



***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:

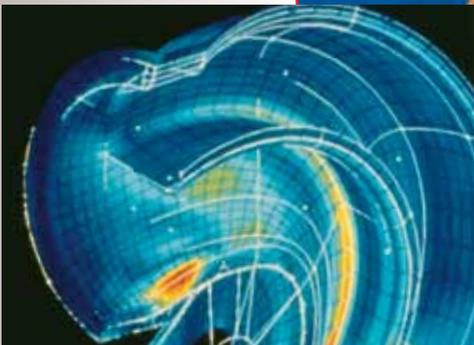
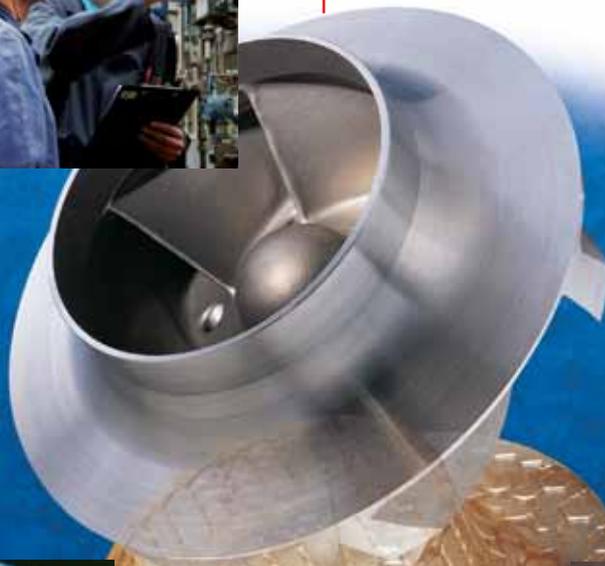
- Hydraulic engineering
- Mechanical design
- Materials science
- Intelligent pumping
- Manufacturing technology

### **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
- Positive displacement
- Nuclear
- Specialty



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

**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**

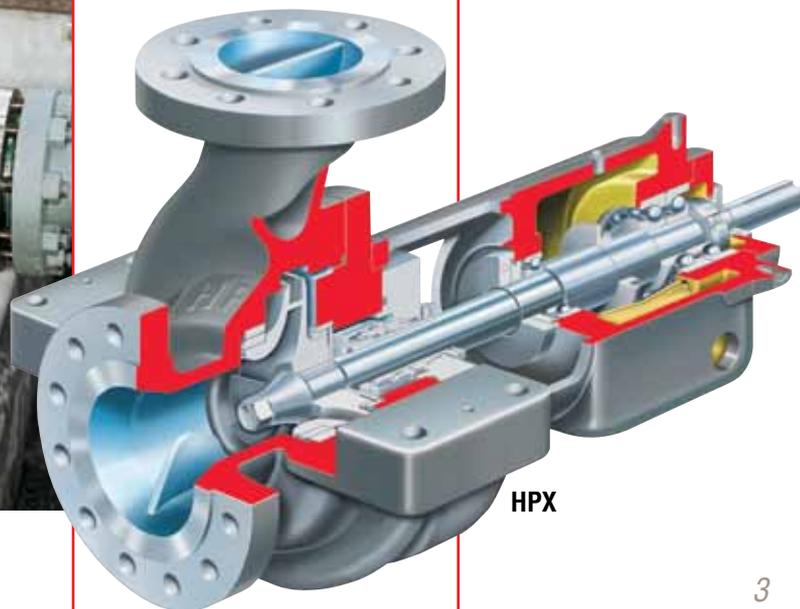
MSP pumps may be applied in low flow, high head applications in:

- 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**

The Flowserve 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 and 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.



**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.

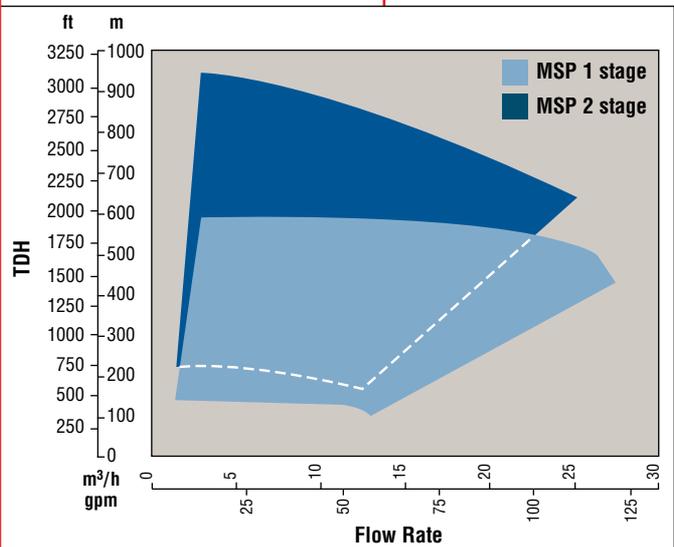
**Horizontal Configuration**  
While primarily designed for vertical in-line installation, a horizontal end suction arrangement is available.



**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**



**Global Engineered Services and Support**

- Total Cost Reduction*
- Asset Management*
- Product Life Cycle*
- Performance Re-rates*
- Site Diagnostics*
- Repair Services*
- Energy Management*
- Spare Parts*
- Maintenance Contracts*
- Materials Upgrades*
- Turnkey Services*
- Field Repairs*
- Installation*
- Project Supervision*
- Commissioning*
- Equipment Upgrades*
- Condition Monitoring*
- Systems Analysis*
- Field Machining*

**Service Dedication**

Flowserve Engineered Services is focused on providing customers with uncompromising service and support, where and when needed. Dedicated to delivering the highest quality support, Engineered Services integrates its extensive pump and materials engineering knowledge with creative service solutions. Engineered Services fully understands the business challenges facing customers and is prepared to manage solutions to succeed as a team.

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

Engineered Services is dedicated to maximizing equipment performance and providing reliability-centered maintenance programs for pumps and related equipment, regardless of manufacturer. Using the FlowStar™ asset management software, Engineered Services tracks performance and supports 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.



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



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