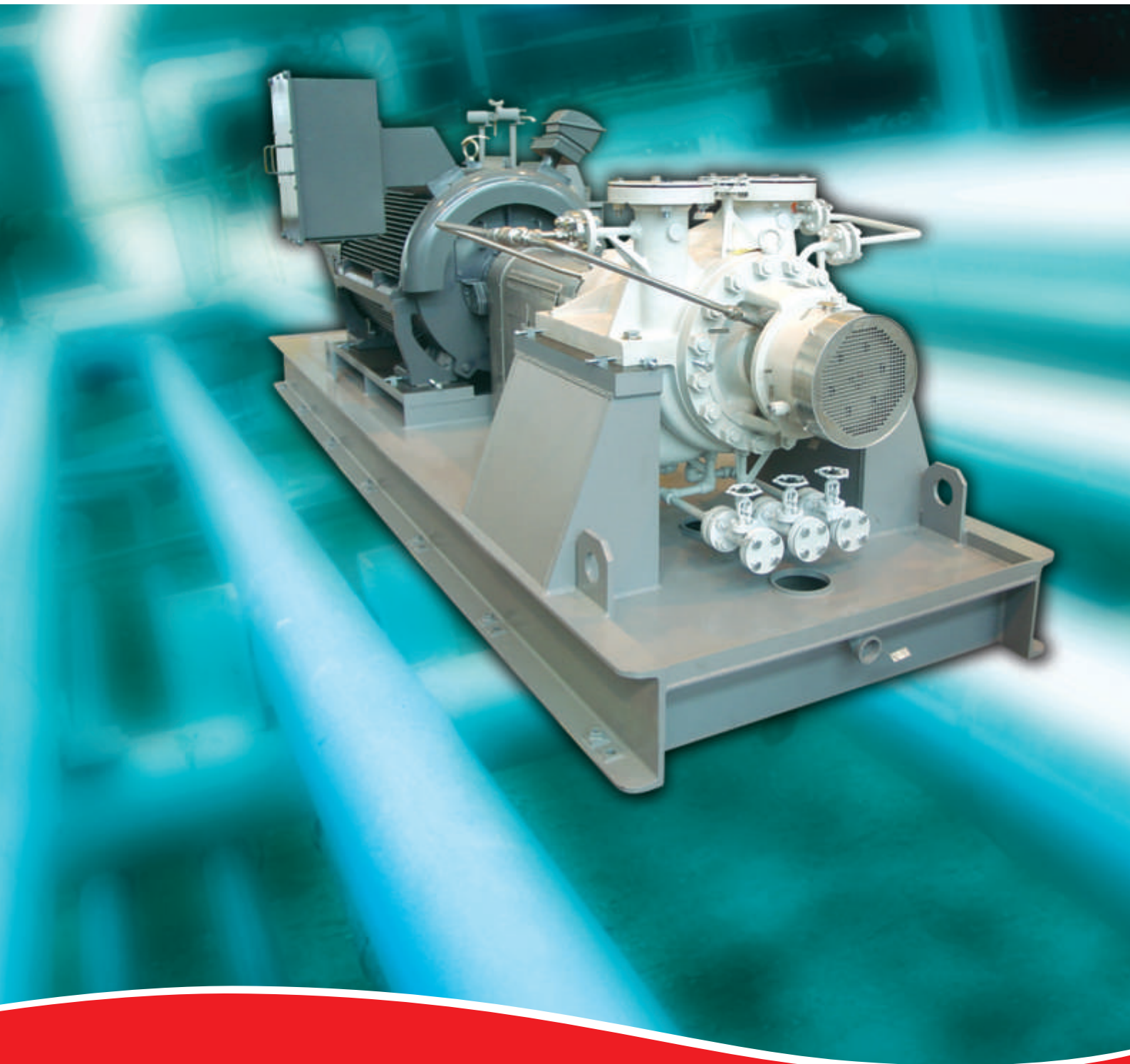
FLOWSERVE

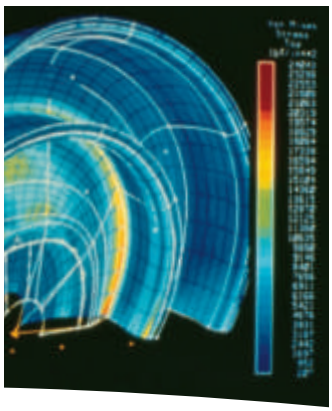
HED & HED-DS

API 610 (BB2) Between Bearings, Two-Stage, Radially Split Pumps



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.

Pumping Solutions

Flowserve is providing pumping solutions which permit customers to continuously 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 inquiry.

Dynamic Technologies

Flowserve is without peer in the development and application of pump technology, including:

- Hydraulic engineering
- Mechanical design
- Materials science
- Intelligent pumping
- Manufacturing technology

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 bearing single stage
- Between bearing multistage
- Vertical
- Submersible motor
- Rotary
- Reciprocating
- Nuclear
- Specialty

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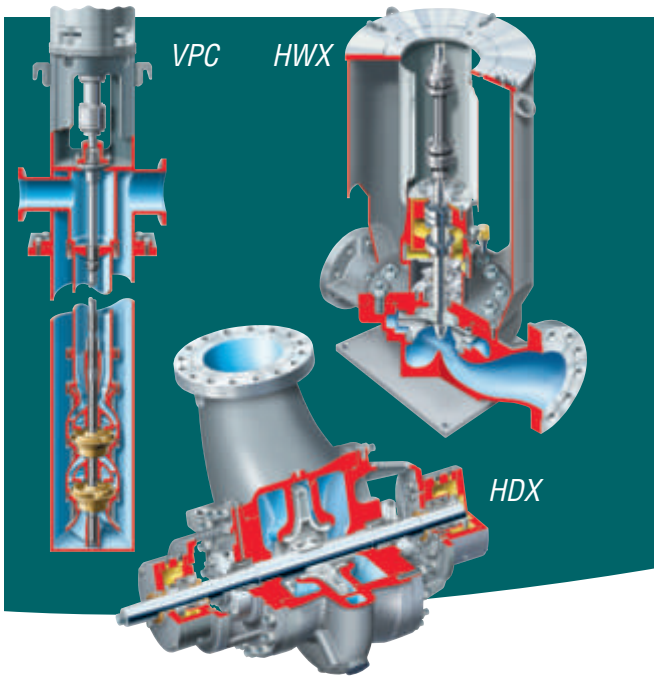


Serving High-Pressure Process Needs

The HED family of two-stage, radially split pumps is particularly well suited for high-temperature process applications, such as those found in hydrocarbon processing, power and specialty services. This family of pumps fills the performance range between the single-stage HDX pump and multistage, double-case pumps.

Available with either a single- or double-suction, first-stage impeller, the pumps feature heavy-duty, single or dual volute casings with a staggered arrangement for extended pump reliability and life.

Meeting Industry Needs

The HED and HED-DS are fully compliant with API 610 (BB2) standards. The pumps incorporate all of the design requirements specified by the demanding hydrocarbon processing and power industries. These include:

- API 610 specified nozzle loads and shaft run-out requirements
- API 682 mechanical seal chambers
- Centerline-mounted casing
- Bearing options
- Materials options
- Control and monitoring systems
- Low NPSH capabilities

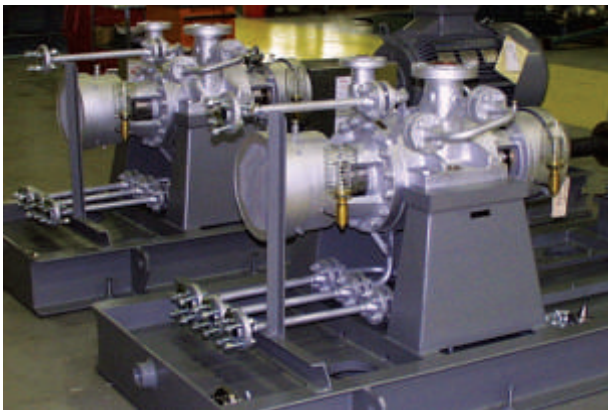
Broad Application

- Petroleum refining, production and distribution
- Heavy-duty chemical and petrochemical processing
- Liquefied gas industry service
- Boiler feed
- Heavy-duty utility service

Complimentary Pump Designs

Type HED and HED-DS pumps may be used with many other Flowserve pump designs, including:

- Radially split, overhung process pumps
- Single stage, between bearings pumps
- Multistage, between bearings pumps
- Vertical, double-case pumps



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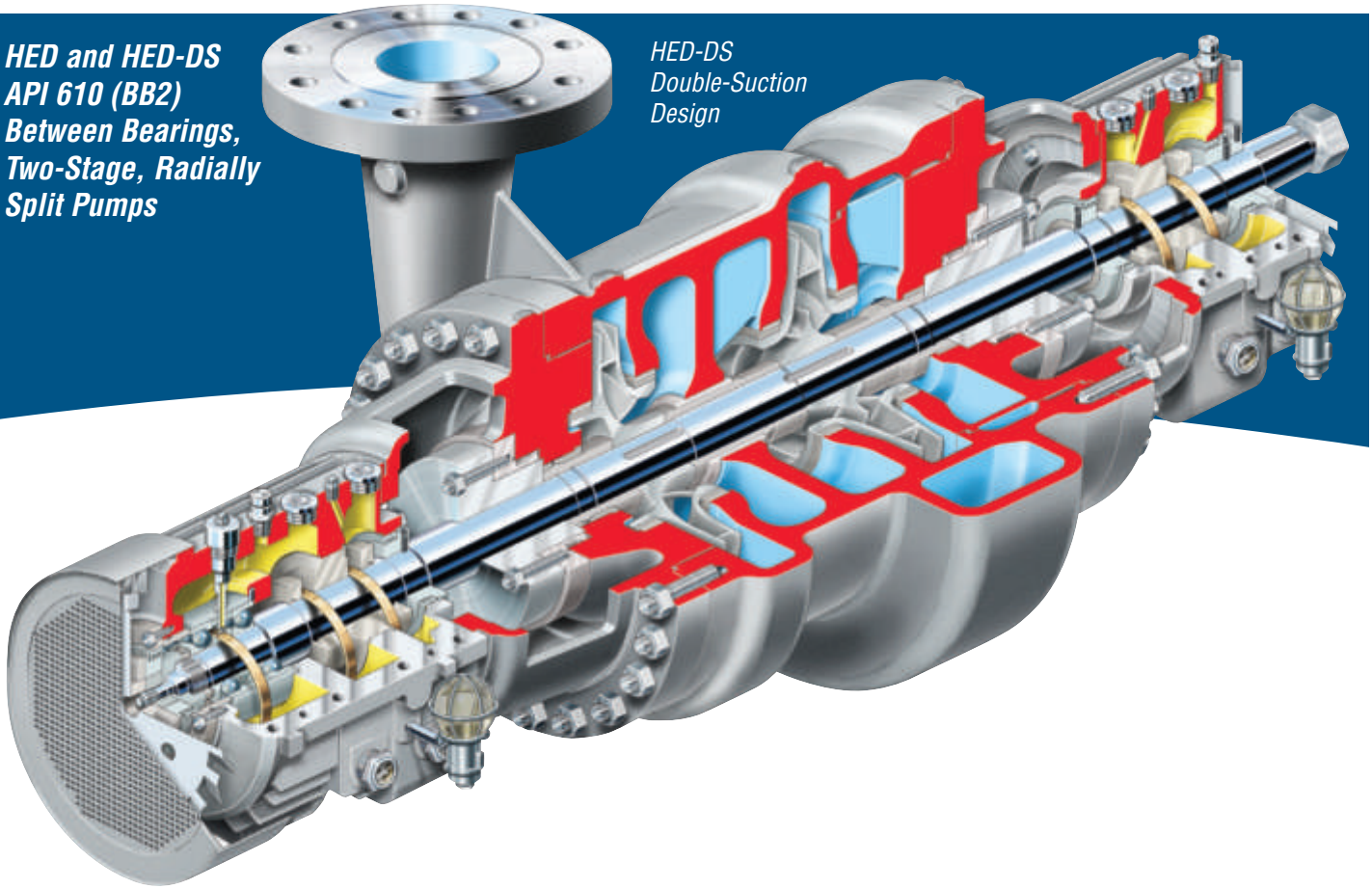


HED-DS Double-Suction Design

Fully compliant with the latest edition of API 610 (BB2), the Flowserve HED pump is a between bearings, radially split, two-stage, single-suction hydrocarbon processing pump. The similarly configured HED-DS boasts a double-suction, first-stage impeller for services with very low NPSHA or higher flow rates. Both pumps are CE compliant and engineered to provide safe, reliable operation in the elevated temperatures experienced in refining and power applications.

Operating Parameters

- Flows to 2000 m^3/h (8500 gpm)
- Heads to 750 m (2500 ft)
- Pressures to 80 bar (1200 psi)
- Temperatures to 450°C (840°F)
- Speeds to 3600 rpm
- Specific gravities down to 0.35

Double Casing Covers *facilitate maintenance. Gasketing is metal-to-metal fit, fully confined and controlled compression to ensure proper sealing and alignment when handling hot liquids*

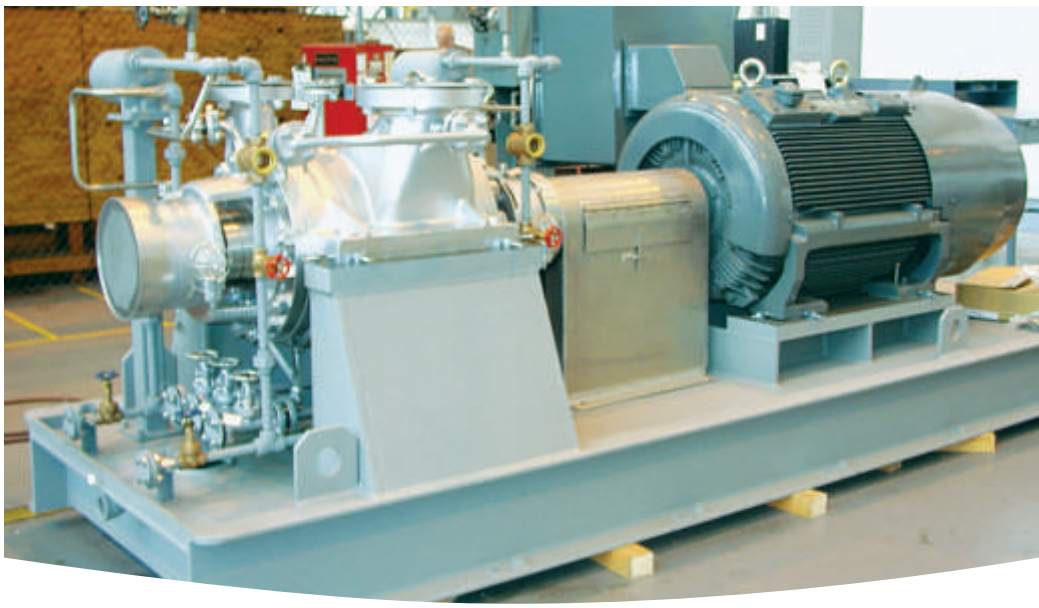
API 682 Seal Chamber *accommodates a wide variety of seal configurations, including dual pressurized and unpressurized cartridge types for the most severe services. A full complement of API 610 seal flush plans is available. Seal chambers are maintained at comparable pressures by a pressure equalizing line fitted on the discharge side chamber*

Raised Face Flanges *meet ASME B16.5 criteria for Class 600. Surface finish is in accordance with API 610. Class 300 and 900 flanges are available upon request*

Renewable Casing and Impeller Wear Rings *are secured by locking pins or threaded dowels. Wear rings economically restore pump efficiency and maintain operational stability. Optional non-metallic wear rings are available in PEEK and other specialty materials*

Cartridge Seal Mounting *ensures precise seal face setting for maximum seal life while easing maintenance*

HED and HED-DS pumps incorporate all of the design requirements specified by the demanding hydrocarbon processing and power industries.



Dual Volute Construction

The HED and HED-DS feature heavy-duty casings with either single or dual volute staggered arrangement construction. Both configurations ensure radial balance over the full operating range. Detrimental shaft deflection and vibration are virtually eliminated.

Dynamically Balanced Impellers

Precision cast impellers are dynamically balanced to reduce vibration and ensure hydraulic efficiency.

- Impellers are positively locked to the shaft to eliminate vibration
- Ceramic core casting technology produces incredibly smooth passages, improving pump efficiency
- Face-to-face impeller mounting of the HED results in axial thrust balance over the entire operating range of the pump
- The double-suction, first-stage impeller of the HED-DS minimizes axial thrust problems, reduces NPSH requirements and allows mechanical seals to operate at equal and low pressure

Oil-Lubricated Bearings

Bearings are lubricated by means of a slinger or ring oil system. This lubrication system prolongs bearing life by ensuring the oil penetrates the bearings without foaming.

- Standard single row, self-aligning radial bearing
- Standard dual single row, back-to-back thrust bearings
- Optional bearing arrangements and lubrication system are available to meet application requirements

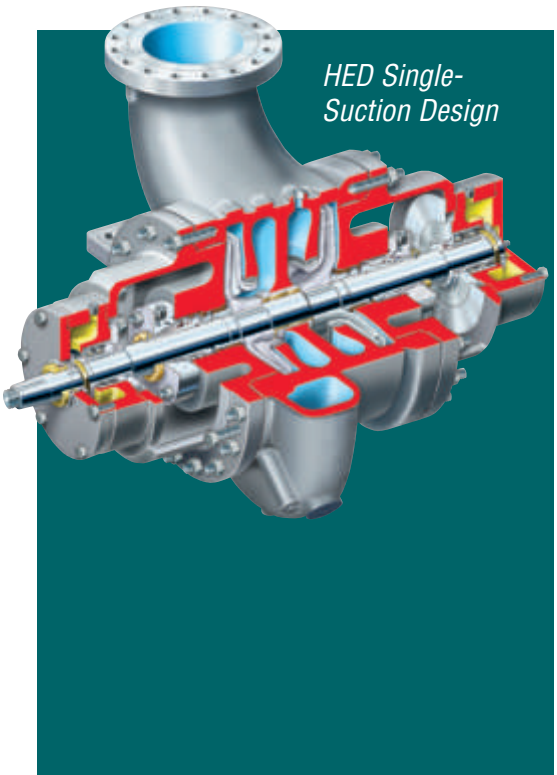
Carbon Steel Bearing Housing

With standard labyrinth type oil seals, the carbon steel bearing housing is designed with 360° bolting to the mounting bracket.

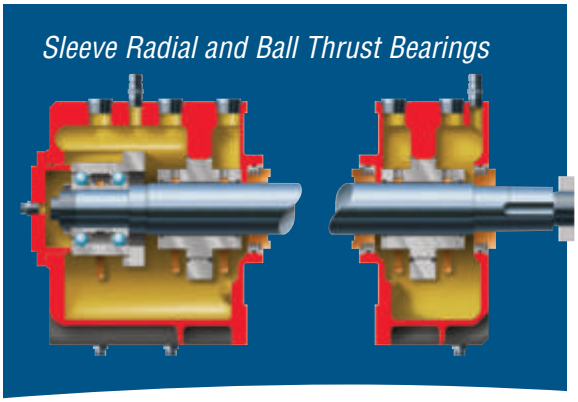
- Available bearing isolators prevent oil loss and contamination
- Optional fan-cooled bearing housing permits use in extreme temperatures without water cooling systems

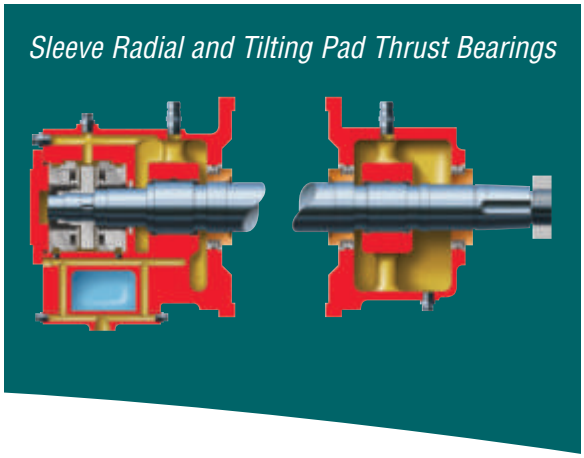
Stiff Shaft Design

Stiff shafts ensure trouble-free operation below the first critical speed. A short bearing span and a heavy shaft minimize deflection under all operating conditions.



Options and Technical Data





Bearing Options

- **Sleeve Radial and Ball Thrust Bearings**
  - Applied to maximum energy density (= power x rated speed) ratings of 4.0 million kW-rpm or 5.4 million hp-rpm
  - For applications in which thrust bearing speed and life for rolling element bearings are within API 610 limits

- **Sleeve Radial and Tilting Pad Thrust Bearings**
  - Applied when energy density ratings and bearing speed or life is beyond the limits for rolling element bearings as defined by API 610
  - Tilting pad thrust bearings normally require an external forced lubrication system. Pump shaft driven or separate lube pumps available

Shaft Options

- Hydraulic-fitted coupling
- Double extended

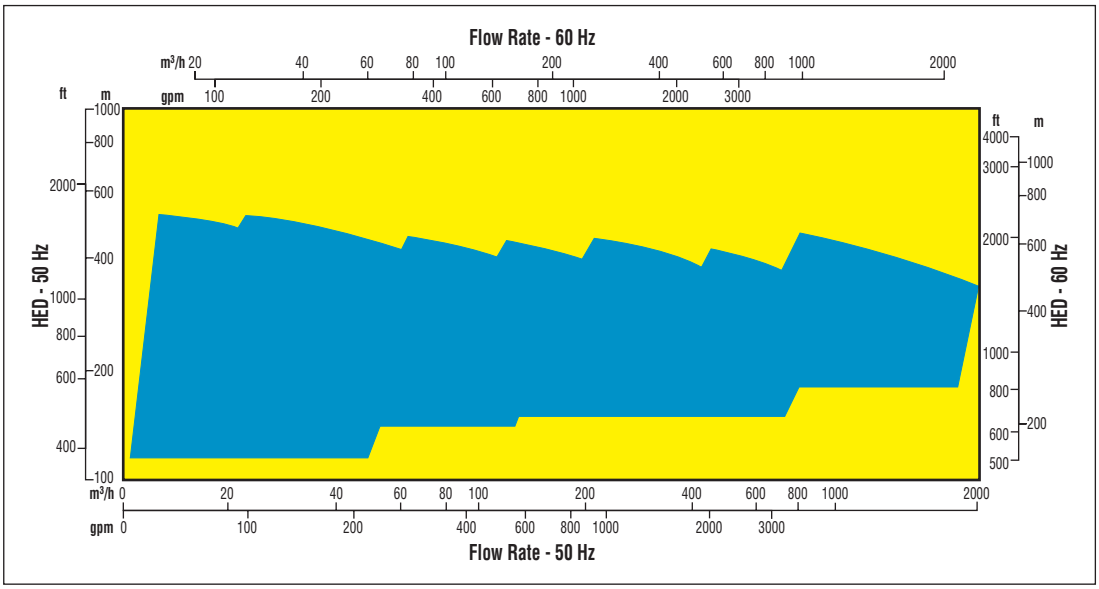
Available Baseplates

- Welded steel with drain rim or pan
- Sub-base under pump only
- Skid type non-grouted
- Three-point design
- Pregrouted design

Other Options

- Pure or oil mist bearing lubrication
- Water- or fan-cooled bearings
- Coatings for slurry services
- Coke crusher construction

HED Range Chart



Global Service and Technical Support

Service Dedication

Flowserve Engineered Services focus on providing customers with uncompromising service and support, where and when needed. Dedicated to delivering the highest quality support, Engineered Services integrate pump and materials engineering knowledge with creative service solutions.

A worldwide network of service and repair centers staffed by highly skilled engineers and technicians is available around the clock, seven days a week to respond to customer queries, to evaluate and troubleshoot problems and to provide reliable solutions.

Strength of Experience, Commitment to Excellence

Flowserve has long served industries requiring superior equipment performance and service life.

- Oil and gas production
- Hydrocarbon processing
- Chemical processing
- Water resources
- Power generation
- Nuclear
- Mining and mineral processing
- Pulp and paper
- General industry

Flowserve is dedicated to maximizing equipment performance and providing reliability-centered maintenance programs for pumps and related equipment, regardless of manufacturer. Using the FlowStar.net™ asset management software, Flowserve engineers and technicians track performance and support improvement programs using a service life cycle cost business approach. The results are improved reliability and increased profitability.

Business Partner

Flowserve partners with customers to respond to the dynamic business conditions that affect them. Flowserve will work with customers to drive efficiency, maximize throughput and control process quality. Whether user needs involve on-site technical assistance or broader project planning with full turnkey responsibility, Flowserve Engineered Services will deliver professional, reliable results.

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