



HWX

***ISO 13709/API 610
Vertical In-Line
Process Pumps***

***ISO 13709/API 610 (OH3)
Pump Bearing Frame***

***ISO 13709/API 610 (OH4)
Rigidly Coupled***

***ISO 13709/API 610 (OH5)
Close Coupled***

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:

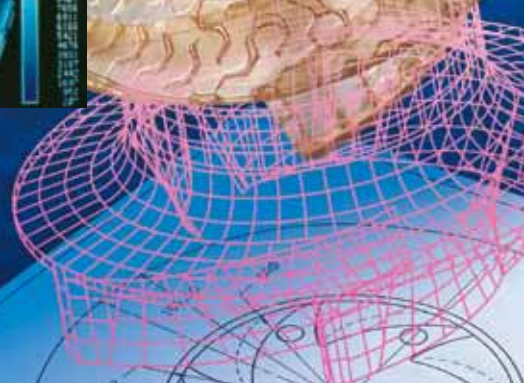
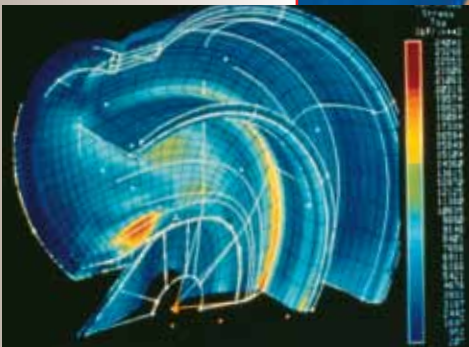
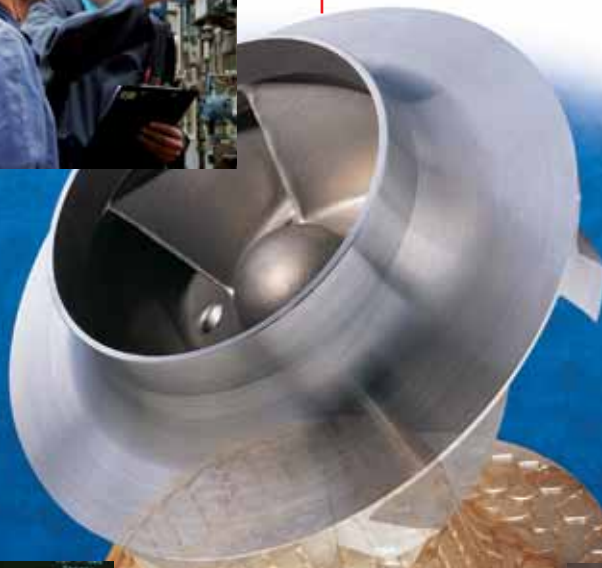
- Hydraulic engineering
- Mechanical design
- Materials science
- Intelligent pumping
- Manufacturing technology

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



HWX
ISO 13709/API 610
Vertical In-Line
Process Pumps

First Choice for Vertical In-line Pumping

The HWX pump is the ISO 13709/API 610 latest edition type OH3, bearing housing design and space-saving in-line alternative for many over-hung process pumps in upstream and down stream services.

The HWX family of pumps consists of designs to API OH3, OH4 and OH5 configurations for meeting customer specific needs.

The most stringent emissions containment is achieved as the ISO 21049/API 682 seal chambers accommodate all mechanical seal styles including advanced gas barrier seal technology.

The HWX pump is the industry leader for these reasons:

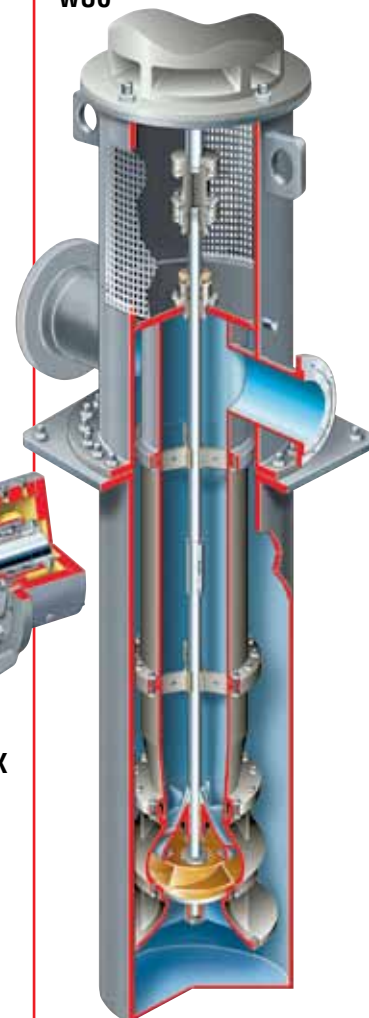
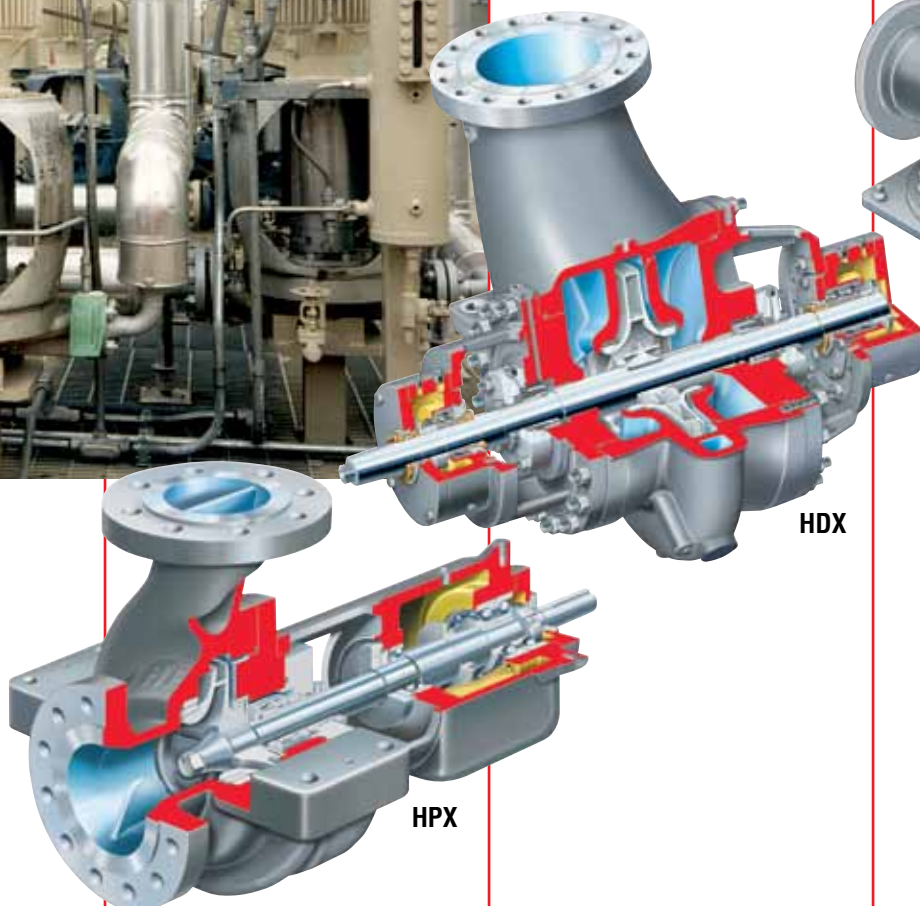
- Robust construction to meet pressure, temperature, nozzle loading and safety considerations required by ISO 13709/API 610 and other industry or user specifications
- Most comprehensive hydraulic coverage in the industry
- Variety of materials and bearing housing lubrication options
- Completely removable, back pull-out design
- Low flow/high head hydraulic options
 - OH3: HWM, HWM-2
 - OH4: MSP
 - OH5: WM, WM-2
- Customized hydraulics
 - OH4: DSVP
 - OH5: PVML, PVML-Mag Drive
- Rigid coupled design
 - OH4: W

Complementary Pump Designs

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

- Single-stage, horizontal overhung pumps
- Single- and two-stage between bearings pumps
- Multistage between bearings pumps
- Vertical, double-casing pumps

VPC
WUC



HWX
ISO 13709/API 610
Vertical In-Line
Process Pumps

The Flowserve HWX pump line meets or exceeds the rigorous requirements of ISO 13709/ API 610, latest edition. It encompasses a family of eleven distinct designs providing the most comprehensive range of pump configurations and hydraulic coverage available to the industry.

These space-saving pumps are engineered and built for reliable and safe performance in cryogenic, high temperature and high working pressure services.

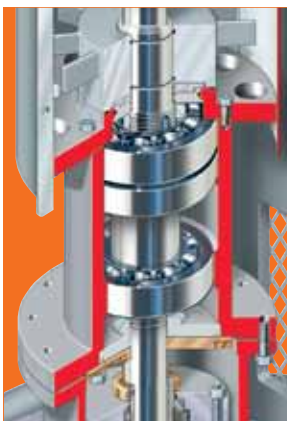
Special HWX OH3 Features

- Choice of bearing lubrication
 - Oil cascade lube design for temperatures to 385°C (725°F)
 - Oil mist design for temperatures to 400°C (750°F)
 - Grease lube design for temperatures to 275°C (525°F)
- Only two bearing housing frames and bearing sets for all OH3 pumps
- Top bearing isolator, optional Inpro

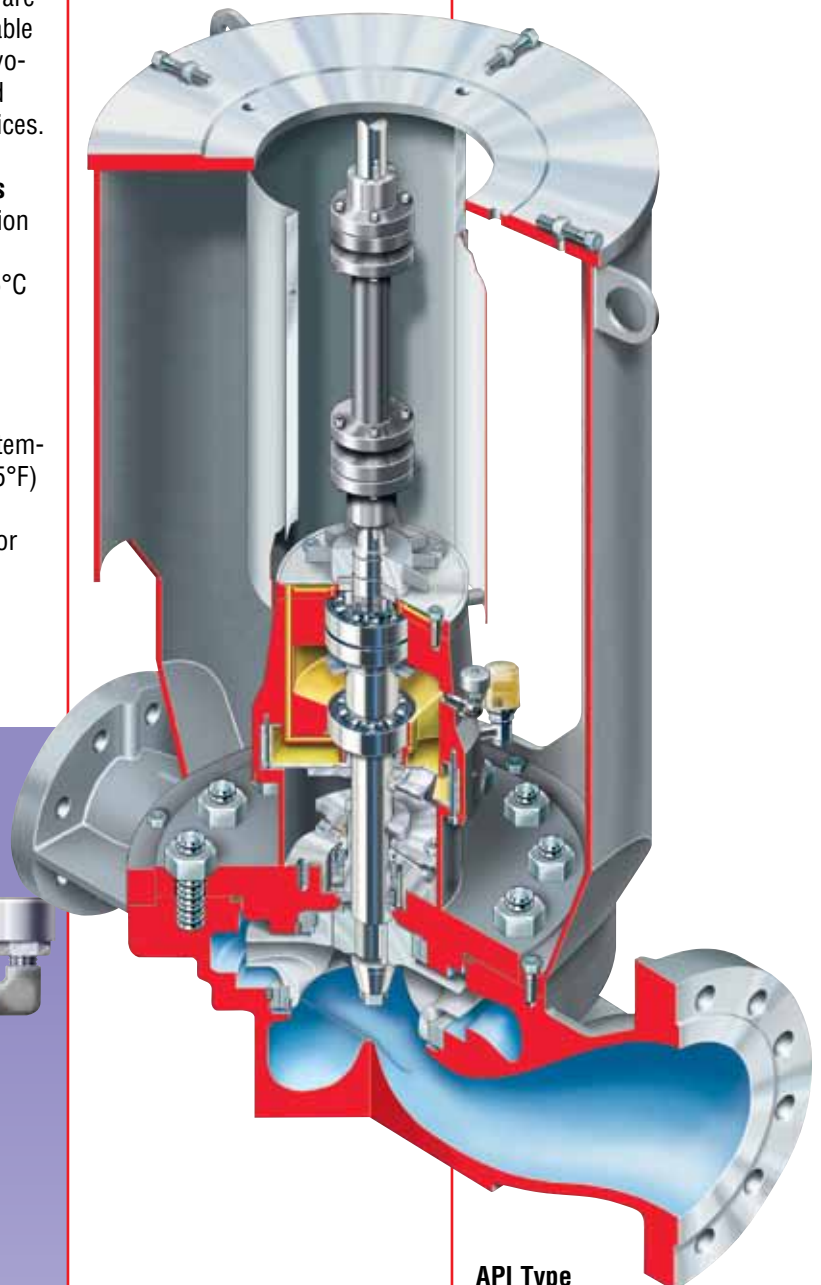
- Flexible disc spacer coupling design
- Standard fan air cooling for grease and oil sump bearing housings. Fan cooling not applicable or needed for oil mist designs
- Complete back pull-out design
- Accommodates NEMA, IEC and existing field drivers (C-face and P-base)

Operating Parameters

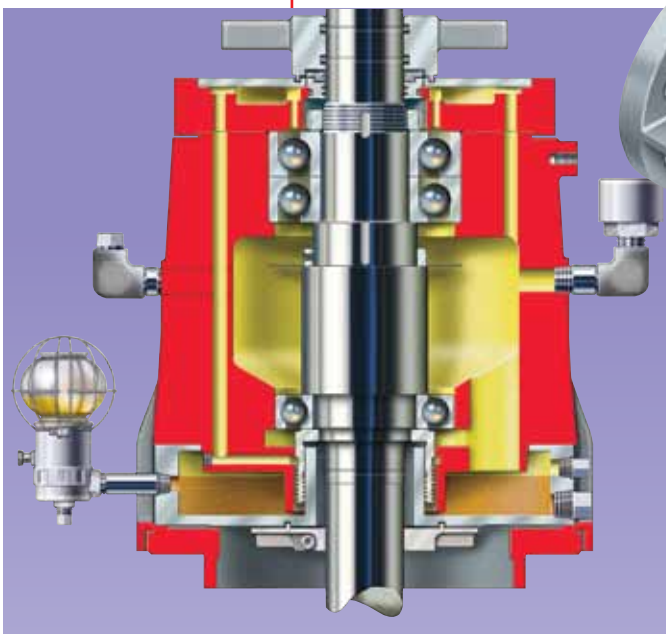
- Flows to 3400 m³/h (15 000 gpm)
- Heads to 900 m (3000 ft)
- Temperatures from -185°C (-300°F) to 400°C (750°F)
- Pressures to 100 bar (1450 psi)



Grease and Oil Mist Bearing Housing Design



API Type OH3 with Oil Cascade Lube Bearing Housing Design



Oil Cascade Design Detail



HWX Line Features

ISO 21049/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 ISO 13709/API 610 seal flush plans is available. Shaft sleeve and gland plate constructed of stainless steel for optimum seal life.

Cartridge Seal Mounting assures:

- Ease of maintenance
- Precise seal face setting for maximum seal life

Fan Cooling¹ of bearing housing permits handling of extreme temperatures without the need for water cooling.

¹ Not applicable or needed for oil mist designs

Raised Face Flanges are to ASME B16.5 for Class 300. Surface finish meets ISO 13709/API 610 standard. ISO flanges and flanges with JIS drilling are available.

Pump Casing and Cover feature metal to metal fit with fully confined, controlled compression gasket to ensure proper sealing and alignment.

Back Pull-Out of rotating assembly for OH3 and OH4 models simplifies maintenance as neither the motor nor piping connections are disturbed.

Standardized Mounting Plate is provided to maintain the API 3:1 ratio from the unit center of gravity to prevent tipping. Larger plates provided as required to accommodate mounting of seal pot assemblies and heat exchangers.

Motor Support Head is a heavy-duty design with a registered fit motor mount. Generous size open compartments allow easy access to all bolting and removal of the complete pumping assembly, including mechanical seal, without removal of casing.

Adjustable Axial Screws allow for easy driver mount positioning and are provided where dowelling of driver is not possible or practical.

Coupling Guard is provided to enclose the coupling, pump shaft and motor shaft areas.

Dynamically Balanced Impeller limits vibration and assures smooth operation over wide flow range.

- Casting techniques and manufacturing processes for fine finish, high efficiency
- Positively locked, anti-rotation impeller nut with threads are unexposed to pumped liquid.

Renewable Wear Rings² for both the casing and impeller reduce replacement cost

- Secured by axial screws, with option for tack welding
- Back wear ring standard
- Rear rings and balance holes eliminated for high suction pressure applications

² Not applicable or needed for low flow impeller designs

Stiff Shaft Design limits maximum deflection at seal faces to 0.05 mm (0.002 in) maximum. Shaft stiffness factors (L^3/D^4) are the best in the industry.

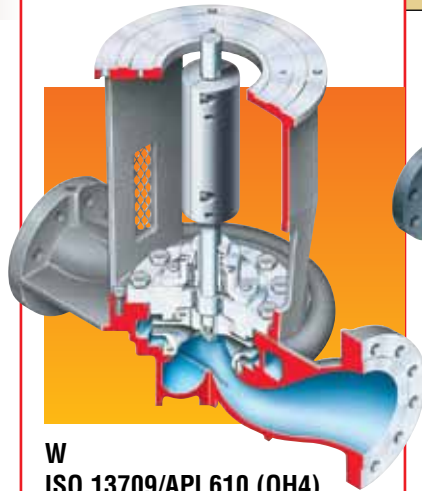
Options and Technical Data

Flowserve offers vertical in-line pumps in all configurations and sizes to meet all service conditions, preferences and budgets. Each model is fully compliant with ISO 13709/API 610, latest edition.

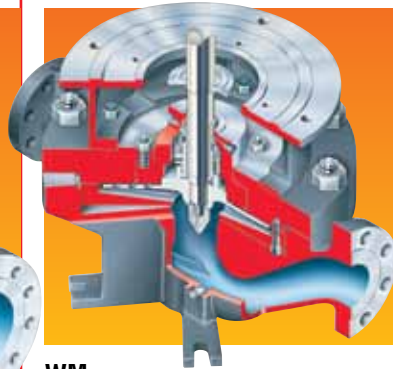
Options include customized hydraulics, using volute inserts/diffusers, radial blade impellers, inducers and double-suction impellers.

Available In-Line Pump Designs

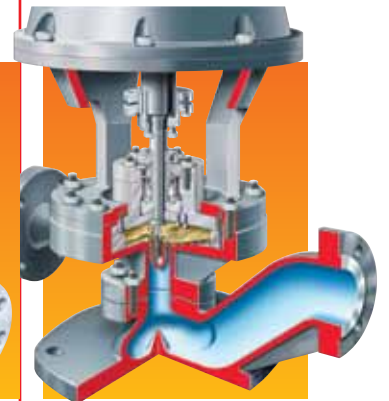
| API Code | Design Type | Single Stage | Two Stage |
|----------|--|--------------|-----------|
| OH 3 | Flexible Coupled with Pump Bearing Housing | HWX | |
| | Flexible Coupled with Pump Bearing Housing, Low Flow Impeller, Volute Insert | HWM | HWM-2 |
| OH 4 | Rigid Coupled Fixed Speed | W | |
| | Rigid Coupled Variable Speed Low Flow/High Head with VFD | MSP | MSP |
| | Rigid Coupled Double-Suction Impeller | DSVP | |
| OH 5 | Extended Motor Shaft with Low Flow Impeller, Volute Insert | WM | WM-2 |
| | Extended Motor Shaft Diffuser Casing | PVML | |
| | Extended Motor Shaft Diffuser Casing Magnetic Drive | PVML-MAG | |



W
ISO 13709/API 610 (OH4)
Rigid Coupled

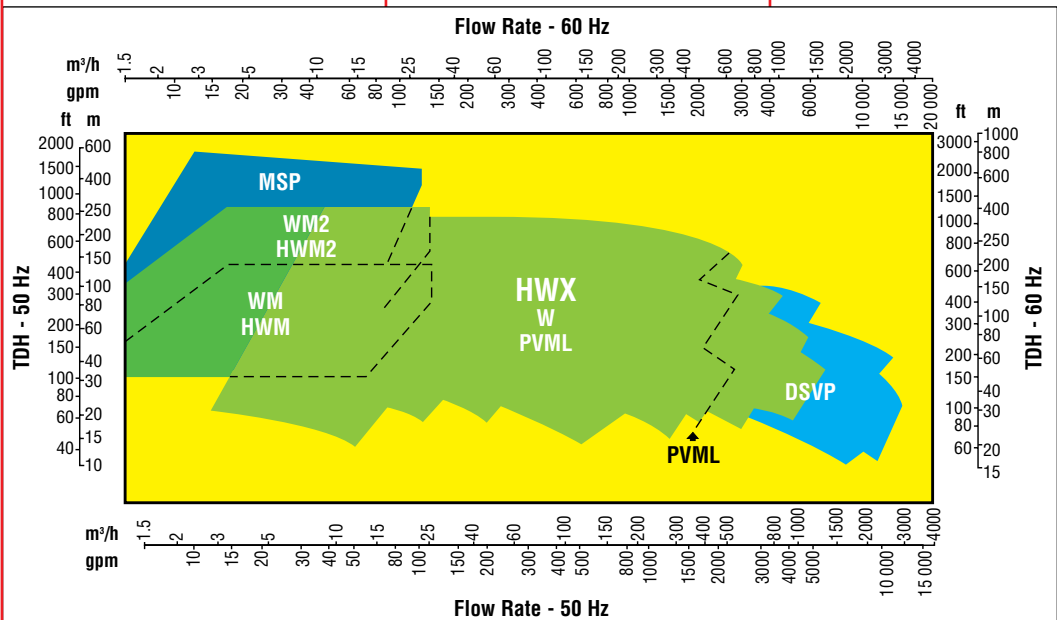


WM
ISO 13709/API 610 (OH5)
Extended Motor Shaft



MSP
ISO 13709/API 610 (OH4)
Rigid Coupled
Variable Speed

HWX 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. Engineered Services is dedicated to delivering the highest quality support by integrating its extensive pump and materials engineering knowledge with creative service solutions. Engineered Services prides itself in understanding 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.

Your 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 your needs involve on-site technical assistance or broader project planning with full turnkey responsibility, you can rely on the strength of Flowserve Engineered Services to deliver professional, reliable results.



Low Frequency Pressure Pulsation



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



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