

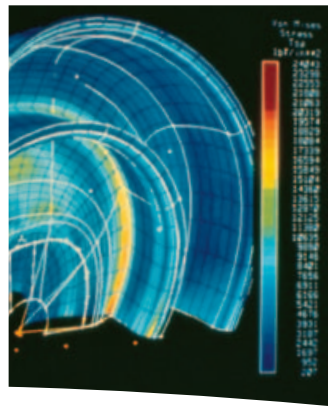


RHWX and RHWX-S Vertical In-Line Power Frame Upgrade Assemblies

ISO 13709/API 610 (OH3)



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.

Life Cycle Cost Solutions

Flowserve is providing pumping solutions which permit customers to reduce total life cycle costs and 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.

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

Product Brands of Distinction

ACEC™ Centrifugal Pumps

Aldrich™ Pumps

Byron Jackson® Pumps

Calder™ Energy Recovery Devices

Cameron™ Pumps

Durco® Process Pumps

Flowserve® Pumps

IDP® Pumps

Lawrence Pumps®

Niigata Worthington™ Pumps

Pacific® Pumps

Pleuger® Pumps

Scienco™ Pumps

Sier-Bath® Rotary Pumps

TKL™ Pumps

United Centrifugal® Pumps

Western Land Roller™ Irrigation Pumps

Wilson-Snyder® Pumps

Worthington® Pumps

Worthington Simpson™ Pumps

**RHWX and RHWX-S
Vertical In-Line Power
Frame Upgrade
Assemblies**

ISO 13709/API 610 (OH3)



Before



After

Upgrade Specialists

The RHWX and RHWX-S upgrade assemblies address users' needs for improved pump reliability with reduced maintenance costs. This permits conversion of rigidly coupled OH4 and closed-coupled OH5 vertical in-line pumps to an OH3 vertical in-line design with a separate bearing frame. These assemblies allow users to reduce fugitive volatile organic compound (VOC) emissions while gaining the advantages of a bearing frame in full compliance with ISO 13709/API 610, latest edition. They also enable pump users to meet changing operating conditions by incorporating a new or re-rated impeller.

Two Designs for Installation Flexibility

Fully compliant with ISO 13709/API 610, the RHWX upgrade assembly enables full back pull-out of the rotor through the motor support head without disturbing the casing, piping or motor. The shortened RHWX-S configuration is ideal where height restrictions exist. Able to be used on units up to 75 kW (100 hp), the RHWX-S enables partial back pull-out with the motor attached.

Standard Equipment

The RHWX and RHWX-S vertical in-line power frame assemblies include the following standard hardware:

- Bearing housing and shaft assembly
- Head and integral seal chamber
- Head wear ring
- Motor support head
- Cooling fan
- Guards for fan and coupling
- Keys for impeller and coupling

Hydraulic Re-rate Benefits

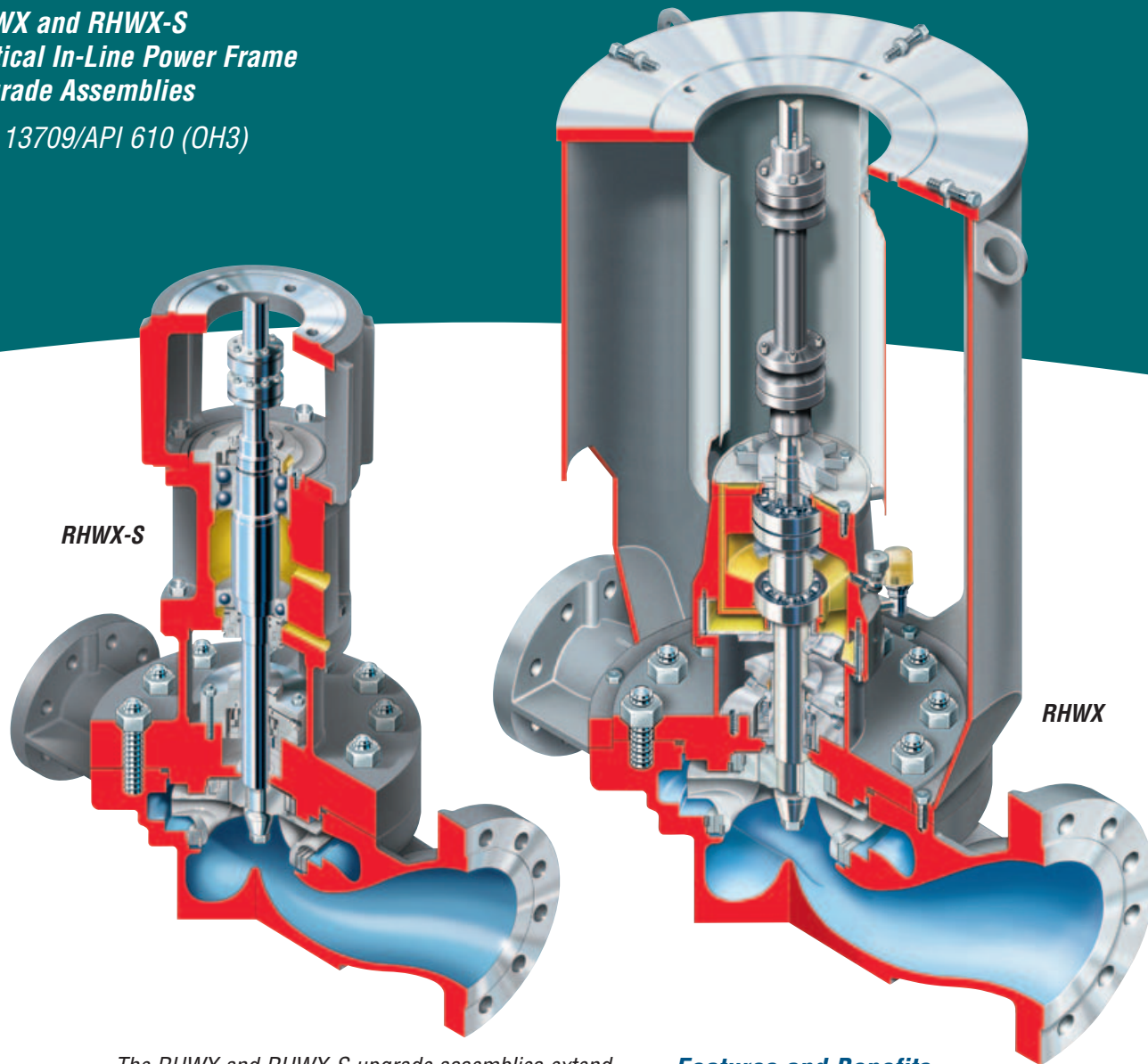
- Customized impellers and volutes provide BEP hydraulic fits
- Energy savings from improved hydraulics and higher efficiency designs
- Reduced vibration levels, minimum continuous stable flow and recirculation damage

Mechanical Upgrade Benefits

- Improved reliability
 - Robust power frame increases mean time between repair (MTBR)
 - Bearing housing with flexible disc coupling minimizes shaft alignment problems
 - Lubrication designs meet most process or environmental temperature limits
 - Compliant with API 610 L10 bearing life
 - Fan cooling eliminates need for cooling water
 - Internal dilating flinger provides trouble-free oil lubrication and cooling
- Increased mechanical seal life
 - Larger diameter shaft with low shaft stiffness ratio (L^3/D^4) for reduced shaft deflection
 - Seal chamber dimensions to ISO 21049/API 682 with full size cartridge seal designs
- Maintain original pump and piping footprint
- Reduced total cost of ownership
- Applicable to any OEM in-line pumps
- Parts standardization for reduced inventory
- Reduced lead time versus new equipment
- Backed by the Flowserve 12/18 month new equipment warranty

RHWX and RHWX-S
Vertical In-Line Power Frame
Upgrade Assemblies

ISO 13709/API 610 (OH3)



The RHWX and RHWX-S upgrade assemblies extend the useful life of old in-line pumps, regardless of OEM, while simultaneously reducing the total cost of ownership and improving equipment reliability. This is accomplished by:

- Adding a pump bearing housing
- Upgrading to ISO/API compliant components
- Replacing old seals with latest ISO 21049/API 682 compliant cartridge designs
- Replacing rigid couplings with flexible disc type

The application of current technology combined with dedicated support by Flowserve aftermarket specialists ensures improved MTBR of any API in-line pump.

Features and Benefits

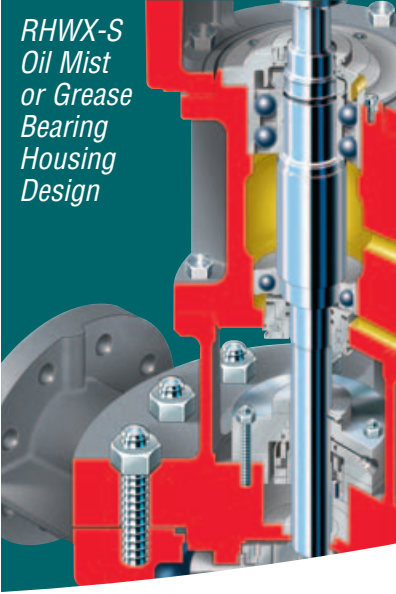
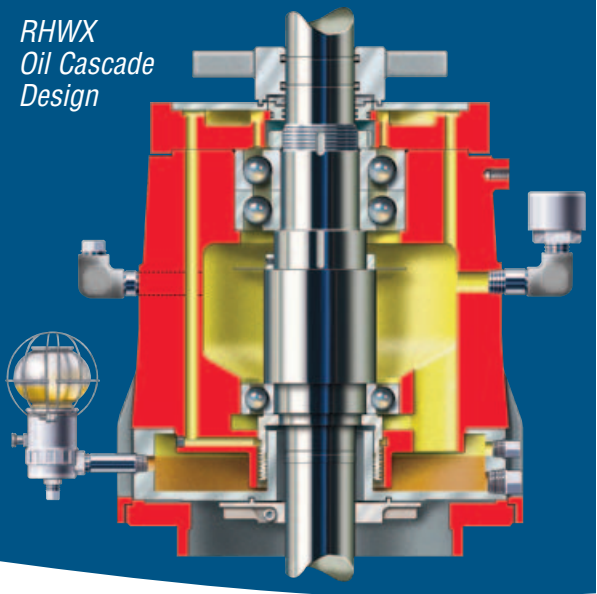
API 682 Seal Chamber accommodates all popular dual seal arrangements without special engineering. State-of-the-art cartridge seals reduce VOC emissions to required industry levels.

Large Radial and Thrust Bearings combined with very low shaft stiffness ratios (L3/D4) and low shaft deflection promote extremely long bearing and mechanical seal life.

Robust Construction to ISO 13709/API 610, latest edition, including carbon steel bearing housing, ensures maximum reliability and safety.

Motor Support Heads are available in ISO/API compliant back pull-out and shortened designs.

12/18 Month New Product Warranty is standard on all RHWX upgrade assemblies.



Bearing Lubrication Options

Featuring heavy-duty carbon steel bearing frames, the RHWX and RHWX-S assemblies are able to handle high product temperatures without cooling water.

RHWX (fan cooled)

- Grease: -100°C to 290°C (-150°F to 550°F)
- Oil mist: -185°C to 400°C (-300°F to 750°F)
- Cascade lube oil sump with Trico oiler:
 - Standard oil: -45°C to 330°C (-50°F to 625°F)
 - Synthetic oil: -75°C to 400°C (-100°F to 750°F)

RHWX-S (air cooled)

- Grease: -50°C to 150°C (-75°F to 300°F)
- Oil mist: -90°C to 230°C (-150°F to 450°F)

Maximized Interchangeability

RHWX and RHWX-S retrofits maximize parts interchangeability by standardizing bearing housings and seals on ISO/API vertical in-line pumps, regardless of original manufacturer.

Motor Support Head

The RHWX and RHWX-S assemblies feature heavy-duty C-Flange motor mounts to ensure positive alignment. Generous openings on the RHWX enable 100% back pull-out of the rotor and cover without disturbing the casing or the motor. An extraction tool which facilitates removal of the back pull-out assembly is available.

With its shortened support head and reduced overall unit height, the RHWX-S is ideal for customers who pull the complete unit into the shop for maintenance.

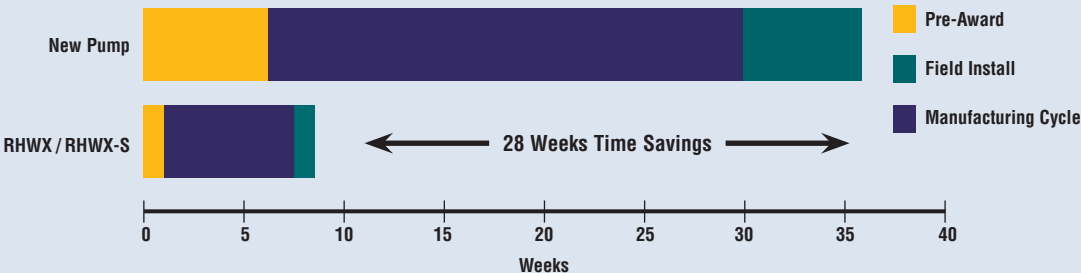
Both designs are available with an optional P-base motor mount to allow reuse of the existing field motor.

Standard Electronic Documentation

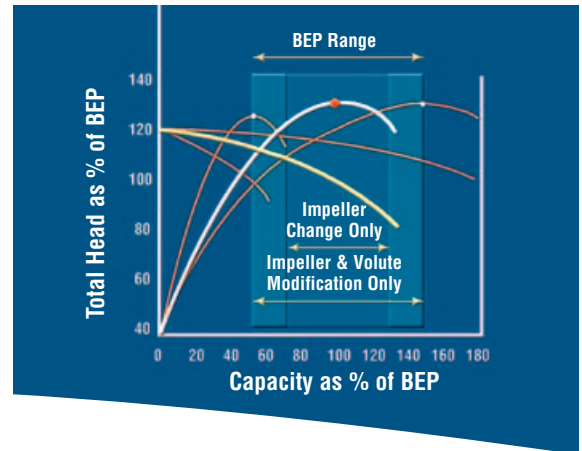
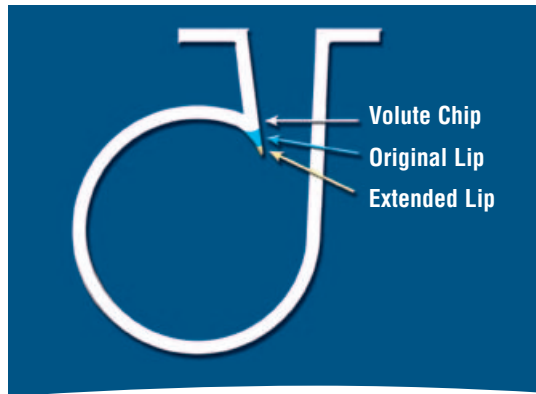
- IOM manual
- Parts list
- Outline drawing
- Cross section drawing

Significantly Reduced Lead Time

The project lead time of RHWX and RHWX-S assemblies is significantly less than that for a duplicate pump or a complete pump package. For example, the typical project lead time for a new, single suction in-line pump in S6 materials is 36 weeks. Conversely, the lead time for a comparable RHWX or RHWX-S is only eight weeks – a 28-week savings.



*Hydraulic Re-rates,
Options and
Technical Data*



Hydraulic Re-rates for Optimal Performance and Reduced Operating Costs

Customized Volute to Impeller Relationship

The relationship between the casing volute and the impeller can be customized to improve hydraulic stability over the entire pump operating range.

New or Re-rated Impeller

A new or re-rated impeller can be provided as an option to meet changing operating conditions.

Energy Payback

Energy payback can be realized by application of an optimized impeller. A case history:

- Reduction of 100 kW/h (135 hp/h)
- Power cost reduction of US \$35,415 annually using \$0.04 per kW/h and around-the-clock operation
- Seven-month payback basis energy savings



Hydraulic re-rates for low-flow, high-head pumps with and without gearbox designs

Optional Hardware Package

- Impeller
- Mechanical seal
- Seal flush piping
- Coupling
- Bearing isolators

Material Upgrades

Material upgrades improve operating life of these parts:

- Cover
- Shaft
- Gaskets
- Wearing rings

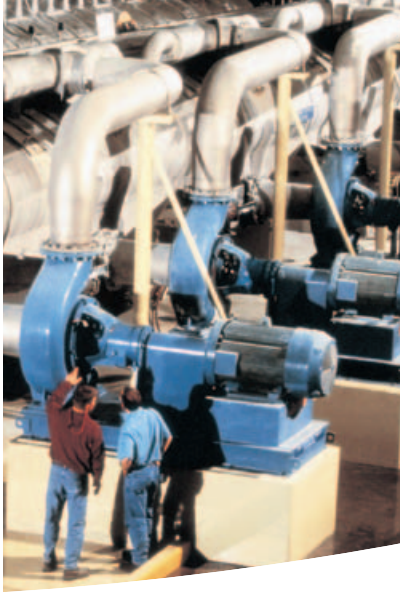
Service and Repair Options

- Casing repair
- Pump assembly
- Field inspection
- Field engineering
- Field machining



RHWX with re-rated impeller

Global Service and Technical Support



Life Cycle Cost Solutions

Typically, 90% of the total life cycle cost (LCC) of a pumping system is accumulated after the equipment is purchased and installed. Flowserve has developed a comprehensive suite of solutions aimed at providing customers with unprecedented value and cost savings throughout the life span of the pumping system. These solutions account for every facet of life cycle cost, including:

Capital Expenses

- Initial purchase
- Installation

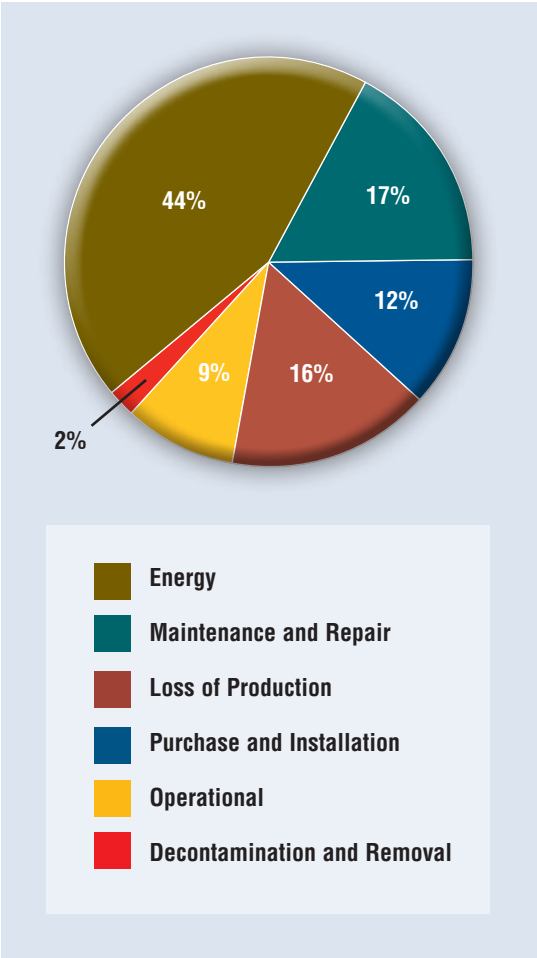
Operating Expenses

- Energy consumption
- Maintenance
- Production losses
- Environmental
- Inventory
- Operating
- Removal

Innovative Life Cycle Cost Solutions

- New Pump Selection
- Turnkey Engineering and Field Service
- Energy Management
- Pump Availability
- Proactive Maintenance
- Inventory Management

Typical Pump Life Cycle Costs¹



¹ While exact values may differ, these percentages are consistent with those published by leading pump manufacturers and end users, as well as industry associations and government agencies worldwide.



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Bulletin PS-100-3c† (E) Printed in USA. January 2011. © Flowserve Corporation

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