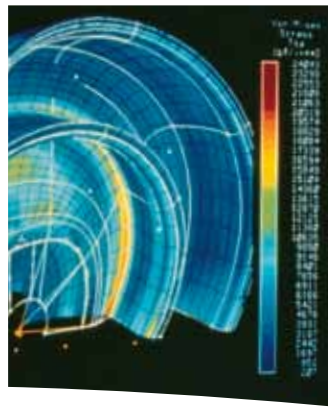




LPN
***API 610/ISO 13709 (BB1) Between Bearings,
Axially Split, Single-Stage, Double Suction Pump***



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.

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™ Centrifugal Pumps

Aldrich™ Pumps

Byron Jackson® Pumps

Calder™ Energy Recovery Devices

Cameron™ Pumps

Durco® Process Pumps

Flowserve® Pumps

IDP® Pumps

Lawrence Pumps®

Niigata Worthington™ Pumps

Pacific® Pumps

Pleuger® Pumps

Scienco™ Pumps

Sier-Bath® Rotary Pumps

TKL™ Pumps

United Centrifugal® Pumps

Western Land Roller™ Irrigation Pumps

Wilson-Snyder® Pumps

Worthington® Pumps

Worthington Simpson™ Pumps

LPN
Between Bearings,
Axially Split,
Single-Stage,
Double Suction Pumps
ISO 13709/API 610 (BB1)



The Fully Compliant API/ISO (BB1) Design for Medium Pressure Applications

Fully compliant with ISO 13709/API 610, latest edition, the Flowserve LPN axial split case, medium pressure pump features the side/side nozzle configuration preferred for hydrocarbon and water transfer applications. It's near-centerline mounting design makes the LPN ideal for the numerous refinery applications subject to ISO/API selection criteria for flammable or hazardous fluids with specific gravities greater than 0.70 and temperatures below 200°C (400°F). The LPN's double-suction impeller provides a low NPSH solution which single-suction overhung process pumps inherently cannot achieve. Maintenance of the LPN is simplified by the split case design which allows removal of the top casing half to easily service the rotor, seals and bearings without disturbing the bottom casing half or the installed piping system.

Engineered Performance and Reliability

Consisting of a double-suction impeller operating in a double volute casing, the LPN's design inherently results in optimal axial and radial thrust balance over the pump's entire operating range.

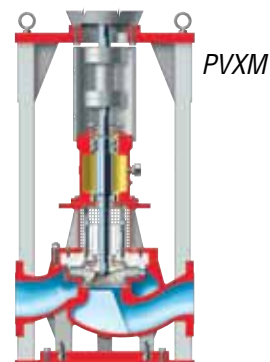
- Double-suction impeller provides hydraulic axial balance and is designed for maximum hydraulic efficiency.
- Double volute design minimizes hydraulic radial loads, even at minimum flow.
- Stiff shaft design ensures trouble-free performance by operating under the first critical speed.
- Extensive hydraulic coverage

Applications

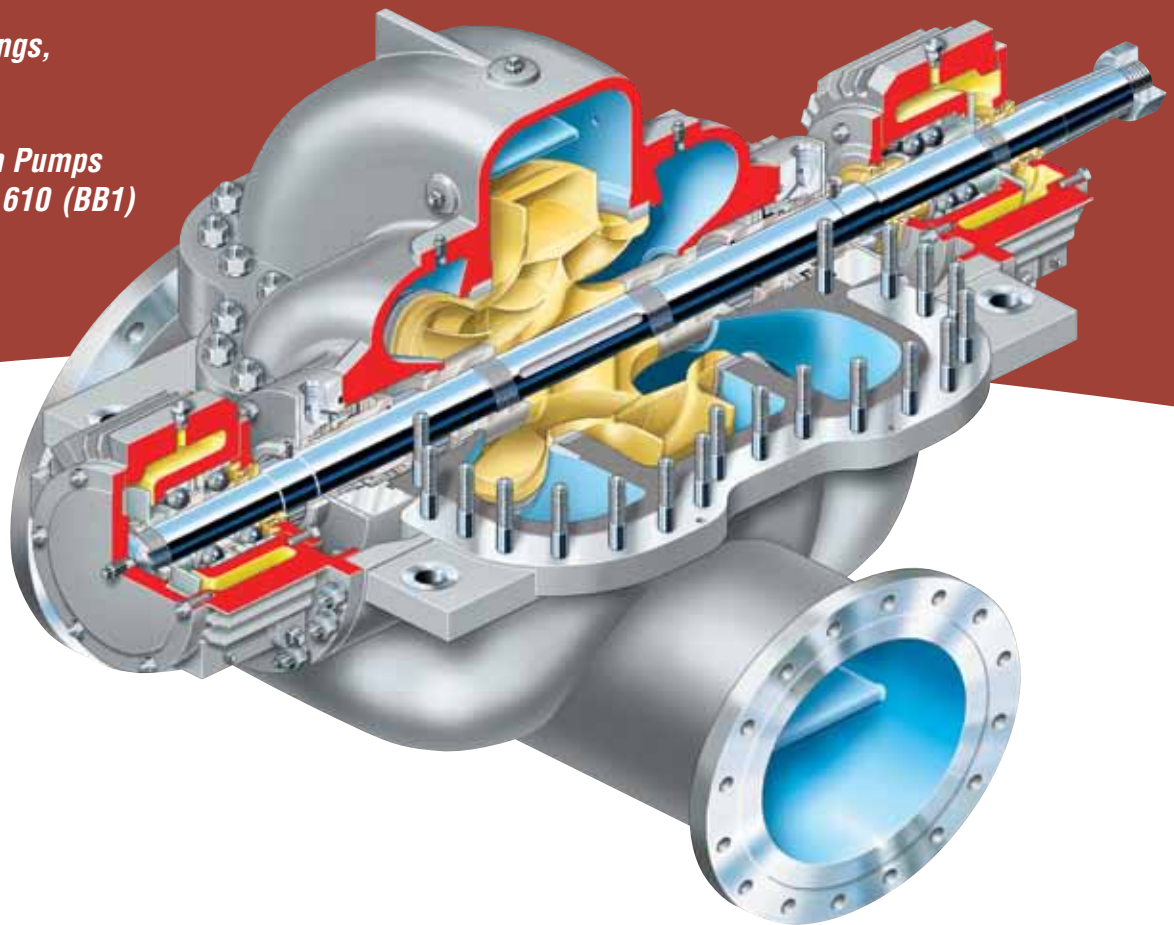
- Hydrocarbon and water transfer
- Petroleum refining, production and distribution
- Petrochemical and heavy-duty chemical processing
- Hydrocarbon and water pipeline
- Power generation
- Gas scrubbing
- Firefighting
- Cooling water

Complementary API 610/ISO 13709 Pump Designs

- DVS and DVSH (BB1) axially split, single-stage, double-suction pumps
- UZDL (BB1) two stage, axially split pump
- HDX (BB2) radially split, double-suction process pump
- HED-DS (BB2) radially split, double-suction, two-stage pump
- PVXM (OH3) vertical in-line diffuser process pump with bearing housing
- HPX (OH2) process pump



LPN
*Between Bearings,
 Axially Split,
 Single-Stage,
 Double Suction Pumps*
ISO 13709/API 610 (BB1)



The Flowserve LPN is an axially split, single-stage pump designed to ISO 13709/API 610 (BB1), latest edition. With a double-suction impeller, the LPN is a natural solution for many low NPSH applications, such as those found in water and hydrocarbon transfer service.

Operating Parameters

- Flows to 15 000 m³/h (65 000 US gpm)
- Heads to 250 m (800 ft)
- Pressures to 25 bar (365 psi); 50 bar (725 psi) on the high pressure LPN-H model
- Temperatures to 204°C (400°F)

Features and Benefits

Double Volute, Axially Split Casing Design minimizes hydraulic radial forces in any condition down to the minimum flow, thus reducing shaft deflection and increasing the life of bearings, seals and wear rings.

Near Centerline Mounting provides superior pump alignment and performance at elevated temperatures.

Suction and Discharge Nozzles are integrally cast in the lower half casing to permit pump disassembly without disturbing the piping. Nozzles are designed to handle external forces and moments equal to or in excess of ISO 13709/API 610 specifications.

Confined Gasket Design allows metal-to-metal contact for proper gasket compression and eliminates corrosion of bolts and nuts.

Raised Face Flanges meet ASME B16.5 standards and are available in Class 150 (PN 20) and 300 (PN 40).

Renewable Casing and Impeller Wear Rings are standard, permitting continued high operating efficiency. Clearances are per ISO/API requirements.

Double-suction Impeller provides hydraulic axial balance and allows minimal NPSHR. The complete rotor assembly is dynamically balanced to assure vibration-free operation as per ISO/API requirements.

ISO 21049/API 682 Seal Chambers operate at suction pressure and allow for installation of cartridge style single, dual unpressurized and dual pressurized mechanical seals to meet safety and environmental requirements.



Multiple Bearing Designs to Suit Application Needs

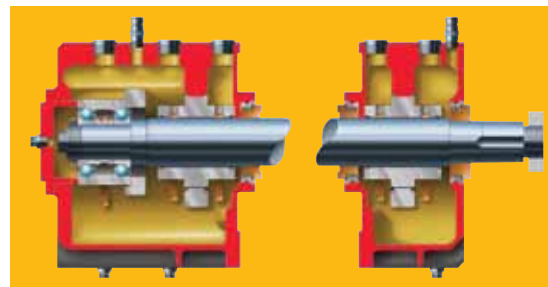
The LPN is offered with a variety of bearing designs to meet application requirements. The standard radial bearings are self-aligning, antifriction type configured in a double row. The thrust bearing also is antifriction and is of the dual, single row, angular contact type. Standard lubrication is via an oil slingers system. This system prolongs bearing life by ensuring oil penetrates the bearings without foaming.

Optional bearing designs include the following:

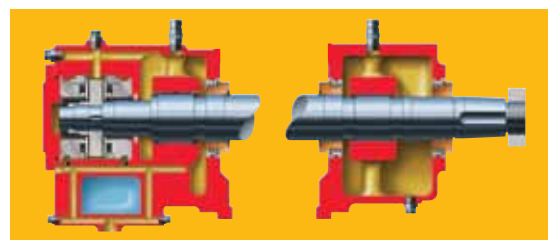
- Split sleeve radial and ball thrust
 - Applied to energy density (= power x rated speed) ratings of 4.0 million (= kW x rpm) or 5.4 million (= hp x rpm) maximum
 - Standard for applications where thrust bearing speed and life for rolling element bearings are within ISO 13709/API 610 limits
- Split sleeve radial and tilting pad thrust with forced feed lubrication
 - Applied when energy density ratings and bearing speed or life is beyond the limits for rolling element bearings as defined by ISO 13709/API 610
 - Tilting pad forced feed lubrication system may be pump shaft-driven or via separate lube pumps.

Bearing Housing

The LPN's carbon steel bearing housing features 180° bolting to heavy-duty mounting brackets to facilitate bearing maintenance. The bearing housing comes standard with labyrinth seals. Optional bearing isolators provide superior sealing to retain oil and exclude atmospheric contaminants and moisture.



Split Sleeve Radial and Ball Thrust



Split Sleeve Radial and Tilting Pad Thrust

Bearing Lubrication Systems

- Slinger with ball/ball
- Ring oil with sleeve/ball
- Pressure lubricated with sleeve/tilting pad

Bearing Cooling Options

- Fan cooling
- Water cooling
- Product cooling



**Options and
Technical Data**



Pump Packages

Pump packages are provided to specification and include lube oil piping, seal system, monitoring instruments and drive train mounting.

Baseplate Designs

Engineered to contract requirements, baseplate designs may include any of the following:

- Conventional welded steel suitable for grouting
- Skid-type, non-grouted
- Three-point support design
- Pre-grouted

Pumps mounted with engine or turbine drivers as well as multiple pump modules also are available.

Available Configurations

LPN-V Vertical Mounting Configuration

Flowserve offers the vertically mounted version of the LPN called the LPN-V. With its suction and discharge in-line, the LPN-V's footprint is small, making it ideal for use where installation space is limited.

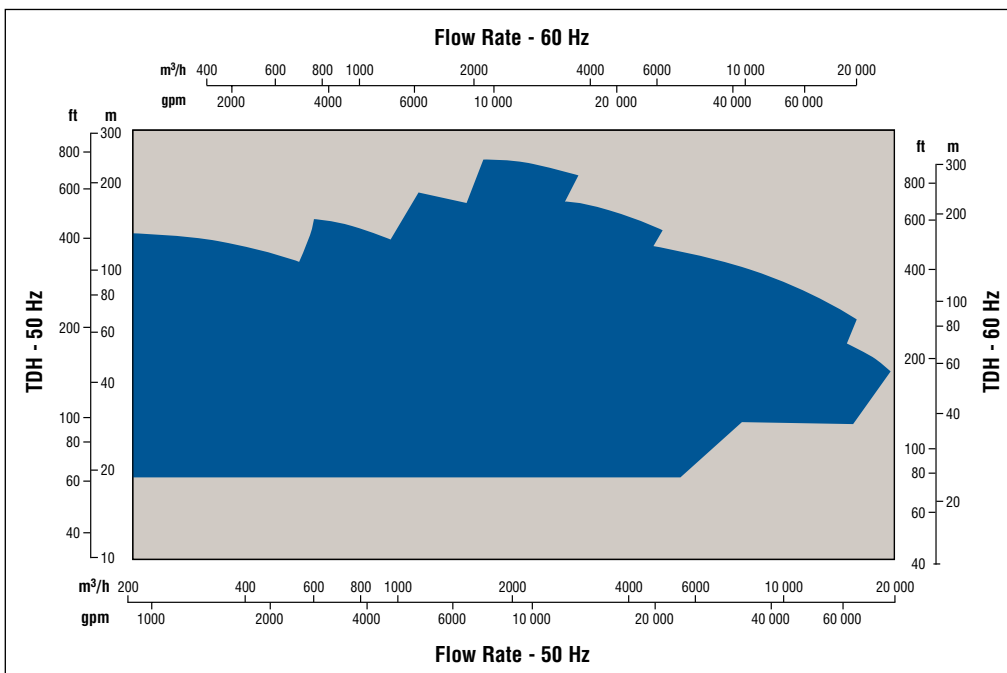
LPN-H

The LPN-H is a high-pressure version of the LPN pump. Featuring a high-pressure casing and the same hydraulics as the LPN, the LPN-H is capable of pressures to 50 bar (710 psi).

Rotation Options

- CCW (standard)
- CW

LPN Range Chart



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

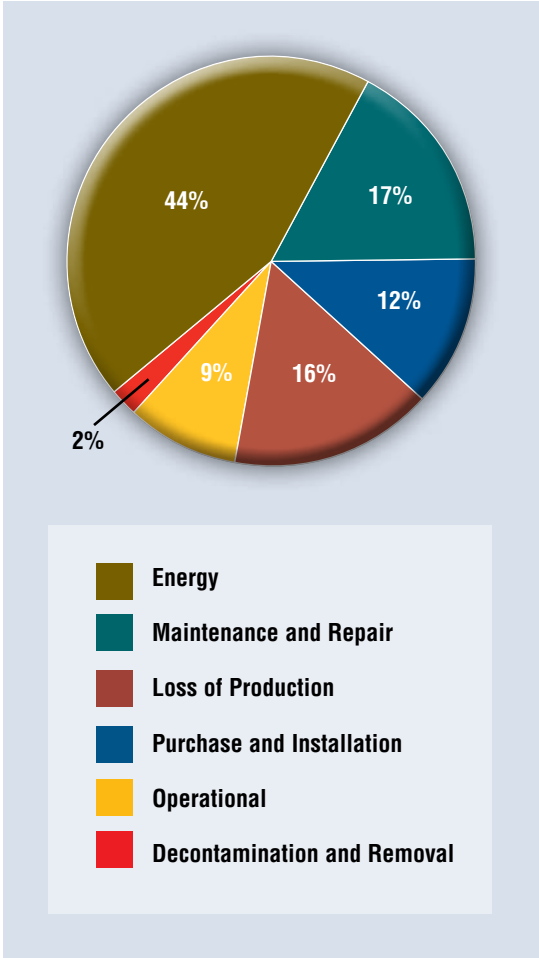
Operating Expenses

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

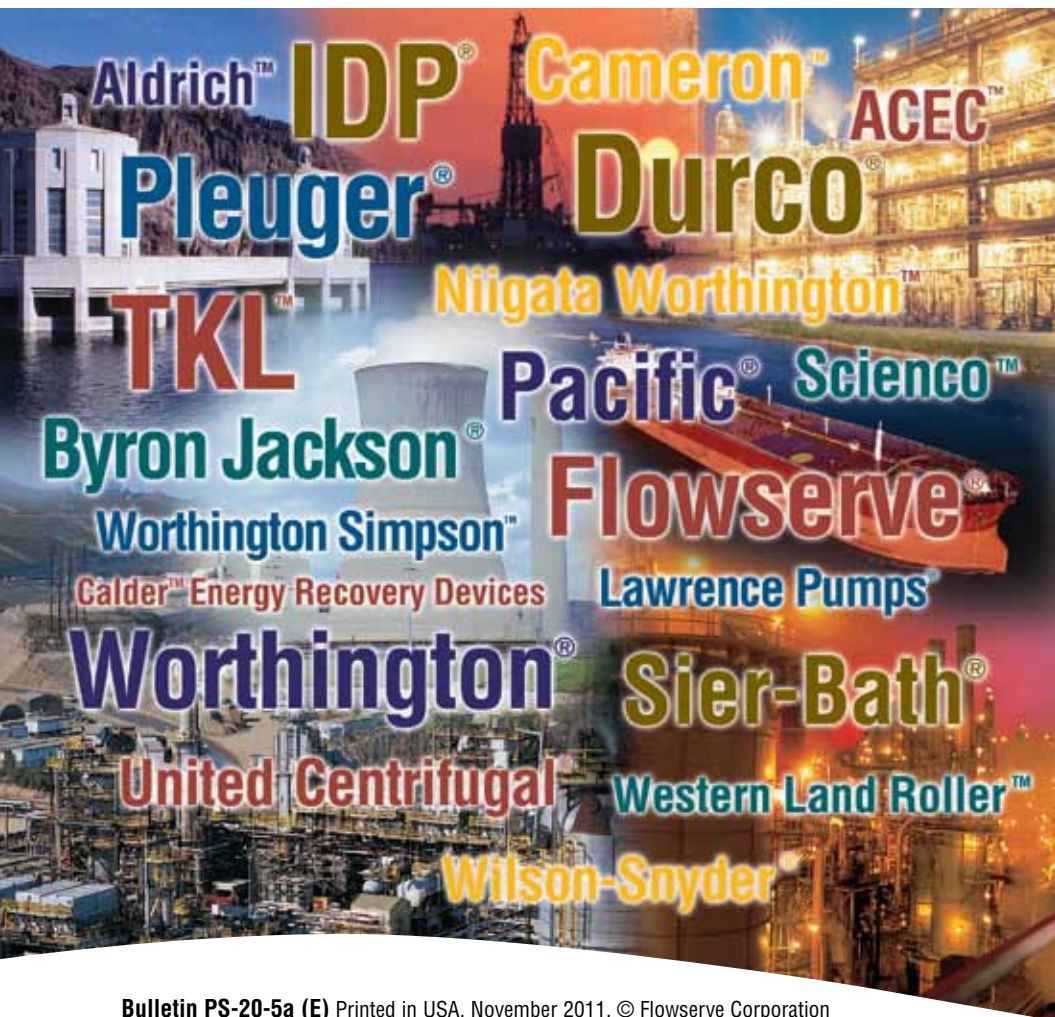
Innovative Life Cycle Cost Solutions

- 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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