

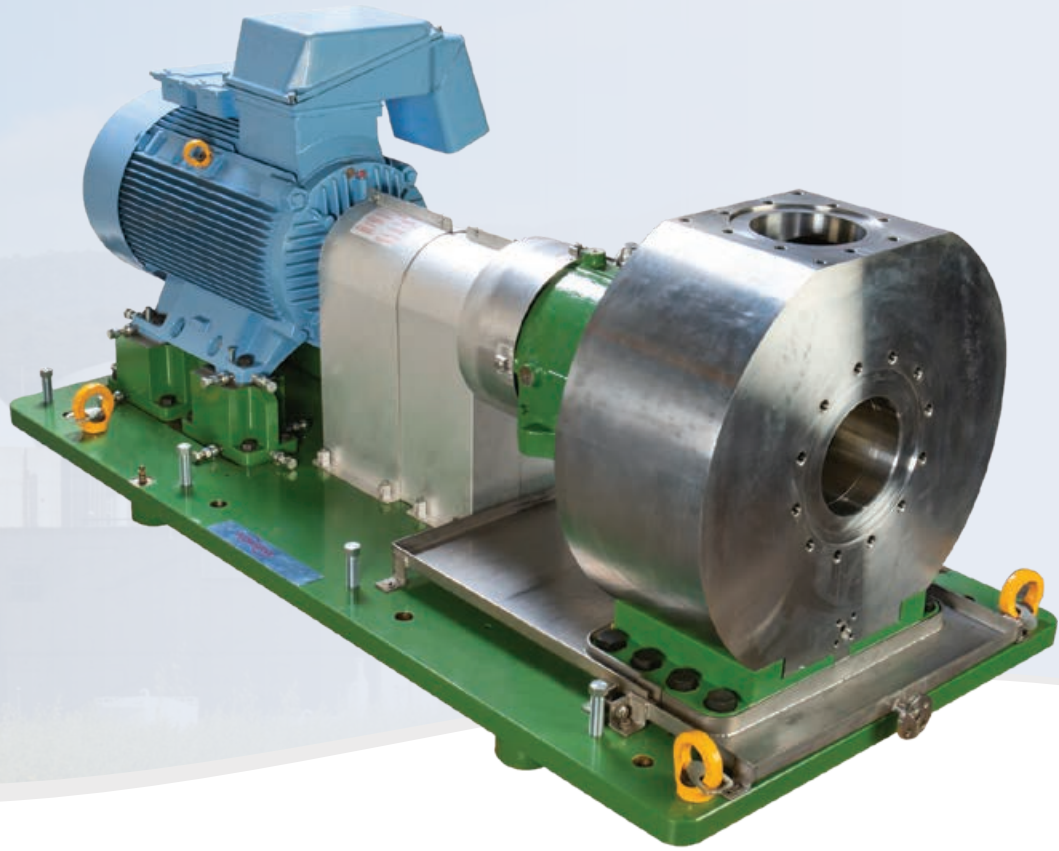


# MFD Forged End-Suction Pump for Nuclear Power Generation

Uncompromised reliability and safety  
with low total cost of ownership



*Experience In Motion*



## Safe, reliable and cost-effective

Safety is a primary concern for nuclear power plant operators, but they also now must consider the costs of production. Equipment is designed to resist extremes such as earthquakes, thermal shock, high nozzle loads and environmental factors. The challenge today is to develop pumps that can survive extreme events, while ensuring lower total cost of ownership (TCO), reliability, maintainability, on-time delivery and efficiency.

That's why Flowserve introduced the MFD forged end-suction pump to ensure superior reliability in nuclear power generation applications.

Its compact yet robust design is capable of withstanding seismic events, thermal shock, high nozzle loads and a radioactive environment. Flowserve engineered the MFD pump to minimize cast and welded components, thus reducing the associated quality issues and scheduling delays. The pump also is designed to handle various types of fluids, including those containing particulates. Moreover, its simplified design with standardized parts provides the flexibility needed to cost-effectively make upgrades or retrofits due to future changes in service conditions or system modifications.

In addition, the MFD pump complies with RCC-M, PED Directive 97/23/EC and ASME Section III standards.

### Key benefits

- Enhances safety and reliability with construction that withstands thermal shock to  $>80^{\circ}\text{C}$  ( $176^{\circ}\text{F}$ )
- Minimizes unplanned downtime (endurance tested to 400 hours, 50 start/stop and 50 flow variations)
- Increases mean time between repair (MTBR) by design with a bearing L10  $>50\text{k}$  hours, robust shaft with low  $L^3/D^4$  ratio
- Eases maintenance by reducing number of parts in addition to weld-less construction and a simplified yet strong baseplate
- Lowers lifecycle costs from a standardized, best-in-class power end that increases interchangeability while reducing inventory of critical spare parts
- Reduces chances of quality issues and associated delivery delays due to engineered design that minimizes castings and weldments

### Target applications

- Chilled water
- Closed loop cooling water
- Containment heat removal
- Fuel pool cooling and purification
- Steam generator blowdown
- Liquid waste processing and discharge
- Essential service water

# Engineered for the complete lifecycle

## Robust forged casing

- Replaces castings and welding to enable the casing to withstand high nozzle loads in normal and accidental conditions
- Thermal shock qualification has been validated by testing.

## Heavy-duty bearing housing

- Reduces vibrations and increased reliability
- Improves rotor response and stiffness
- A standardized bearing housing design reduces inventory of critical spare parts and enables interchangeability.

## Optimized hydraulics

- Hydraulics are optimized via computational fluid dynamics (CFD) modeling to achieve the best performance at different points of operation.
- Diffuser design provides more precise adjustment to operating conditions and reduced radial loads.

## Machined baseplate and pump support

- Increases pump reliability and strength with stiff baseplate that has no welded components

## Self-vented casing

- Reduces risk of gas entrainment during transient operations
- Eases commissioning

## Back pullout design

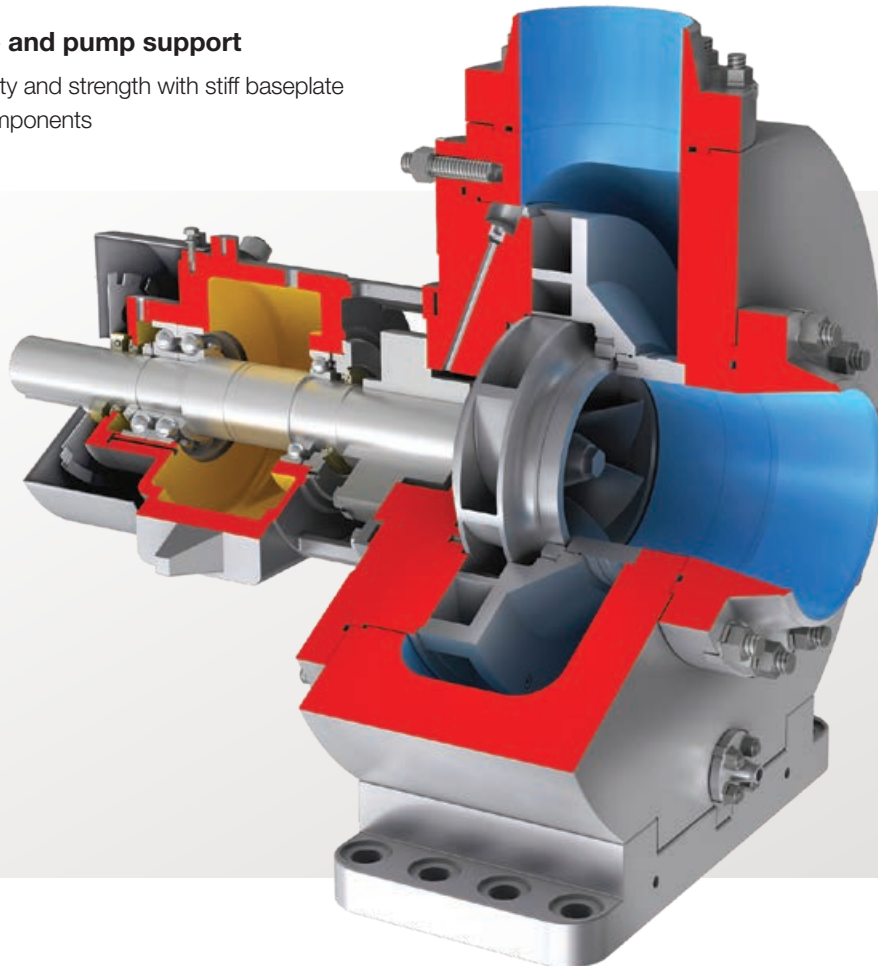
- Simplifies maintenance, reduces time for repair by eliminating the need to disconnect from piping
- Requires less spare parts inventory and eases modification or upgrading, contributing to lower lifecycle costs

## Integral flanges

- Provide higher nozzle load tolerances and increase application flexibility
- No welding required; can be customized to mating flanges

## Special configurations

- Enhance flexibility with vertical and centerline mounting

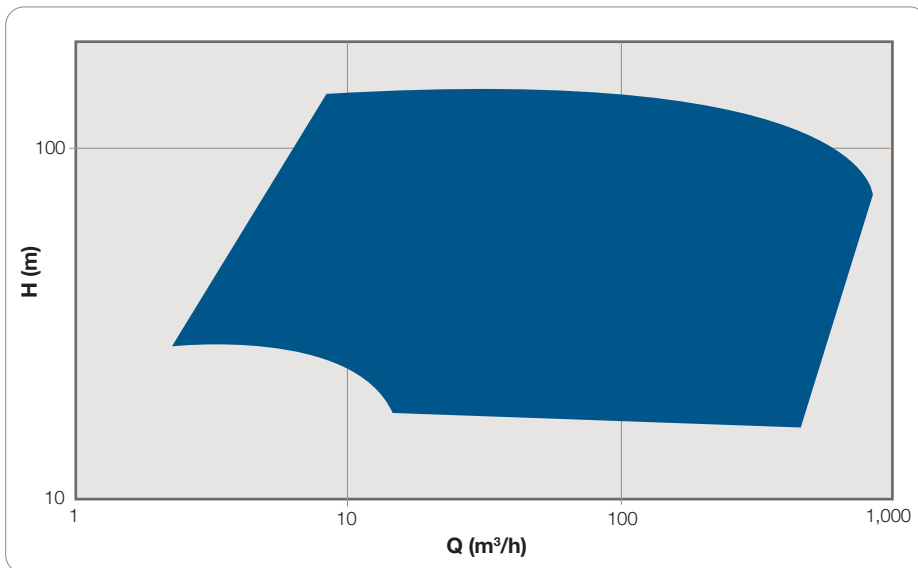




## Operating parameters

- Flows to: 850 m<sup>3</sup>/h (3,750 gpm); higher flows on demand/optional
- Heads to: 140 m (460 ft)
- Pressures: up to 35 bar (508 psi); higher pressures optional
- Temperature: -29°C to 260°C (-20°F to 500°F)
- Sizes: 18 sizes with discharges from 32 to 250 mm (1.25 to 10 in); larger sizes on demand/optional
- For alternative duties, sizes and configurations, please contact your sales representative.

## Performance curve



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