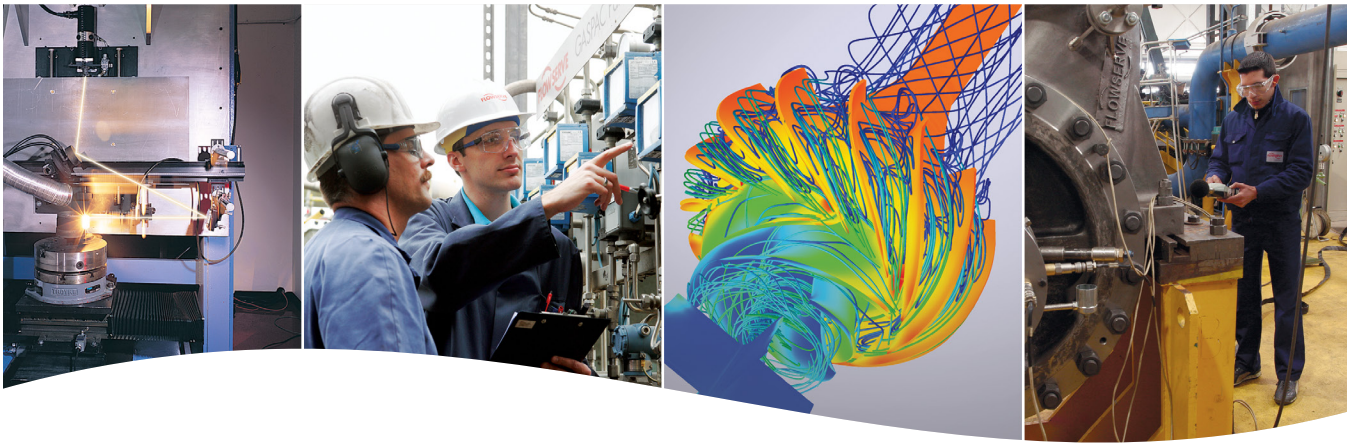
FLOWSERVE

Lawrence Pumps®
HPXM6000
Low-Flow, High-Head, Fully Lined Slurry Pump

ISO 13709/API 610 (OH2)

Experience In Motion



Pump Supplier to the World

Flowserve is the driving force in the global industrial pump marketplace. No other pump company in the world has the depth or breadth of expertise in the successful application of pre-engineered, engineered, and special purpose pumps and systems.

Life Cycle Cost Solutions

Flowserve provides pumping solutions that permit customers to reduce total life cycle costs and improve productivity, profitability and pumping system reliability.

Market-Focused Customer Support

Product and industry specialists develop effective proposals and solutions directed toward market and customer preferences. They offer technical advice and assistance throughout each stage of the product life cycle, beginning with the initial inquiry.

Broad Product Lines

Flowserve offers a wide range of complementary pump types, from pre-engineered process pumps to highly engineered and special purpose pumps and systems. Pumps are built to recognized global standards and customer specifications.the initial inquiry.

- Pump designs include:
- Single-stage process
- Between bearings single-stage
- Between bearings multistage
- Vertical
- Submersible motor
- Positive displacement
- Nuclear
- Specialty

Product Brands of Distinction

ACEC™

Aldrich™

Byron Jackson®

Calder™ Energy Recovery Devices

Cameron™

Durco®

Flowserve®

HALBERG™

IDP®

INNOMAG®

Lawrence Pumps®

Niigata Worthington™

Pacific®

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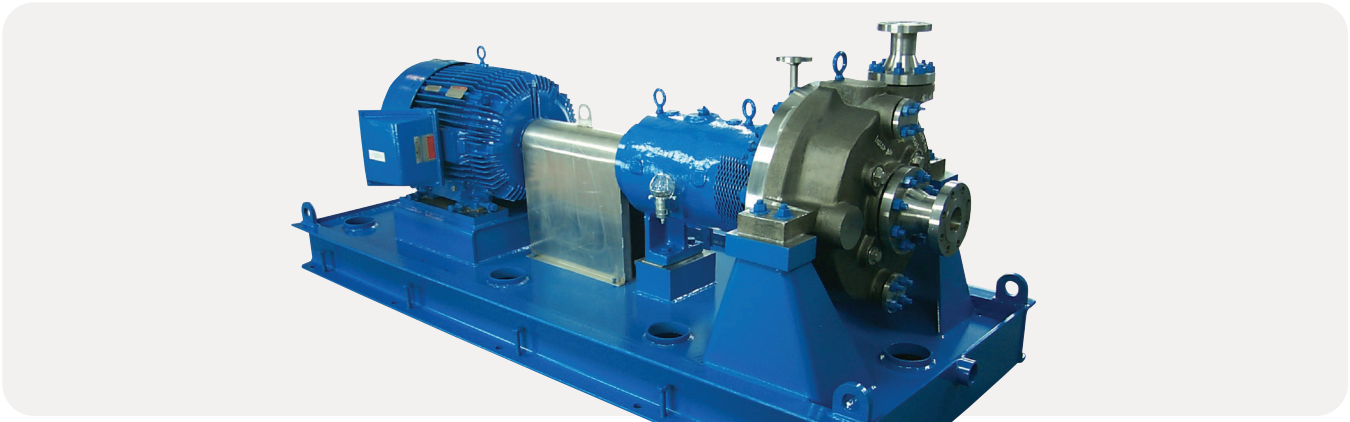


Uncompromised Safety and Performance

Processing heavy oils and synthetic fuels requires pumps capable of withstanding high-velocity abrasive slurries at high process temperatures. That's why the HPXM6000 makes no compromises. Both a true slurry pump and a true low-flow pump, the HPXM6000's "pump within a pump" design reliably and safely moves hot, solids-laden fluids without the danger of pump casing erosion. Compliant with ISO 13709/API 610 (OH2), the HPXM6000 uses replaceable hard metal liners to protect the pressure casing from erosion and abrasion. This design greatly extends the useful life of the pressure casing and eliminates a safety hazard inherent to all standard unlined, partially lined or coated pumps.

Partial Emission Technology

The HPXM6000 uses partial emission technology to achieve its low-flow, high-head hydraulics. This means only a small percentage of the impeller's total fluid volume exits the pump with each revolution of the impeller. Characterized by its radial vane impeller and circular concentric casing, this Barske-style hydraulic design provides:

- Extended wear life in abrasive environments
- Reliable operation at low flows
- Greater MTBF than conventional pump designs

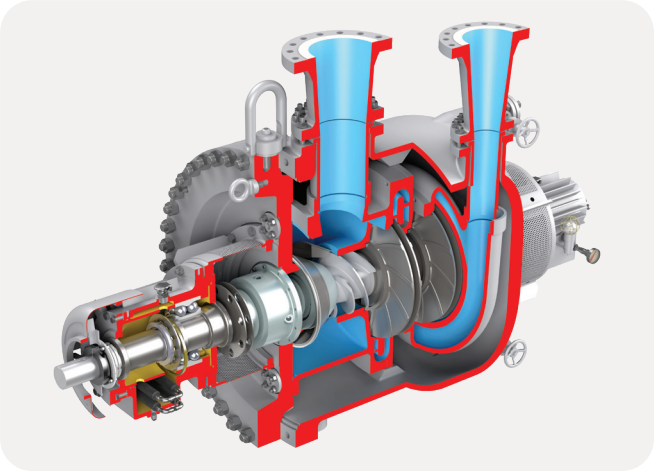
Typical Applications

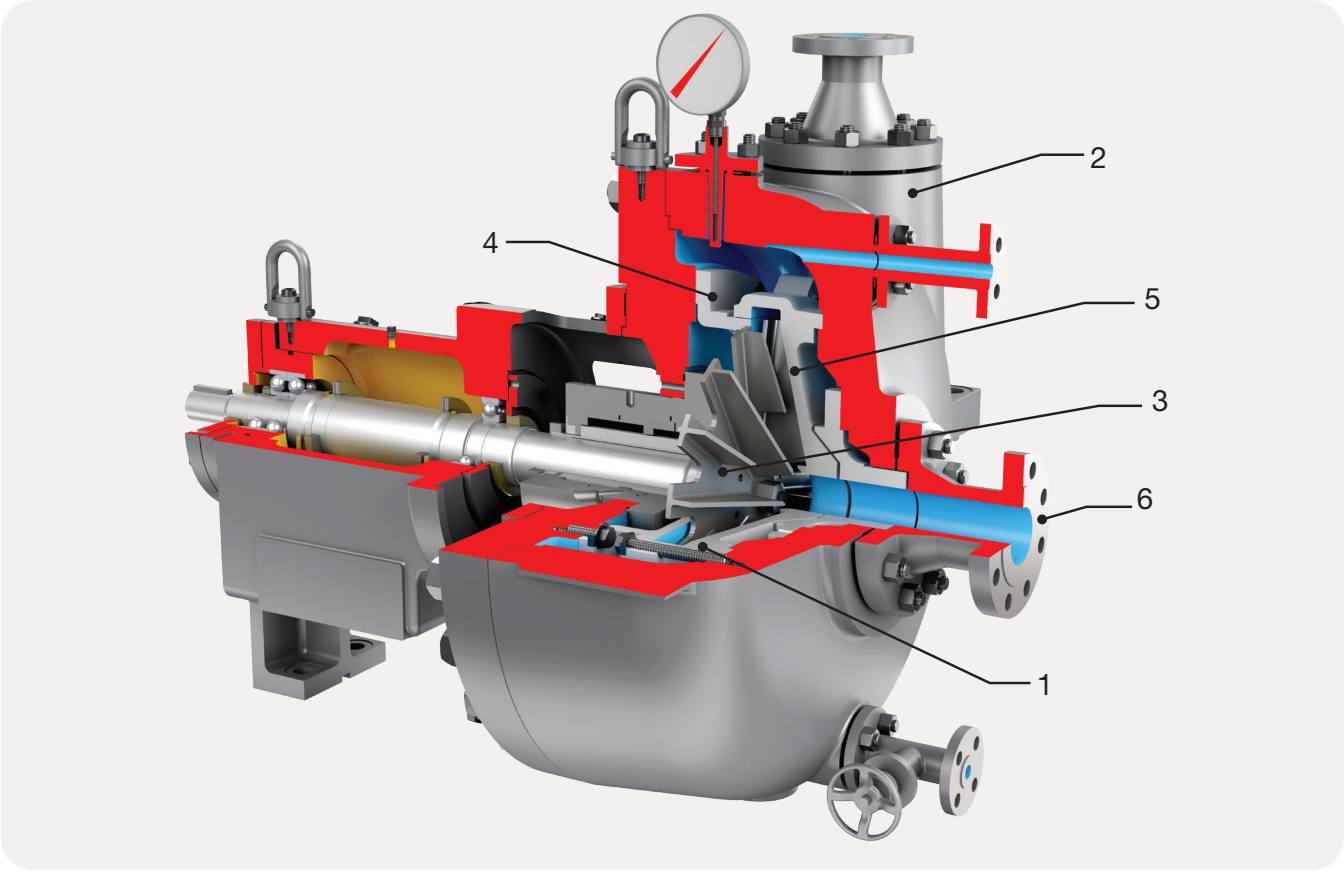
Currently available in five sizes ranging from 38 mm (1.5 in) to 150 mm (6 in) and multiple diffuser combinations, the HPXM6000 is ideally suited for:

- FCCU, RCCU and vacuum tower bottoms
- SAGD production
- Catalyst filtration
- Coke slurry
- Sludge injection
- Desalter slurry
- Filter backwash slurry oil

Complementary Pumps

- HPX6000 fully lined slurry pump (OH2)
- HED6400 fully lined between bearings, radially split, two-stage slurry pump (BB2)





With its replaceable hard metal liners and low-flow, high-head hydraulics, the HPXM6000 offers heavy oil processors safe and reliable performance in hot, abrasive applications.

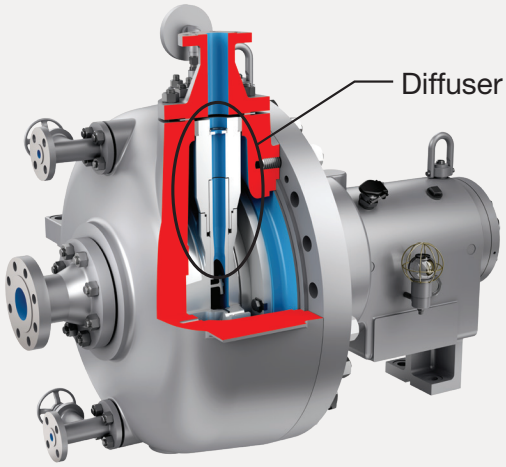
Typical Operating Parameters

- Flows to 159 m3/h (700 gpm)
- Heads to 442 m (1450 ft)
- Pressures to 83 bar (1200 psi)
- Temperatures to 426°C (800°C)
- Speeds to 3600 rpm

Custom designs available for limits exceeding those listed.

Features and benefits

1. Circular Concentric Casing With Tangential Discharge is more hydraulically efficient at lower flow rates than conventional volute casings. This design also reduces radial loads and vibration at low flows, thereby extending bearing and seal life.
2. Diffuser located in the throat of the discharge nozzle permits greater control of the flow rate under low-flow conditions. This modular insert is “tuned” to provide precise hydraulic performance and can be easily modified to fit new process requirements.
3. Barske-style Radial Vane Impeller provides exceptional low-flow stability.
4. Fully Replaceable, Mechanically Fastened Casing Liners protect the pressure casing, including all penetrations, from erosion and abrasion. Without disturbing the driver or piping, liners may be economically replaced or machined to re-establish proper operating clearances and restore pump efficiency. Liners are available in several abrasion-resistant materials to meet process requirements.
5. Heavy-walled sections extend component life beyond that of standard ISO/API pumps.
6. Flanges can be machined to meet most client specifications.



Improved Performance and Reliability

The radial vane impeller and circular concentric casing of the HPXM6000 allow for efficient low-flow, high-head operation over a wide operating range while minimizing radial loads. Moreover, pump reliability is improved and maintenance needs are reduced when compared to conventional designs.

- Reduced radial and thrust loads
- Reduced NPSH requirements
- Reduced shaft vibration and deflection
- Reduced erosive/abrasive wear
- Extended bearing and mechanical seal life
- Increased MTBF

Hydraulic Flexibility

The hydraulic performance of the HPXM6000 is easily altered by changing the diffuser, casing liner and/or impeller. This flexibility enables plant operators to adapt pump performance to changing process conditions or operating requirements. Changes may be completed without modifying the pump foundation and piping, keeping associated implementation costs low.

Guaranteed to Not Wear Out

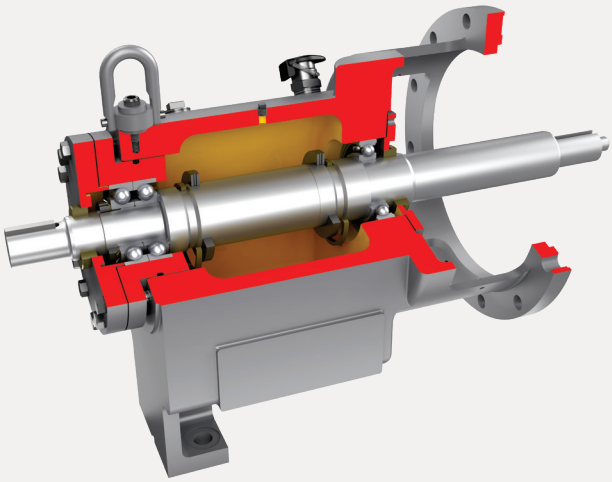
In the HPXM6000, the fluid is contained within renewable hard metal liners. At no time is the pressure casing exposed to erosion or abrasion from the fluid. The pressure casing in a typical ISO/API pump is completely exposed to erosive and/or abrasive wear that can quickly compromise safety and result in expensive, unplanned repairs.

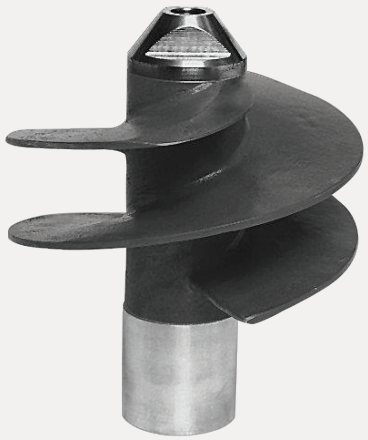
Flowserve can offer a lifetime warranty* against erosive/ abrasive wear-through on the HPXM6000 pressure casings.

Low Total Cost of Ownership

Available in several abrasion-resistant materials, HPXM6000 impellers and casing liners are designed to last more than three times longer than standard ISO/API pumps with coated parts in similar services. In addition, replacing or re-machining casing liners is a fraction of the cost of replacing or repairing an ISO/API coated pump pressure casing. Extended operational cycles combined with reduced maintenance costs translates into low total cost of ownership.

*Subject to terms and conditions; please inquire for details.





Materials of Construction

The HPXM6000 is available in numerous abrasion- and corrosion-resistant materials to maximize service life. Materials are selected to suit applications. Examples include:

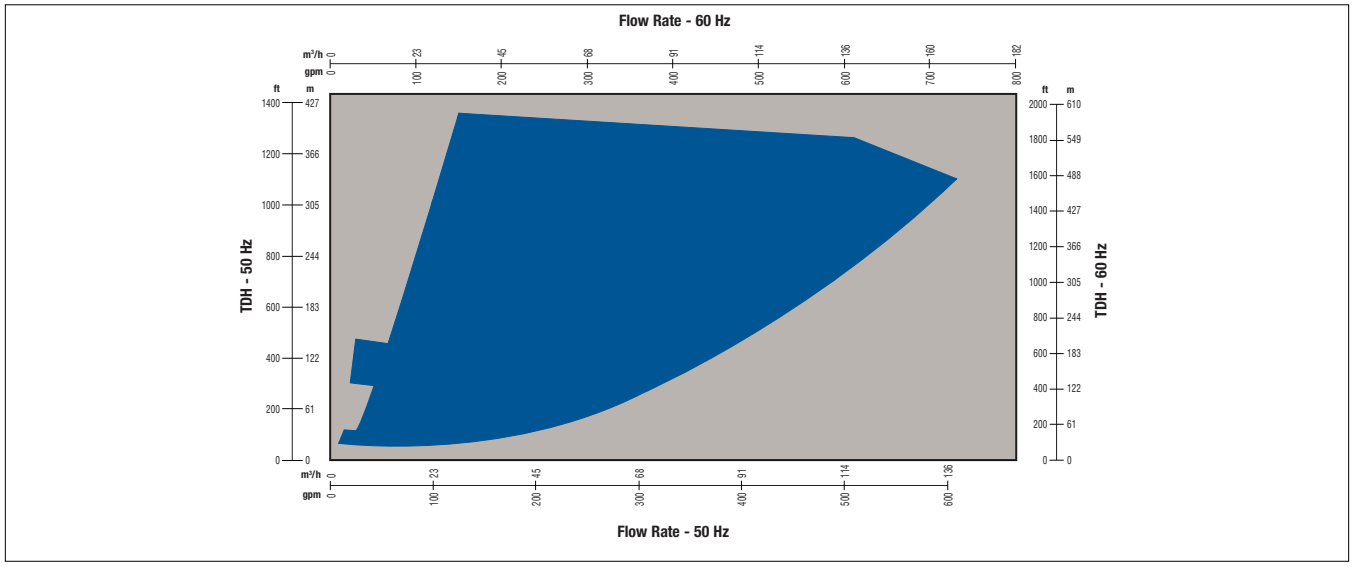
- Liners are most commonly constructed of 25% chrome iron per ASTM 532 Class IIIA. CA6NM (ASTM A743) and other specialty materials are also available.
- Pressure-retaining components may be specified in all standard API materials, including carbon steel and austenitic, duplex and martensitic stainless steels.

Heavy-Duty Bearing System

The HPXM6000 utilizes a rigid, oversized bearing frame to maintain shaft deflection below ISO/API requirements. Standard antifriction or optional hydrodynamic bearings provide an L10 life in excess of 100 000 hours at rated flow conditions, providing the durability required for extended operation.

Optional Inducer

Inducers are available for low-NPSHA applications. An upgraded rotor is utilized to manage the additional loads on the shaft.



Global Service and Technical Support

Life Cycle Cost Solutions

Typically, 90% of the total life cycle cost (LCC) of a pumping system is accumulated after the equipment is purchased and installed. Flowserve has developed a comprehensive suite of solutions aimed at providing customers with unprecedented value and cost savings throughout the life span of the pumping system. These solutions account for every facet of life cycle cost, including:

Capital Expenses

- Initial purchase
- Installation

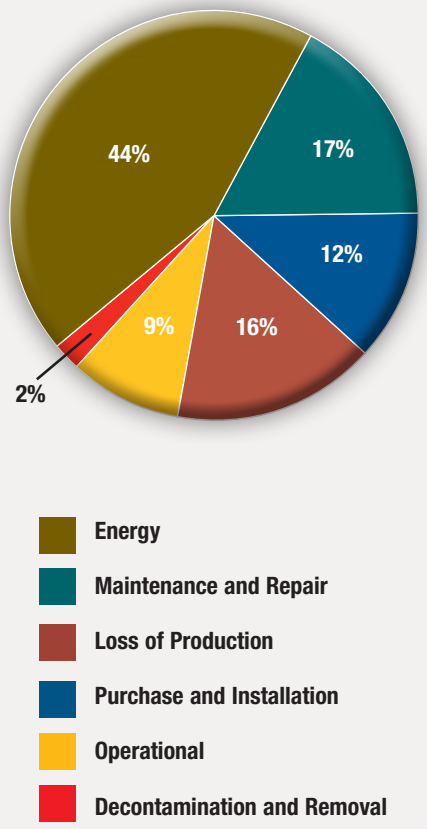
Operating Expenses

- Energy consumption
- Maintenance
- Production losses
- Environmental
- Inventory
- Operating
- Removal

Innovative Life Cycle Cost Solutions

- New Pump Selection
- Turnkey Engineering and Field Service
- Energy Management
- Pump Availability
- Proactive Maintenance
- Inventory Management

Typical Pump Life Cycle Costs[1]



[1] While exact values may differ, these percentages are consistent with those published by leading pump manufacturers and end users, as well as industry associations and government agencies worldwide.

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