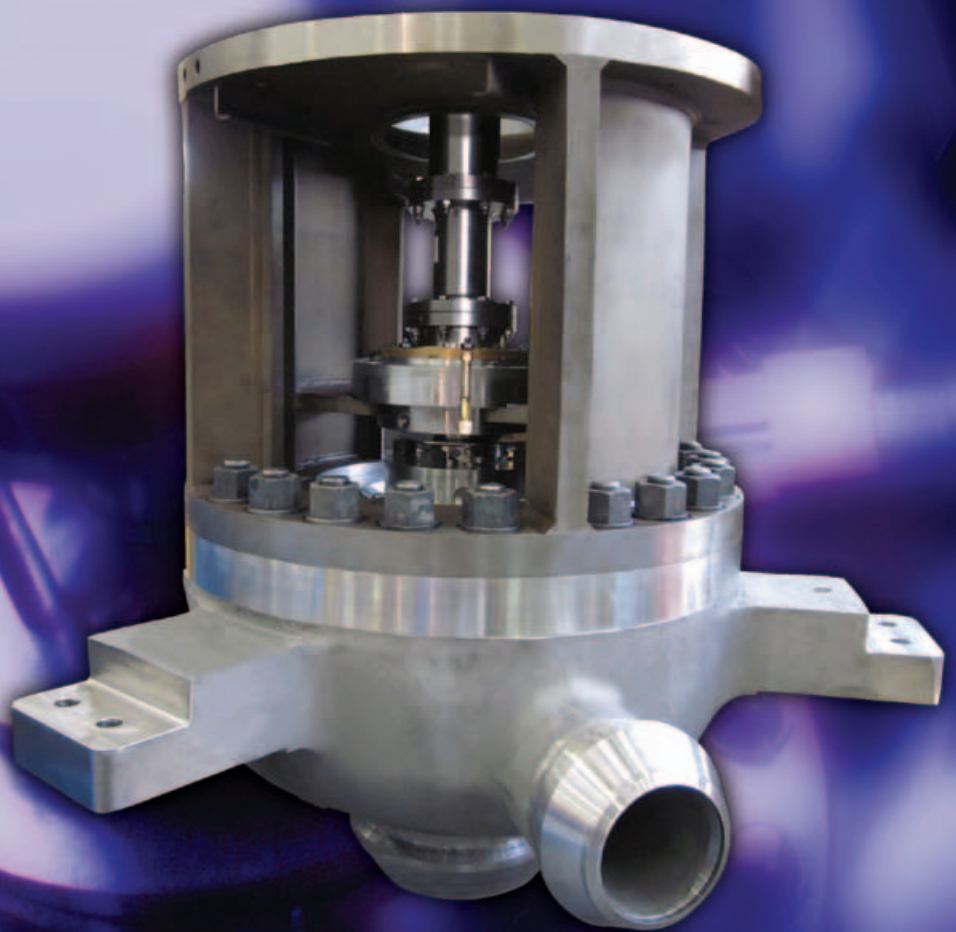




***WD – WDF***  
***Vertical, Single-Stage Nuclear RHR Pump***

ASME Section III, Class 2 and 3



***Experience In Motion***

## W-WDF

### Vertical, Single-Stage Nuclear RHR Pump

ASME Section III,  
Class 2 and 3

Introduced in the 1970s, WD and WDF vertical, single-stage, diffuser-style pumps have established an excellent record of reliability in residual heat removal (RHR) applications in nuclear power stations around the globe. They have been continuously upgraded to meet the evolving safety and performance criteria of successive reactor design generations. Now featuring a removable spacer coupling to facilitate seal and bearing maintenance, current WD and WDF models are designed to meet the requirements of advanced pressurized water reactors (PWR) in terms of safety, reliability (extended MTBR), reduced maintenance costs and man-rem exposure (ALARA).

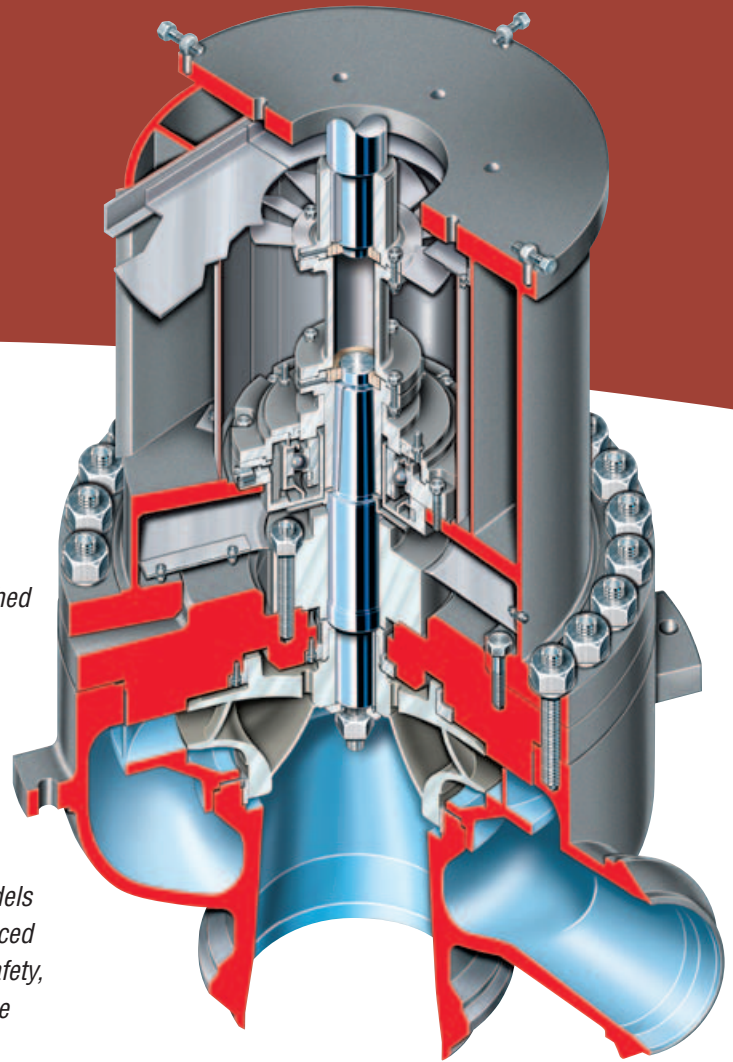
#### Operating Parameters

- Flows to 900 m<sup>3</sup>/h (4000 gpm)
- Heads to 245 m (800 ft)
- Pressures to 41 bar (600 psi)
- Temperatures to 205°C (400°F)

#### Features and Benefits

**Heavy-duty Motor Support Head** with large access openings permits quick in situ maintenance and removal of the spacer coupling, bearing housing, bearing and mechanical seal without removing the motor or casing cover. Its robust construction effectively dampens vibration to extend seal and bearing life.

**Removable Four-piece Spacer Coupling** provides easy access to the bearing and mechanical seal for removal or maintenance. The precision-machined and matchmarked coupling is secured to the shaft with reverse thread nuts.



**Single Row Radial Bearing** is oil lubricated and cooled with a fan flinger to achieve extended service life.

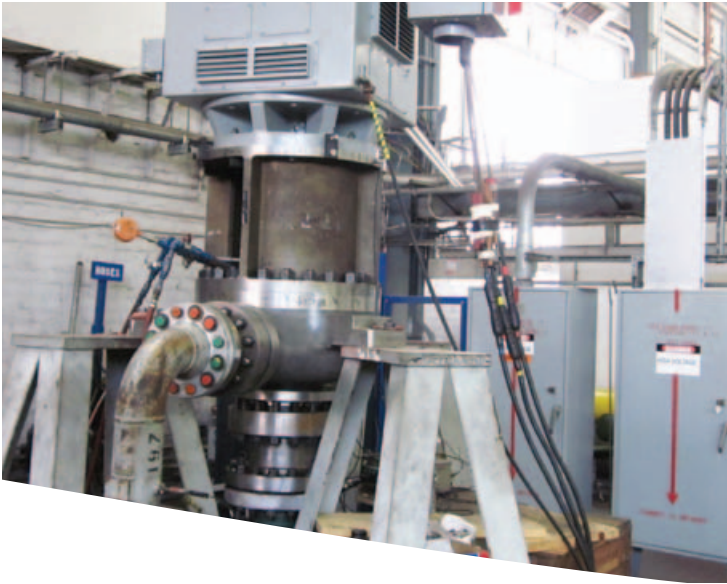
**Cartridge Type, Single Mechanical Seal** with integral disaster bushing and tungsten carbide and carbon seal faces offers proven reliability. Seal replacement can be accomplished without motor or pump casing removal.

**Robust Rotor** features a radial bearing located between the spacer coupling and mechanical seal. With its large shaft diameter and tapered fit at the coupling hub, this design reduces deflection and vibration for improved bearing and mechanical seal life.

**Cast (WD) or Forged (WDF) Stainless Steel Casing With Diffuser** effectively converts velocity head to pressure, thereby optimizing hydraulic performance.

**Replaceable Wear Rings** extend casing life and may be removed without disturbing piping connections.

**Compact Footprint** addresses space limitations inside containment.



### Significant Functional Design Advantages

#### Simplified Maintenance

The four-piece spacer coupling greatly simplifies maintenance projects into routine chores. For example, mechanical seal replacement can be accomplished in 16 hours or less. The motor need not be removed from its mount, nor piping broken. No overhead cranes are required. These are significant advantages in the typically difficult work constraints found within containment.

#### Reduced Radiation Exposure Environment

Reduced maintenance time equals reduced man-rems. With the WD and WDF, seal replacement is estimated at less than one man-rem. Since the pump casing is not disassembled, there is no exposure to contaminated pump internals during routine maintenance.

#### Improved Reliability

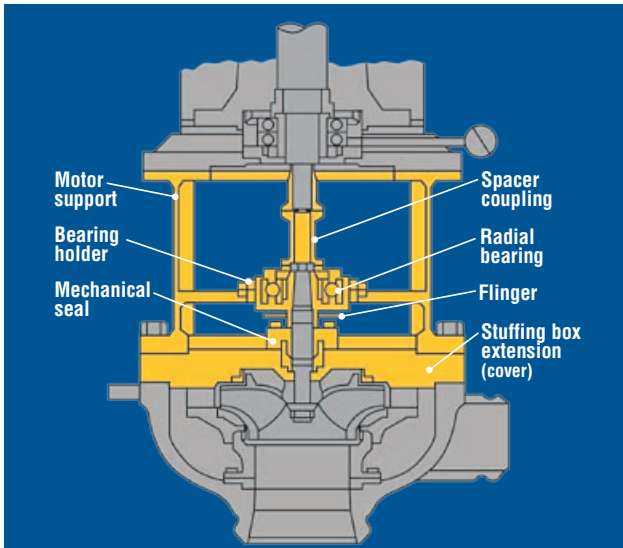
The robust designs of the WD and WDF assures extended mean time between repair (MTBR). The pumps' bearing configuration and motor support head construction provide:

- Reduced loads on motor bearings
- Reduced rotor deflection at low flows
- Improved mechanical seal life

### Stringent Qualification Analyses

Pump qualification includes:

- Certified critical speed analysis and natural frequency calculations (finite element modeling with all applicable motor weights)
- Seismic integrity and operability analyses (support and pressure boundary stresses, shaft stress and deflection, bearing loads, generic nozzle and seismic loads)



### Upgrade Existing W, WD and WDF Pumps

Existing W, WD and WDF pumps may be cost-effectively upgraded to the current design, allowing pump owners and operators to take advantage of the simplified maintenance, reduced man-rem exposure and improved reliability that it offers.

The upgrade requires seven major new components (shown above in yellow) and may be quickly implemented via the following steps:

1. Disassemble the stuffing box extension from the pump case.
2. Remove the impeller.
3. Re-machine the motor shaft.
4. Reassemble the pump, incorporating all new components.





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