

GE Oil & Gas

High-pressure diffuser barrel multistage pump DDHM

API610 / ISO13709 type BB5 for high reliability and efficiency onshore and offshore



Reliable & Flexible

Our DDHM pumps are designed for ultra-reliability in the most demanding onshore and offshore water-injection applications. They are also well suited for boiler feedwater, pipeline, amine, energy recovery and CO₂ injection.

During the selection process, we can tailor the complete system to specific customer objectives in terms of CAPEX, OPEX and operability. This service includes matching of the main and booster pump as a crucial step in optimizing performance.

A proven package

GE Oil & Gas has a long history of proven design and manufacturing excellence for the industry's most demanding pumping applications, including water and CO₂ injection for enhanced oil recovery (EOR).

The design improves on our previously referenced DDM pump, including features designed and tested by Nuovo Pignone for water injection in direct connection with a gas turbine running at 10,000 rpm.

Our advantage for both onshore and offshore oil and gas projects is the ability to go from conceptual design to final field commissioning, delivering a complete and highly efficient system – including the main pumps as well as drivers (electric motor, gas and steam turbine, gas engine), controls and auxiliary systems.

Other pump models manufactured by GE Oil & Gas and successfully employed for water injection services are the DDHF BB5 volute and the MSN BB3. Most recent project references include:

- Kuwait – DDHF 10x16, 163 bar max pressure, 4 MW power
- UAE – DDHF 4x11, 202 bar max pressure, 600 kW power
- Congo – DDHF 6x15, 200 bar max pressure, 6 MW power
- Iraq – MSN 4x11, 250 bar max pressure, 3.7 MW power

Engineering excellence

The GE Oil & Gas heritage includes the first centrifugal pump manufactured in 1959 by Nuovo Pignone under license of UCP. Today, our installed fleet of over 18,000 pumps worldwide comprises various models compliant with API610/ISO13709, including over 500 of BB5 type designs.

Capabilities at our Pumps Center of Excellence in Bari, Italy include comprehensive testing facilities, with a model test laboratory to accurately characterize new hydraulics. Our designs take advantage of the broad technology portfolio across GE Oil & Gas; engineering and manufacturing practices for gas turbines and centrifugal compressors, for example, have a strong connection with the advantages of our centrifugal pump designs. Similar technological synergies result from other areas of our business, such as subsea systems and electrical submersible pumps.

We also maintain a network of Global Research Centers dedicated to developing superior technologies, materials, aerodynamics and controls, which capitalizes on synergies in other GE businesses outside of the oil and gas industry.



Expert lifecycle support

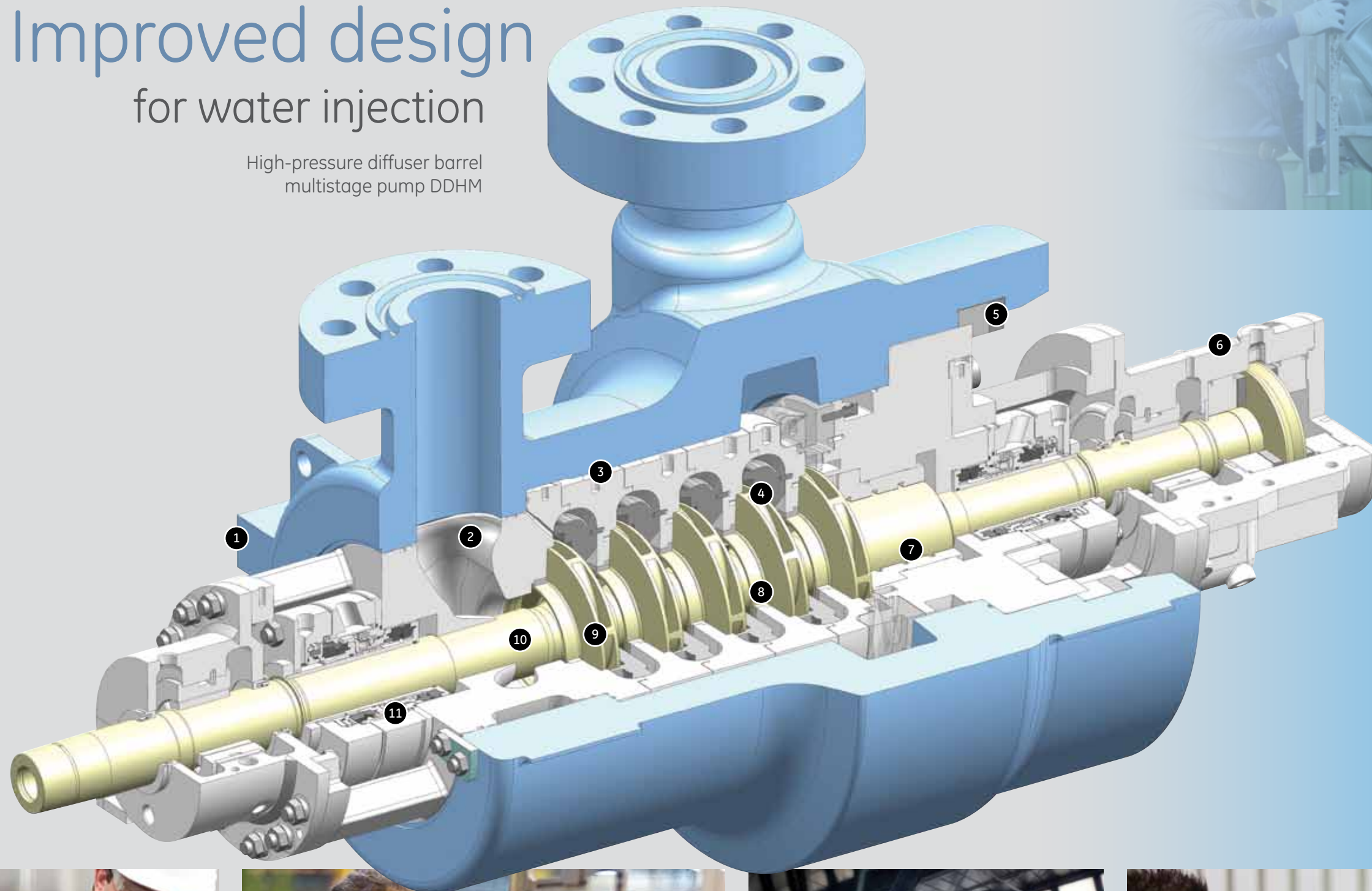
- Initial engineering and feasibility studies of special-purpose pumps or complete pumping systems
- Full on-site support during installation and commissioning to ensure flawless execution and timely completion
- Expert in-field maintenance and repair services, including continuous lifecycle improvements through expert OEM conversion, modifications and uprates; popular options include: modifying impellers or replacing diffuser to match actual operating conditions, destaging, upgrading wear rings with new composites to reduce internal leakage and increase efficiency, super-finishing internal wetted surfaces to increase efficiency
- Advanced remote monitoring and diagnostic services to improve operating efficiency and avoid unplanned downtime

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Improved design for water injection

High-pressure diffuser barrel
multistage pump DDHM



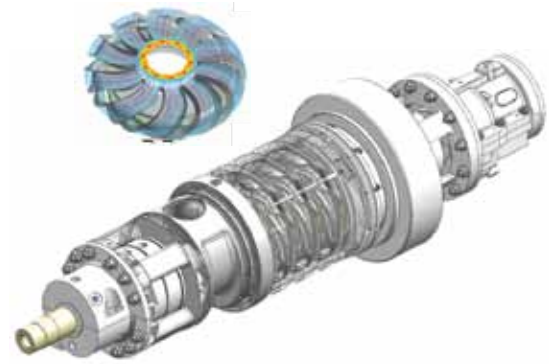
Design features

1. Centerline mounting of barrel to increase tolerance to thermal expansion
2. Inlet channel shaped to optimize flow uniformity and reduce net positive suction head (NPSH) required
3. Lifting lugs and many other design features to facilitate assembly and handling of components
4. Impellers with double keys and shrink-fit by induction heating to minimize residual unbalance
5. Cover held in place by shear rings to minimize assembly/disassembly time. This feature is available for all frame sizes
6. Bearings with forced lubrication; all frames fitted with proximity probes and RTDs
7. Balancing drum shrunk on shaft by induction heating to minimize residual unbalance; swirl brakes for enhanced rotor stability even when operating with late-lifecycle worn condition
8. Hard coating on all wear surfaces of stage seals and balancing drum
9. Precision-casted impellers and diffusers maximize performance predictability and hydraulic radial load balance; optional first-stage impeller with reduced NPSH
10. Rotor designed for operation below its first critical speed to increase reliability and life of seals; stepped shaft facilitates mounting of impellers
11. Mechanical seal chamber compliant with API682/ISO21049 to accommodate the engineered seal cartridges

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Other key features



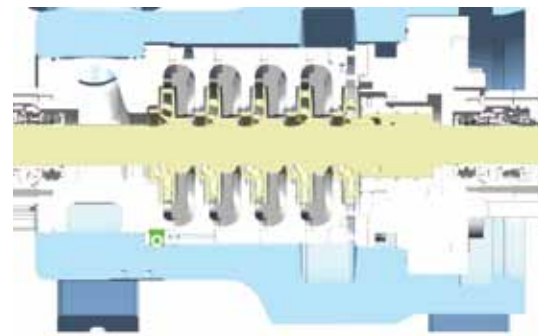
Continuously bladed diffuser-return channel maximizes range of flow with high efficiency. Diffusers are precision casted to guarantee high conformity and low radial loads on the rotor.



Discharge channel, downstream of last stage, is designed to minimize hydraulic losses and increase efficiency.



Extraction/insertion of inner bundle in the barrel is facilitated by a special tool suitable for DDHM pumps at all frame size. The bundle assembly includes bearings and seals that minimize field activity.



Inner bundle fitted with rollers to avoid damage to internal seal surfaces during assembly/disassembly for maintenance.



Main benefits

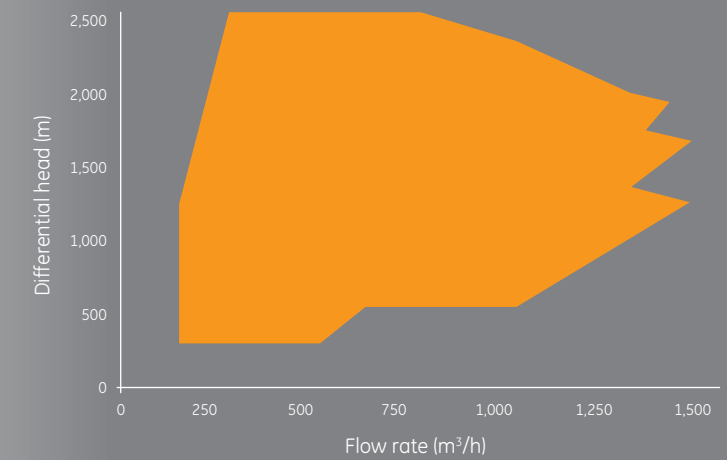
- High reliability given by low vibration levels
- High efficiency thanks to optimized hydraulic design
- Easy maintenance obtained with detailed design of assembly solutions

Operating data

Differential head	up to 2,500 m
Flow rate	up to 1,500 m ³ /h
Shaft power	up to 10 MW
Rotational speed	up to 6,600 rpm
Head rise	15 – 30%
Operating temperature	-10°C – 120°C
Impeller diameters	250 – 385 mm

The standard frames are: 4x11, 6x11, 6x12, 8x15, 10x16.

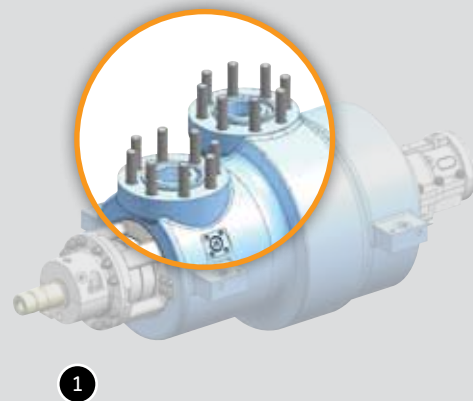
Performance range



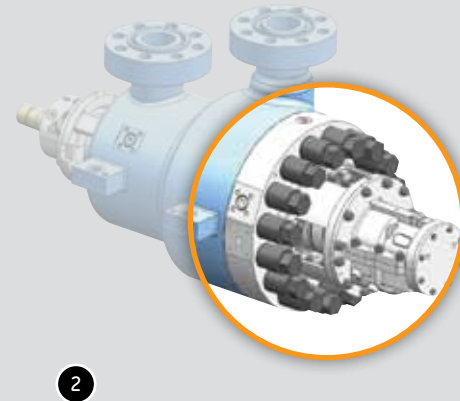
This graph shows the performance range of our standard product portfolio.

Customization options

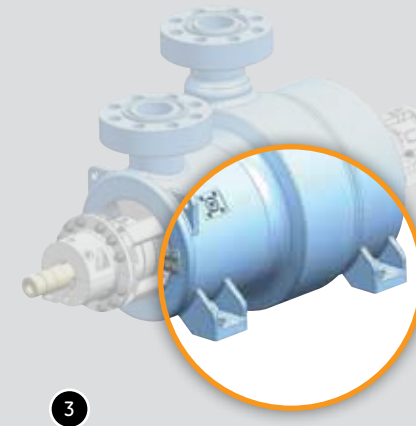
1. Integral studded flanges to reduce weight of the barrel; alternative orientations of inlet and outlet nozzles are available
2. Flanged and bolted cover for the barrel to increase operating temperature
3. Foot-mounted barrel to reduce footprint
4. Lube oil console integrated in the baseplate to minimize footprint
5. Optional balancing of rotor after assembly of the bundle to guarantee and certify residual unbalance ISO1940 G1 for maximum reliability



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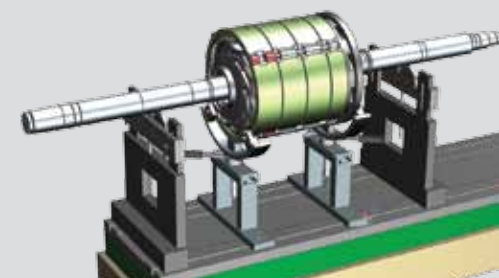
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