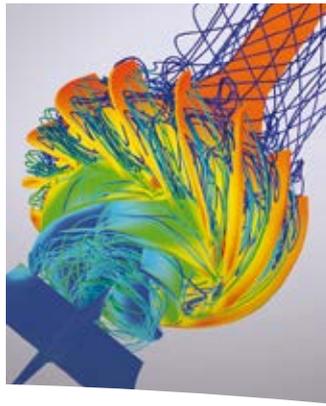


SIHI® LPH-X
Liquid Ring Vacuum Pumps





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.

Pump designs include:

- Single-stage process
- Between bearings single-stage
- Between bearings multistage
- Vertical
- Submersible motor
- Positive displacement
- Vacuum & Compressor
- Nuclear
- Specialty

Product Brands of Distinction

ACEC™ Centrifugal Pumps

Aldrich™ Pumps

Byron Jackson® Pumps

Calder™ Energy Recovery Devices

Cameron™ Pumps

Durco® Process Pumps

Flowserve® Pumps

IDP® Pumps

INNOMAG® Sealless Pumps

Lawrence Pumps®

Niigata Worthington™ Pumps

Pacific® Pumps

Pleuger® Pumps

Scienco™ Pumps

Sier-Bath® Rotary Pumps

SIHI® Pumps

TKL™ Pumps

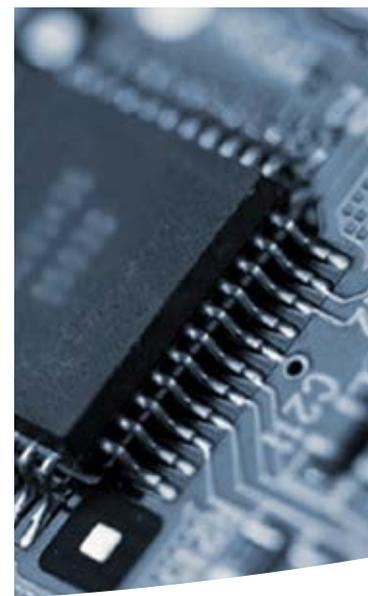
United Centrifugal® Pumps

Western Land Roller™ Irrigation Pumps

Wilson-Snyder® Pumps

Worthington® Pumps

Worthington Simpson™ Pumps



SIHI® LPH-X – Cool, robust and cost effective ...

Reliability, that has stood the test of time, ensures this generation of vacuum pump is positioned to tackle the most demanding applications. For almost 100 years SIHI® has maintained its innovative position as a leading supplier of liquid ring vacuum and liquid ring compressor technologies.

The comprehensive SIHI® range of liquid ring vacuum pumps is available in single and two stage designs, with suction capacity up to 12 000 m³/h (7063 cfm) and pressures in the range 33 (25) to 1013 mbar (760 Torr) without further boosting equipment. Additionally, the liquid-ring principle is also used as a compressor in which to generate positive pressures up to circa. 13 barg (188 psig).

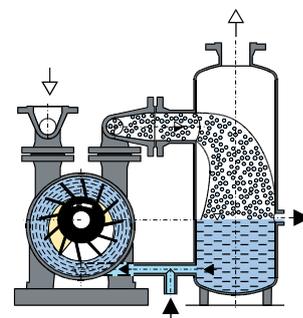
Lately, the SIHI® LPH-X has been introduced to the range in which to address the elevated demands of our developing customers. Improved maintenance, longevity, reliability, modularity, and performance all being considered within the design of this ultra-modern liquid-ring construction. Available in one and two stage variants the unit can operate at 50 Hz and 60 Hz speeds. Importantly, the SIHI® LPH-X offers the lowest cost of ownership.

Benefits

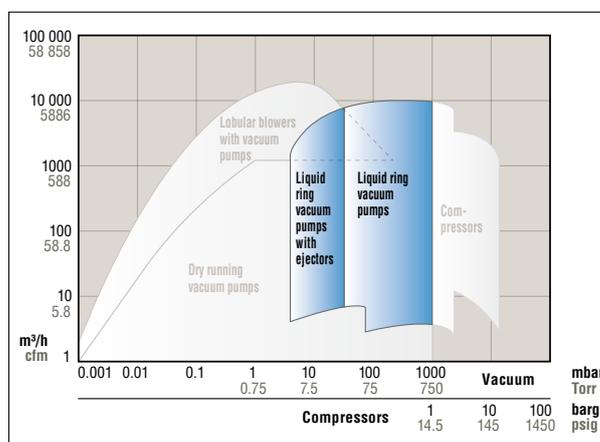
- Extremely robust
- Cool operation
- Superior liquid, vapour and solids handling
- High Volumetric flow-rate
- Simple maintenance
- Effective heat exchanger
- ATEX Category 1 without flame-arresters

Industries/Markets

- Chemical
- Pharmaceutical
- Plastics & Plastic
- Food
- Beverage
- Ceramics
- Medical
- Textile
- Pulp & Paper
- Printing
- Electronics
- and many more



Performance graphics





The SIHI® LPH-X range has been designed to incorporate the best features of the widely accepted LPHA range whilst improving the overall design, reducing part complexity and cutting life cycle costs. The benefits are lower maintenance, reduced requirement for spare parts, enhanced reliability and increased customer satisfaction.

Increased shaft stiffness for extended seal life

- Reduced distance between bearings

Secure component sealing

- O-ring seals
- Reduced number of sealing faces

Diverse material options

- Guide discs available in different materials
- Exotic materials available throughout

Benefits

- Certified for Category 1 and Category 2
- Enhanced performance range
- Ease of maintenance and low inventories of spare parts
- Space saving
- Short lead times and fast deliveries
- Ensures optimal solution for the application
- Ease of maintenance
- Complete solution

Simple installation & Integration

- Universal flanges: DIN/EN, ANSI, and JIS



Reduced internal wear

- Peripheral dirt drain permits continual liquid-ring cleaning

Drain

- Drain plug to empty the central bodies



“Drop in” replacement for the former LPHA range with key wear part interchangeability

Features

- Complies with ATEX legislation
- Single and two stage
- Modular construction
- Compact design
- Extensive range of sizes, materials and shaft sealings
- Seal accessibility



SIHI® LPH-X with single acting mechanical seal



SIHI® LPH-X with magnetic coupling



SIHI® LPH-X with double acting mechanical seal

Cavitation protection

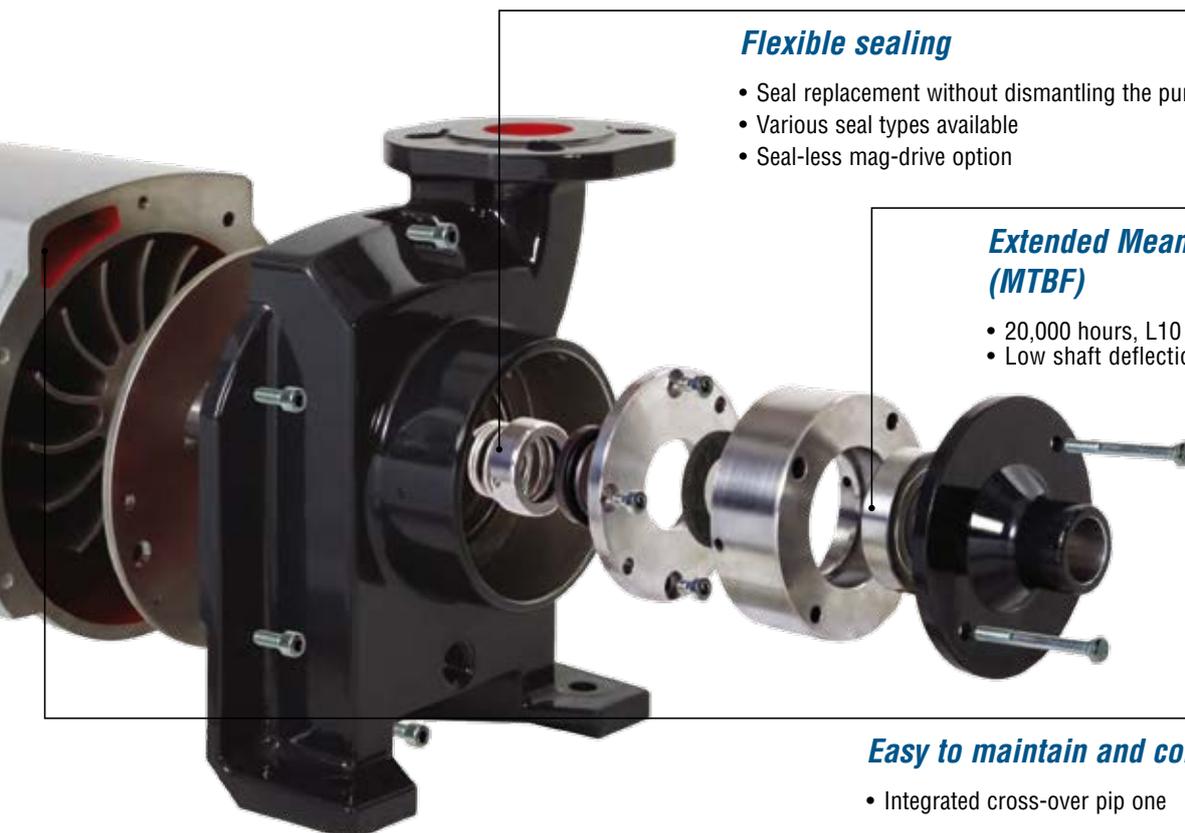
- Enhanced performance and reliability

Flexible sealing

- Seal replacement without dismantling the pump
- Various seal types available
- Seal-less mag-drive option

Extended Mean Time Between Failure (MTBF)

- 20,000 hours, L10 life - maintenance free bearings
- Low shaft deflection for longer seal life



Easy to maintain and compact

- Integrated cross-over pip one

Materials

| Item | Material of Construction |
|--------------|-------------------------------------|
| Casing | Grey cast iron, stainless steel |
| Central Body | Grey cast iron, stainless steel |
| Impeller | Cast steel, bronze, stainless steel |
| Guide Disc | Grey cast iron, stainless steel |
| Shaft | Chrome steel, stainless steel |

The Proven Vacuum Solution



The modular SIHI® LPH-X is an ideal choice for the most demanding vacuum applications. Near isothermal compression presents an opportunity to handle thermally sensitive, and explosive, media in a secure manner.

ATEX Category 1, without flame-arrestors underpins the wide-reaching flexibility of the liquid-ring principal together with low noise and its suitability for temperatures up to 170 °C (338 °F).

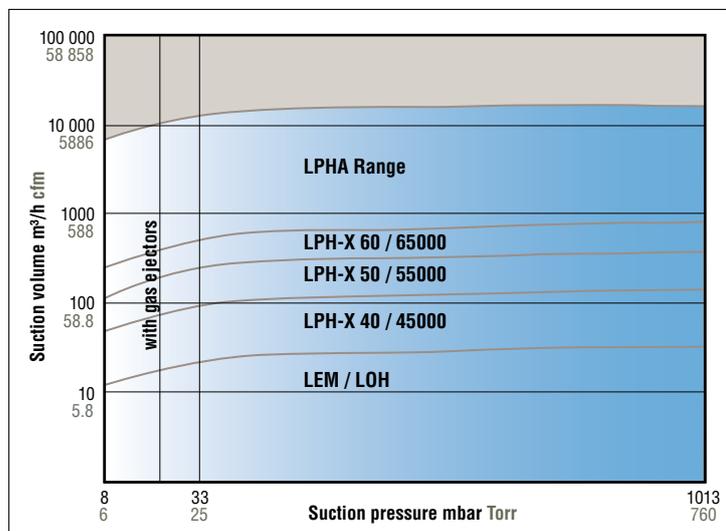
Water doesn't need to be the Liquid Ring...

- Water is conventional, clean, and accessible
- Hydrocarbons can be chilled to promote process-condensation for subsequent recovery

Typical Applications

- Distillation
- Drying
- De-gassing
- Filtration
- De-odorisation
- De-oxygenation
- Sterilisation
- Filling
- Product transfer
- Vapour recovery
- Priming
- Central vacuum systems

LPH Performance Range



LPH-X



LEM



Ejectors

**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

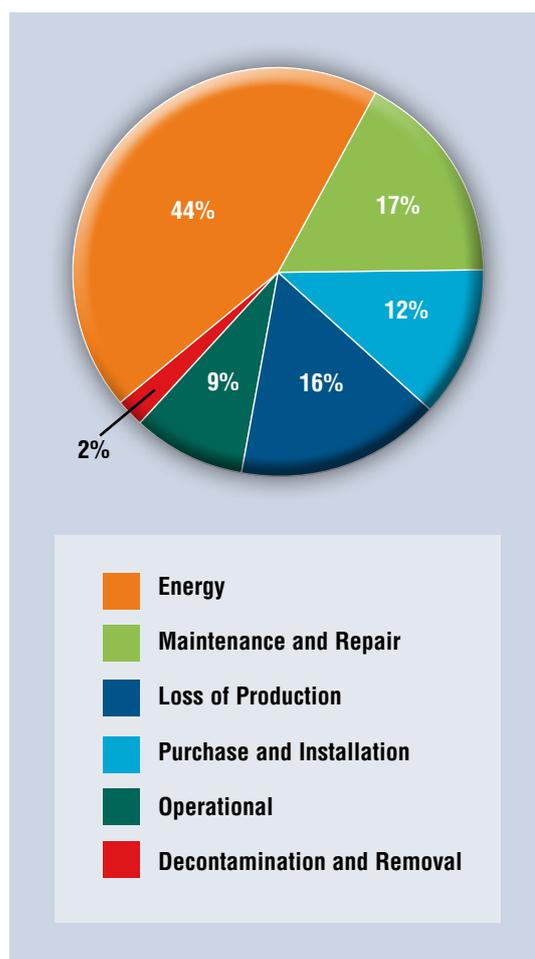
Operating Expenses

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

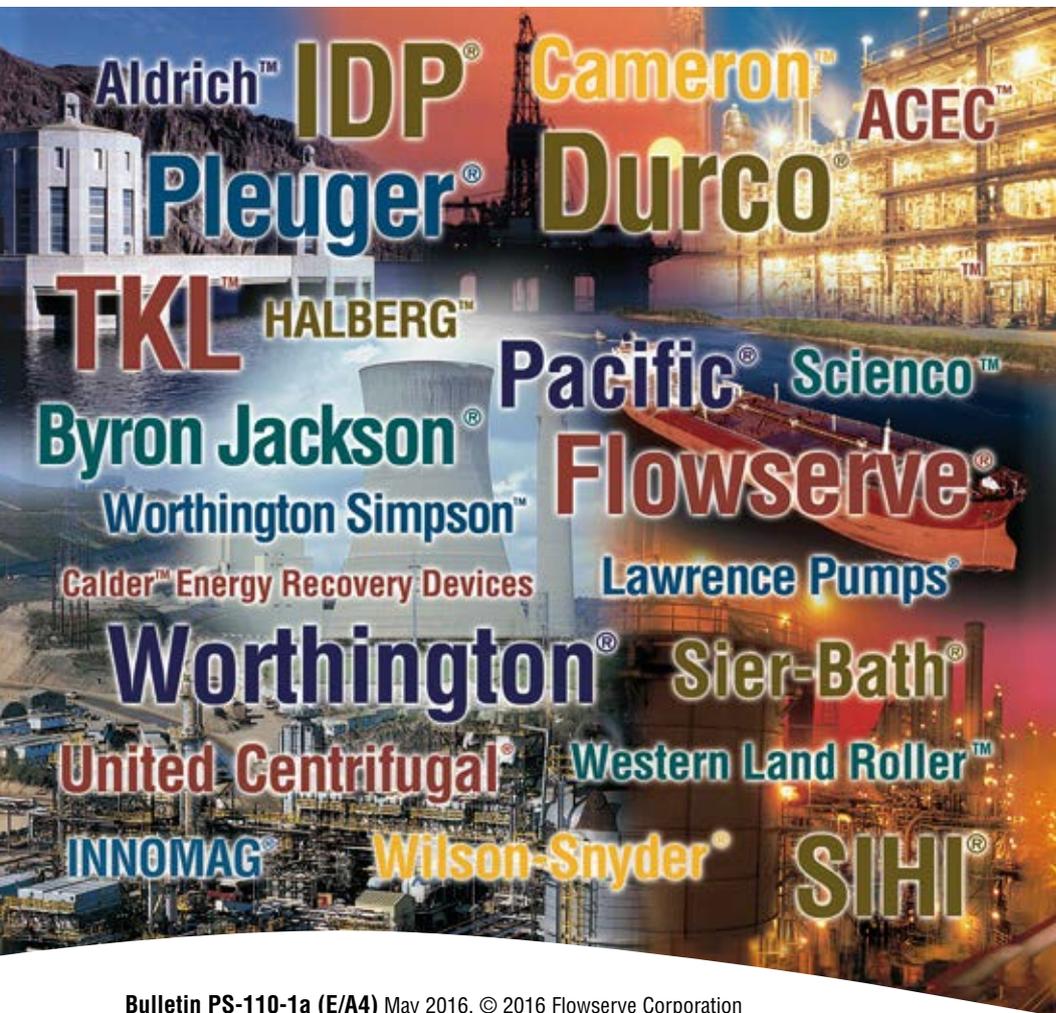
Innovative Life Cycle Cost Solutions

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

Typical Pump Life Cycle Costs¹



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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