



Pump Division



Mark 3
ANSI B73.2
Vertical In-Line
Chemical Process
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.

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:

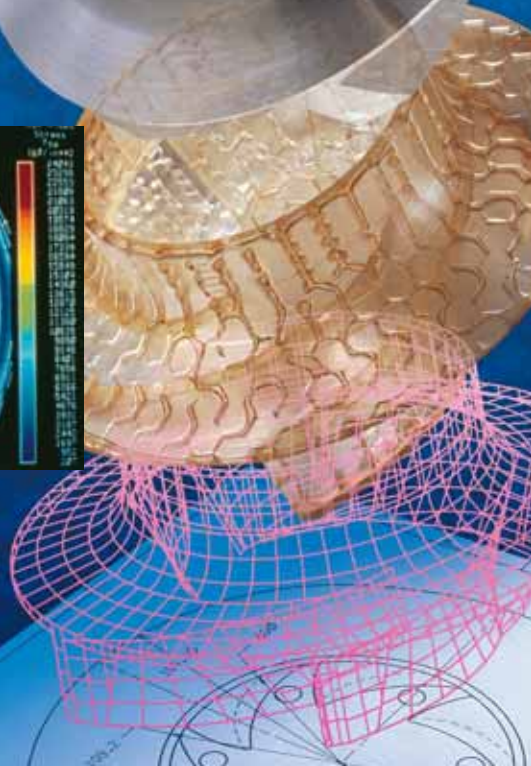
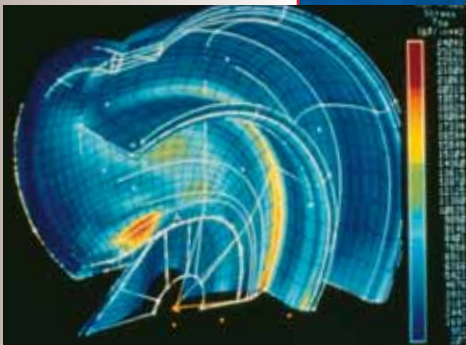
- Hydraulic engineering
- Mechanical design
- Materials science
- Intelligent pumping
- Manufacturing technology

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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Without Equal

Designed to exceed ASME (ANSI) B73.2M criteria, The Flowserve Mark 3 In-Line is more than a space-saving chemical process pump. It offers improved pump reliability and extended mean time between planned maintenance (MTBPM) through these exclusive features:

- Standard Mark 3 A power frame with micrometer impeller adjustment
- Optional ANSI 3A™ power frame with three-year MTBPM guarantee

- The unique reverse vane impeller with consistent, repeatable performance
- SealSentry™ seal chambers including models with flow modifiers
- The Flowserve unique C-Plus precision motor and pump shaft alignment system
- Broad parts interchangeability with standard Mark 3 horizontal pumps
- Complete menu of mechanical seal options, including advanced gas seal technology, to best meet application needs
- A wide array of options and accessories for extended MTBPM and improved safety

Primary Industries Served

- Chemical processing
- Hydrocarbon processing
- General industry

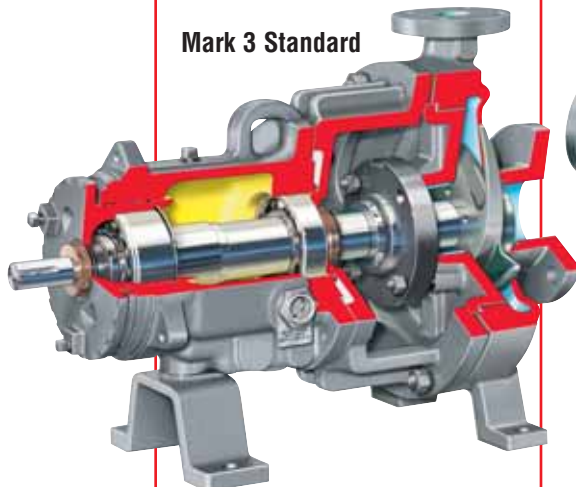
Complementary Pump Designs

Depending upon application requirements, Flowserve can also provide these pump designs:

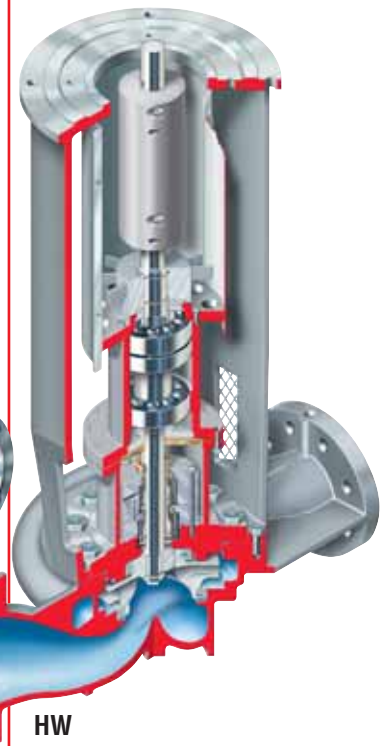
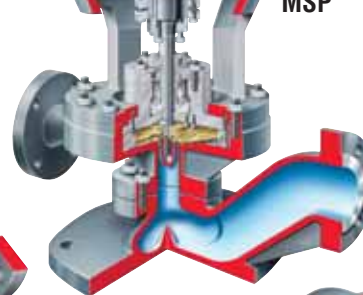
- HW API 610 compliant in-line
- MSP low flow, high head in-line with variable frequency drive
- Mark 3 ASME (ANSI) horizontal standard
- CPX ISO horizontal standard
- PVML API 610 compliant, in-line with multi-channel diffuser



Mark 3 Standard



MSP



HW



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Process Pumps**

The Flowserve Mark 3 In-Line ASME (ANSI) process pump delivers extended pump life, ease of maintenance and safety in addition to reliable, efficient performance. This space-saving pump has broad application in chemical and hydrocarbon processing as well as in general industry for services including:

- Chemical transfer
- Heat transfer
- Liquid gases
- Storage
- Water

- Washdown and cleaning
- Condensate return
- Light slurries

Operating Parameters

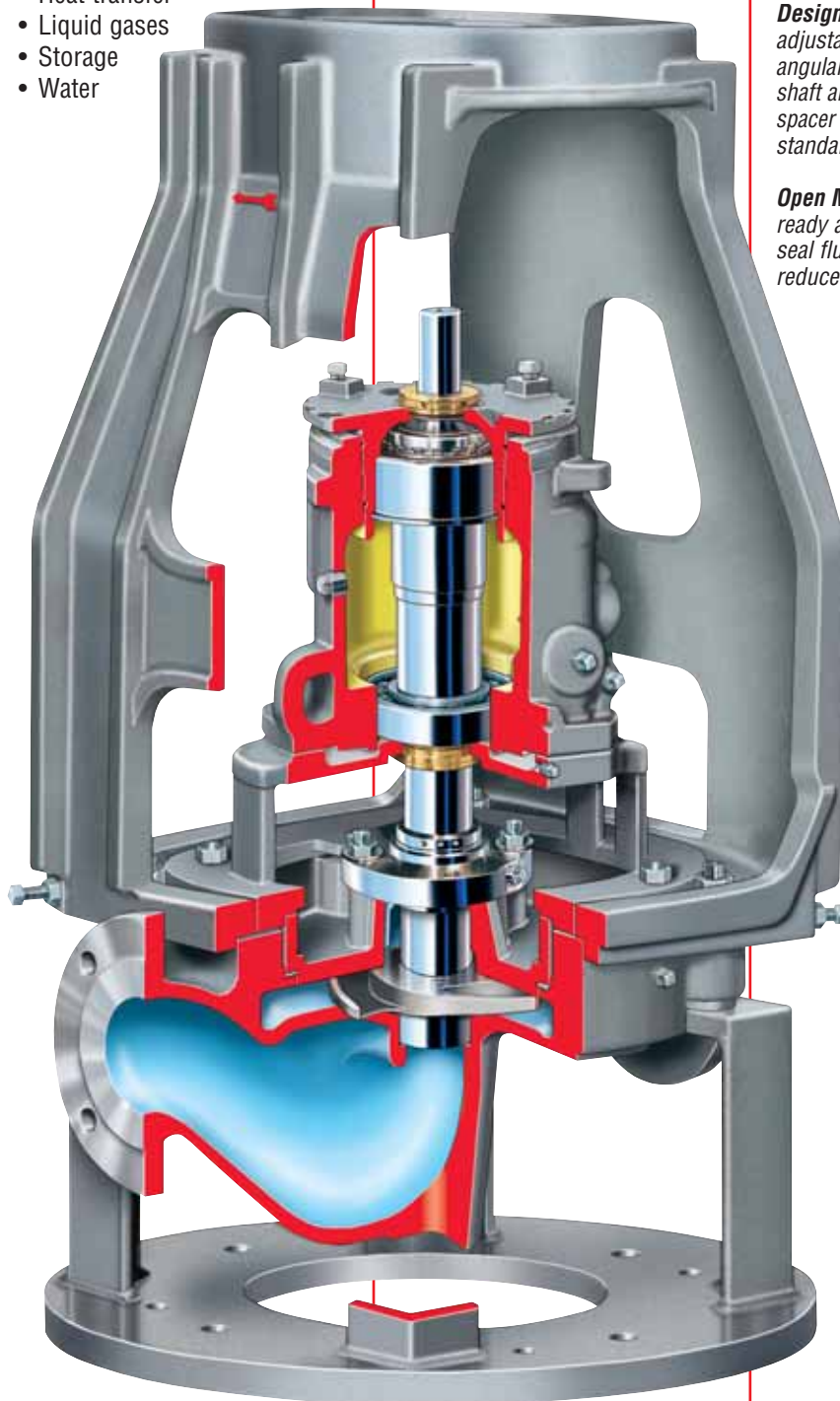
- Flows to 370 m³/h (1630 gpm)
- Heads to 230 m (760 ft)
- Pressures to 24 bar (350 psi)
- Temperatures to 370°C (700°F)
- Motor sizes to 110 kW (150 hp)

***C-Flange Adapter** is precision machined to provide fixed motor to pump angular shaft alignment within 0.001 mm/mm (0.001 in/in)*

***Adjustable Parallel Alignment** of motor to pump shaft to within 0.05 mm (0.002 in) reduces coupling loads to improve pump, seal, motor and coupling life*

***Broad Choice of Coupling Designs** due to precisely adjustable parallel and fixed angular motor to pump shaft alignment. Conventional spacer coupling type is standard*

***Open Motor Adapter** permits ready access to seals and seal flush connections for reduced maintenance time*



Mark 3 Power Ends are completely interchangeable with Mark 3 standard pumps and offer:

- Double-row angular-contact outboard - single-row deep-groove inboard bearings for excellent axial and radial load support
- Double-lip oil seals
- Micrometer shaft adjustment for precisely accurate impeller-to-seal chamber setting and reduced maintenance time

Superior Pipe Load Capacity as loads are transferred through the casing, eliminating misalignment of the pump and motor

SealSentry Seal Chamber designs are available in cylindrical bore models or tapered bore models with flow modifiers to precisely match application needs and to extend seal life. All cover designs completely drain for safety and longer parts life

Streamlined Suction Nozzle eliminates turbulence for low NPSH requirements

Flange Connections are available in ASME (ANSI) Class 150 or Class 300 with flat or raised faces

Pump Bearings carry impeller loads - not the motor. With the largest shaft and bearing components available in standard ASME (ANSI) pumps, the Mark 3 offers greater load-handling ratings and deflection comparisons (< 0.05 mm [0.002 in] deflection at seal faces) for extended MTBPM. Regreasable bearing lubrication is standard

Coupling Guards are available in steel, aluminum or polycarbonate materials to ASME (ANSI) B15.1 requirements

Design Features



Micrometer Impeller Adjustment

- Impeller clearance setting to rear cover in 20 seconds
- No shims or wear rings
- In-shop or in-field adjustment



Reverse Vane Impeller

- Low, predictable seal chamber pressure and thrust loads for longer seal and bearings life
- Lowest overall NPSH required of any standard pump
- Rear cover plate wear surface instead of the more expensive casing
- In-shop or field impeller and mechanical seal setting
- Repeatable performance assurance



Reduce Parts Inventory
Interchangeability with horizontal Mark 3

- Standard power ends
- Standard adapters
- Standard shafts
- Standard seals
- Standard hardware and fasteners

Advanced FM SealSentry Technology

- Self-flushing
- Self-venting
- Self-draining
- Extended seal life by superior purging of heat, solids and vapors
- Single seals instead of dual seals or external flush and throat bushing combinations for reduced cost, simplified maintenance

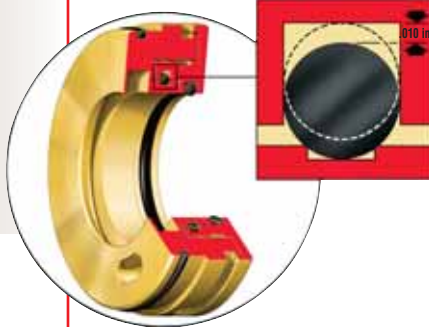
Flow Modifiers Extend Mechanical Seal MTBPM

- Flow modifiers redirect flow from circumferential to axial
- Balanced flow with low pressure drop in the chamber helps keep solids in suspension, minimizing erosive characteristics of the process
- A mechanical seal creates a centrifuging action away from its parts and into the returning flow path of the process liquid
- Solids and slurry merge in the returning flow path and are flushed out of the seal chamber

**Technical Data
and Options**

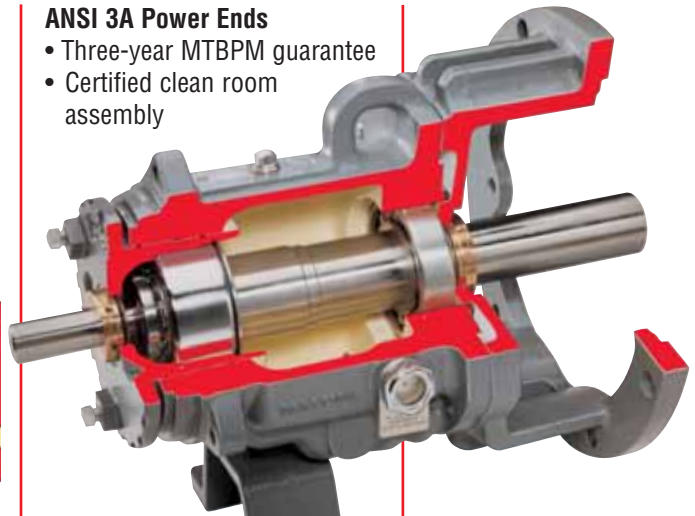
Mark 3 A Power Ends

- Lubrication options
 - Regreasable bearings
 - Oil mist
 - Permanently lubricated bearings
- Bearing isolators
 - Inpro/Seal's non-contact Vapor Block



ANSI 3A Power Ends

- Three-year MTBPM guarantee
- Certified clean room assembly



Safety

- DurcoShield™ splash and shaft guard
- ClearGuard™ non-metallic coupling guard

Pump Stand

- Large footprint for added stability
- Permits fixed mounting of pump unit

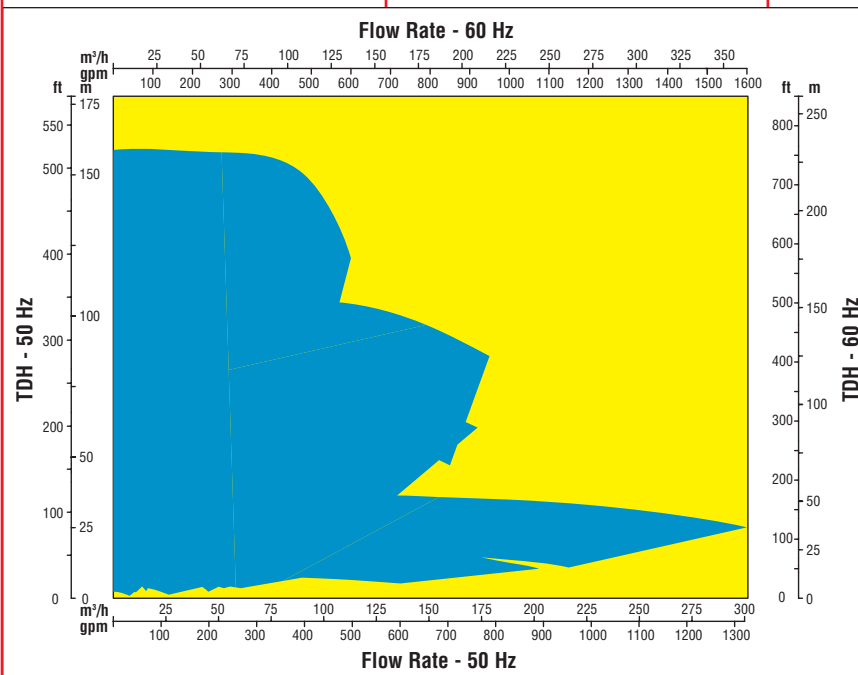


Jacketed Seal Chambers

SealSentry Seal Chambers

- Flow modifiers with tapered bore
 - FML (large gland bolt circles)
 - FMS (small gland bolt circles)
 - FMI (integral gland)
- Cylindrical bore
 - CBL (large gland bolt circles)
 - SBL (small gland bolt circles)

Mark 3 In-Line 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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Pump Division

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