



***MSP***  
***Vertical, In-line,  
Medium Speed  
Pump***

## 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:

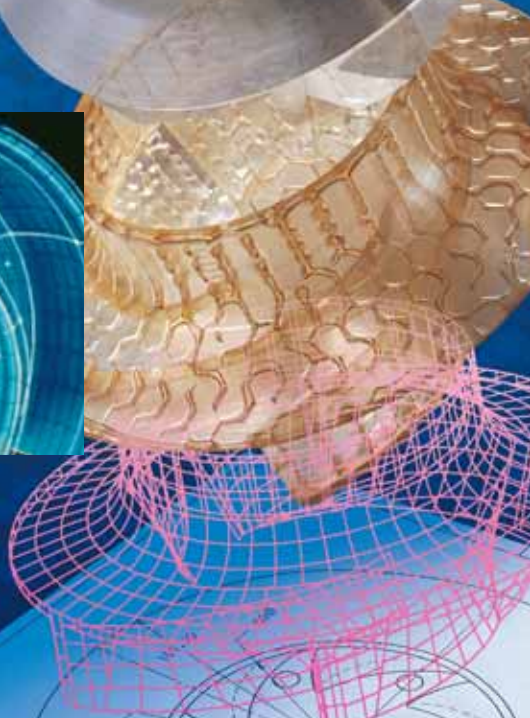
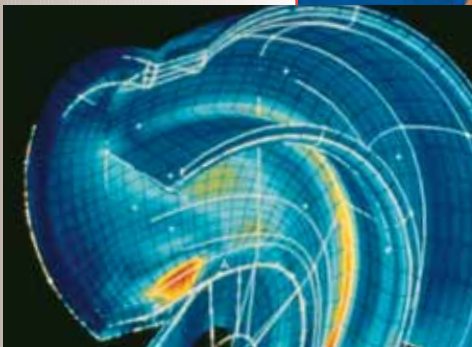
- Hydraulic engineering
- Mechanical design
- Materials science
- Intelligent pumping
- Manufacturing technology

### 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



**Type MSP**  
**Medium Speed**  
**Pump With**  
**Variable Frequency**  
**Technology**

**Innovative Design**

Closely following API 610, 8th Edition design criteria, the MSP is a vertical, in-line, single stage, medium speed pump. It offers exceptional performance and operating benefits.

- Hydraulics specifically designed for low flow, high head applications
  - Modified concentric volute to minimize radial forces
  - Radial vaned impeller with balance holes to minimize axial forces

- Medium speed induction motor with variable frequency drive for optimal BEP and adaptability in a wide range of changing service conditions
  - Pump control by motor frequency adjustment or integrated PI controller
  - EExd (e) II C T4, IP 55, motor design for hazardous environments
  - Complete electronic-electrical package and customized control solutions available

**Broad Application**

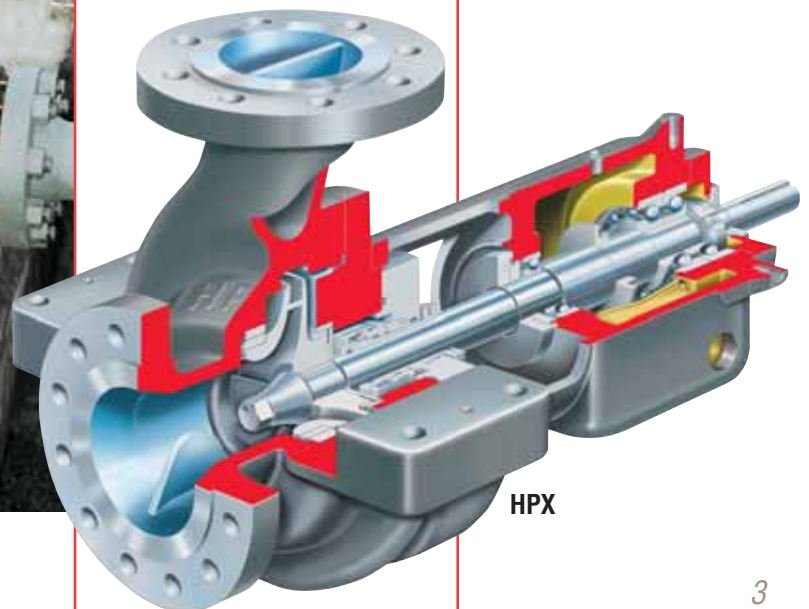
MSP pumps may be applied in low flow, high head applications in:

- Power generation
- Oil production and transportation
- Hydrocarbon processing
- Petrochemical and chemical processing
- General industry

**Complementary Pump Designs**

MSP pumps may be used with other Flowserve pumps of API design. These include:

- Petroleum process pumps
- Horizontal, between bearing pumps
- Vertical pumps
- Specialty pumps



**Type MSP**  
**Medium Speed**  
**Pump With**  
**Variable Frequency**  
**Drive**

Flowserve's MSP design brings a new level of sophistication to low flow, high head pump technology. Featuring a medium speed induction motor with a range from 2000 rpm to 8000 rpm, the MSP delivers peak efficiency, excellent economy, simplified installation and reduced maintenance.

**Design Features**

- Advanced low flow, high head performance
- Variable speed motor-pump control
- Soft-starting of electric motor
- Elimination of step-up gearbox and lubrication
- Elimination of throttling, bypass or control valves
- Easy integration into main process control circuit
- Complete electronic-electrical packages for quick connection to power supply
- Customized control solutions including programmable minimum flow protection

**Variable Frequency Drive**

Reduced energy cost is achieved as no energy is wasted for throttling and the pump is running at or close to BEP. Other benefits include:

- Elimination of gearbox
- Optimal pump performance over a wide range of service conditions
- Manual control by selecting desired speed
- Optional, integrated PI controller to adjust pump performance in response to physical parameters like pressure or flow rate (Example: speed regulation based upon a pressure set point can easily be established, thus eliminating the need for a throttling control valve.)

**Typical Applications**

Low flow, high head requirements in:

- Power Generation
  - Boiler feedwater
  - Condensate
- Oil & gas production and hydrocarbon processing
  - Feed
  - Recycle
  - Charging
  - Transfer
- Chemical processing and general industry
  - Transfer
  - Wash down and cleaning services

**Options**

- Inducer for lower NPSHR
- Horizontal configuration
- Two stage opposed impeller configuration
- Materials
  - CA6NM
  - Carbon steel
  - 316 stainless steel
  - Duplex stainless steel

**Operating Parameters**

- Temperatures from -40°C (-40°F) to 200°C (392°F)
- Pressures to 100 bar (1450 psi)
- Maximum suction pressure to 40 bar (580 psi)
- Operating speeds from 2000 rpm to 8000 rpm
- Maximum flow at 8000 rpm
  - 25 m<sup>3</sup>/h (110 gpm)
- Maximum head at 8000 rpm
  - 900 m (2950 ft)





**Variable Speed** ensures consistent BEP performance. It achieves system fluid demand without throttling for significant energy savings. Changing operating conditions are addressed by simple speed adjustment

**Variable Frequency Drive** includes all safety features.

- Choice of speed control or PI controller for easy process control implementation
- Numerous control options for exact requirements of system configuration

**Rigid Coupling** ensures precision shaft alignment while eliminating time-consuming manual alignment.

- No need for gear box and lubrication
- Lifetime lubricated bearings for most applications

**Vertical In-line Design** permits easy pump installation and mechanical seal access

**Special Hydraulics** provide efficient low specific speed hydraulics for low flows at high heads.

- Modified concentric volute and impeller with balance holes for minimal radial and axial force, respectively
- Open impeller with deep scallops for superior axial thrust control
- Compliance with API 610 bearing life requirements

**Variable Speed Motor** is EExd (e) II C T4, IP55, explosion-proof, medium speed with grease lubricated, ball bearings

**Mechanical Seals** are available in single or dual cartridge design.

- Single seals with API Plans 11 or 23 for seal face flushing
- Dual seals with API Plans 11/52 or 53

**Impeller Sub-Shaft** allows wide range of materials for wetted shaft

**Options and Technical Data**



**MSP2 Two Stage Design**

Two stage opposed impeller configuration limits axial thrust and is particularly well suited for very high head applications.

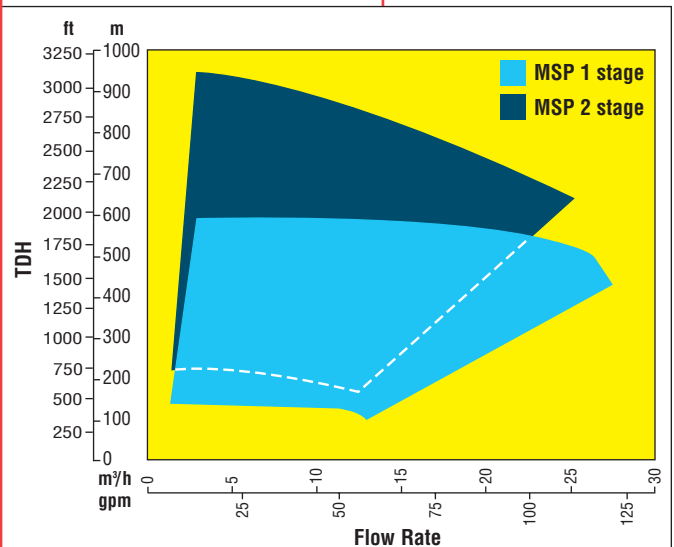
**Horizontal Configuration**  
While primarily designed for vertical in-line installation, a horizontal end suction arrangement is available.



**Inducer**

A high specific speed, axial flow, pumping device, an inducer provides significant improvement in suction performance by reducing pump NPSHR.

**MSP Variable Speed Range Chart**



**Frequency Converter**

Control of the frequency converter enhances the performance, reliability and safety of the pump and motor combination.

Frequency converter can be supplied as a component for user installation. It is also available as a plug-in package with pre-set motor parameters, all required accessories and specifications to local codes.

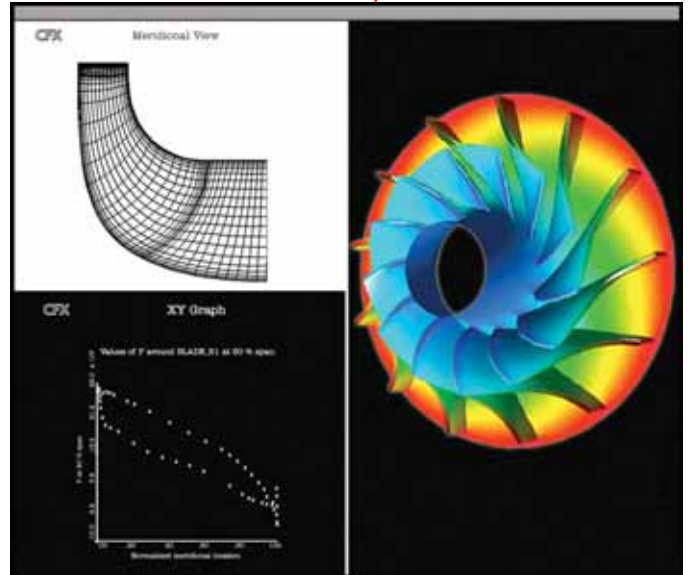
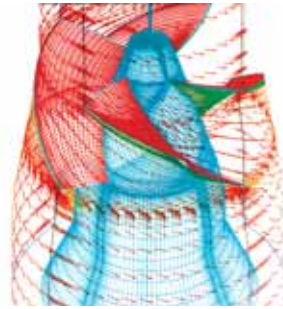
Optimal computer software and integrated PI controller further customize pump-motor operation.

**Global Service and Technical Support**

**Advanced Technologies**

Few if any pump companies can match Flowserve's capabilities in hydraulic and mechanical design or in materials engineering. These capabilities include:

- Computational fluid dynamics
- Flow visualization
- Cavitation studies
- Efficiency optimization
- Finite element analysis
- Rapid prototyping
- Captive high nickel alloy and light reactive alloy foundries
- Non-metallic materials processing and manufacturing



**Service and Repair Group**

Flowserve's Service and Repair Group is dedicated to maximizing equipment performance and reliability-centered maintenance programs. Pump related services include:

- Startup and commissioning
- Diagnostics and prognostics
- Routine and repair maintenance
- ANSI and ISO power end exchange program
- Re-rates, upgrades and retrofits
- Spare parts inventory and management programs
- Training



**Pump Improvement Engineering Services**

Flowserve is committed to helping customers obtain the best possible return on their pump equipment investment. Engineering assistance and technological solutions for pumping problems are readily available.

These services include:

- Field performance testing
- Vibration analysis
- Design analysis and root-cause problem solving
- Material improvements
- Pump and system audit
- Advanced technology solutions
- PumpTrac™ remote pump monitoring and diagnostic services
- Instruction manual updates
- Training courses

**Flowserve... Supporting Our Customers  
With The World's Leading  
Pump Brands**



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