thrust Bearing Due to Balance Disk Device

Bushings are produced from sintered silicon carbide (SiC) – a ceramic material that withstands high compressive loads.

The result of this combination is a robust, wear resistant and therefore maintenance free bearing.

A carbon-fiber-reinforced polymer ring made of PEEK prevents wear at the balance disk/counter disk – important if pump operates with frequent starts and stops.
MC-PLB Performance Range

Operating Data

<table>
<thead>
<tr>
<th></th>
<th>50 Hz</th>
<th>60 Hz</th>
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</thead>
<tbody>
<tr>
<td>Pump sizes</td>
<td>50 mm – 100 mm</td>
<td>2 to 4 inches</td>
</tr>
<tr>
<td>Capacities</td>
<td>up to 300 m³/h</td>
<td>up to 1,500 USgpm</td>
</tr>
<tr>
<td>Heads</td>
<td>up to 1,500 m</td>
<td>up to 6,000 ft</td>
</tr>
<tr>
<td>Pressures</td>
<td>up to 160 bar</td>
<td>up to 2,320 psi</td>
</tr>
<tr>
<td>Temperatures</td>
<td>up to 180 °C</td>
<td>up to 356 °F</td>
</tr>
</tbody>
</table>

Material Selection

<table>
<thead>
<tr>
<th>Component</th>
<th>50 Hz</th>
<th>60 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suction casing, Stage casing, Discharge casing</td>
<td>Carbon Steel, Chrome Steel, Duplex, Super Duplex</td>
<td></td>
</tr>
<tr>
<td>Diffusers</td>
<td>Chrome Steel, Duplex, Super Duplex</td>
<td></td>
</tr>
<tr>
<td>Impellers, Stationary wear rings</td>
<td>Chrome Steel, Duplex, Super Duplex</td>
<td></td>
</tr>
<tr>
<td>Impeller wear rings</td>
<td>Non galling PEEK wear rings in case of Duplex / Super Duplex</td>
<td></td>
</tr>
<tr>
<td>Shaft, Shaft sleeves</td>
<td>Chrome Steel, Duplex, Super Duplex</td>
<td></td>
</tr>
<tr>
<td>Tie bolts</td>
<td>Alloy Steel</td>
<td></td>
</tr>
<tr>
<td>Static seals</td>
<td>O-Rings</td>
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