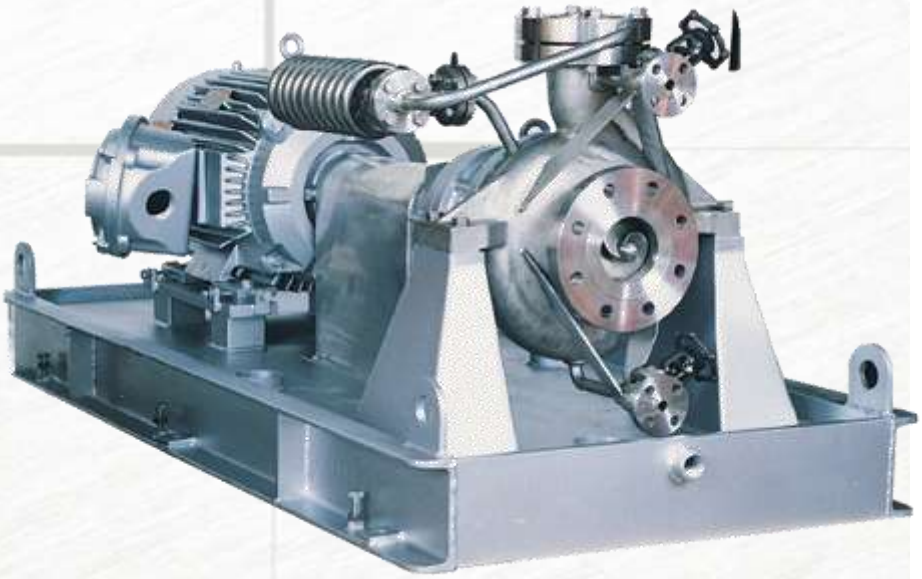
WARRENDER, LTD.

Seal-less Mag-Drive Pumps
*From Stock or Built-to-**Spec**™*

Series WMCA
API 685 / 610
Mag-Drive Pumps

Providing environmentally safe sealless, magnetic pumps of the highest quality for over 30 years

Our company goal is to provide the solutions that protect our surroundings, raise the environmental awareness, and promote the growth of the community.



Applications

- Oil Refineries
- Chemical & Petrochemical Plants
- Oil Pipeline Sampling
- Refrigeration & Heat Transfer
- Gas Plants
- High Pressure Systems
- Power Stations
- Tank Farms
- Pharmaceutical Plants
- Textile Industries

Industries

- Petroleum & Petroleum By-Products
- Hydrocarbons & Solvents
- Heat Transfer Fluids
- Liquefied Gases & Refrigerants
- Explosives & Pyrophorics
- Acids & Caustics
- Aggressive, Toxic & Carcinogenic Liquids

WARRENDER
SEALLESS MAG-DRIVE PUMPS

*21st Century Seal-**less Pump Technology™***

Over 30 years of experience in producing and applying magnetic drive pumps continues to provide problem solving for thousands of customers with an expansive array of applications. We typically solve the most challenging pumping problems with reliable and cost effective solutions.

We know the key elements that comprise a magnetic pump, engineering our own pump hydraulics and magnetic couplings to provide an integrated design.

Seal-less for Maximum Safety

Benefit from a process free of leakage, contamination or toxic releases while avoiding constant monitoring and potential environmental fines. Eliminate all toxic and dangerous chemical releases including explosive and volatile liquids that can react with atmospheric contact.

Zero Emissions - **Zero Leakage™**

WARRENDER WMCA mag-drive pumps are built in various constructional materials including: Carbon Steel / AISI 316, AISI 316, Alloy-20, or Hastelloy-C276 to meet specific process requirements while ensuring long-term safety and reliability.

Advanced Engineering and the Highest Quality for Long Pump Life

WARRENDER pump designs are built to the highest quality standards to protect your process, preventing costly maintenance and lost production time.

- Robust, high thickness pump casings
- High efficiency impellers with low NPSH requirements
- High strength, rare earth magnetic couplings suitable for extreme temperatures
- Heavy duty rear casings in single or double walled non-welded designs

Performances to the Extreme

- Magnetic coupling power up to 650 HP (larger couplings available)
- Flows from 0.1 to 4500 gpm
- Pressures up to 1500 psig (higher pressures available)
- Heads to 720 feet (higher heads available)
- Temperatures from -180°F to +840° F
- Pump liquefied gases or liquids with low NPSH

APPLICATIONS

Demanding API Pump Services

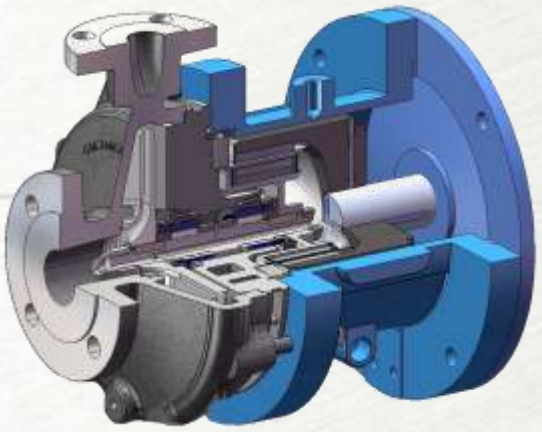
- Petroleum & Petroleum By-Products
- Crude Oil
- All EPA monitored chemicals
- Dangerous, toxic, noxious and carcinogenic liquids
- Solvents, hydrocarbons, pyrophorics and other volatile liquids
- Heat transfer fluids up to 650° F, (840° F w/ heat exchanger).
- Super heated water
- Refrigerants and liquefied gases
- Cryogenic fluids (down to -184°F/-120°C)
- High pressure circulation systems
- Pressurizing mechanical seal pots
- Sampling, metering or chemical injection systems

We have an extensive selection of pumps and spare parts to provide the best service. Our technical department is at your disposal from the onset of plant start-up to meet all of your needs.

Rear Cartridge Kits Minimize Downtime

Rear cartridge kits can be changed out in minutes with registered fits, requiring no special tools. This assembly is recommended as an emergency spare for all critical services.

WMCA - *API 685 Process, End or Top Suction*



Close-Coupled Design

Foot Mounted API Pumps Meet ISO-2858 Dimensional Standards

WMCA API-685/ 610 centrifugal process pumps are built for critical services and extreme system pressures in accordance with the API-685/ 610 specifications. The WMCA designs are the benchmark for heavy-duty seal-less process pumps. The WMCA API-685/ 610 process pump offers the utmost in versatility and reliability in the most hazardous and severe applications.

WMCA alloy centrifugal mag-drive designs are available in API 610, API 685 and API 685 multistage configurations. Dynamically balanced, back-to-back impellers allow for minimal axial load on multistage units.

Performance Range		
Flow	8-4500 GPM	2-1000 M^3/H
Head	To 720 feet	220 M
Temp	-238 to 840°F	-150 to 449°C
System Pressures	To 1500 PSIG	100 BAR

API-610 Mechanical Seal Pump Designs Available

MATERIALS

- Cast steel WCB (Casing and Impeller only)
- AISI 316 or 316L SS
- Alloy 20
- Monel-400
- Hastelloy B or C-276

DESIGN FEATURES

- Casings built with heavy wall thicknesses
- The standard one-piece Hastelloy C276 containment housing exceeds ASME pressure vessel codes; rated for 750 PSIG working pressures with capabilities to 1500 PSIG
- External lubrication maintains highest pressure differential, enabling intermittent dead-head operation (w/ external circulation)
- Backed by silicon carbide thrust bearings, impeller pump-out vanes balance axial thrust
- Quick-change rear cartridge assembly (an WMCA standard) allows for replacement and restart-up within 10 minutes
- Dual back-pull-out design (service either hydraulic end or power frame assembly)

General

WMCA magnetic drive pumps are zero emissions, seal-less designs. The static rear casing (rear containment shell) forms a hermetically sealed liquid end.

Applications

WARRENDER WMCA Magnetic drive pumps are designed to improve personnel and plant safety. Especially when pumping toxic, explosive or other dangerous liquids that react on contact with the atmosphere. For all these services rear containment shells replace single and double mechanical seals with external barrier fluids, seal pots and monitoring apparatus.
WMCA pumps offer exceptional benefits to the chemical, petrochemical and oil & gas industries. Maximum capacity up to 4400 GPM (1000 m3/h) and differential head up to 720' TDH (220 m).

Temperature range from -185 °F (-120 °C) to +662°F (+350 °C) without external cooling. The MAWP (maximum allowable working pressure) is 750 PSIG (50 BAR) for the standard version and 1500 PSIG (100 BAR) for HP Version. *Higher system pressures and/or higher head designs available.*

Leak Proof

WMCA pumps are free of mechnical seals and elaborate monitoring systems. Contrary to sealed centrifugal pumps, the hermetic construction of the WMCA mag drive pumps ensure a safe and leak free operation. Even under heavy-duty applications the pumps are extremely reliable.

WMCA mag drive pumps are available in a wide range of sizes and metallurgies. With its zero leakage mag drive coupling the WMCA safely handles hazardous chemicals.

Advantages of Warrender WMCA mag drive centrifugal pumps

- Zero emissions, zero leakage
- Eliminates mechanical seals and monitoring systems
- Free of external flushing systems or seal pots
- Ensures a clean and safe operating environment
- Increased MTBPM (Mean Time Between Planned Maintenance)

ATEX

WARRENDER WMCA mag drive pumps can be supplied to meet the requirements of the 94/9/EC Directive, with ATEX certification II /2 G cbk II C Tx for installation in potentially explosive atmospheres

Construction

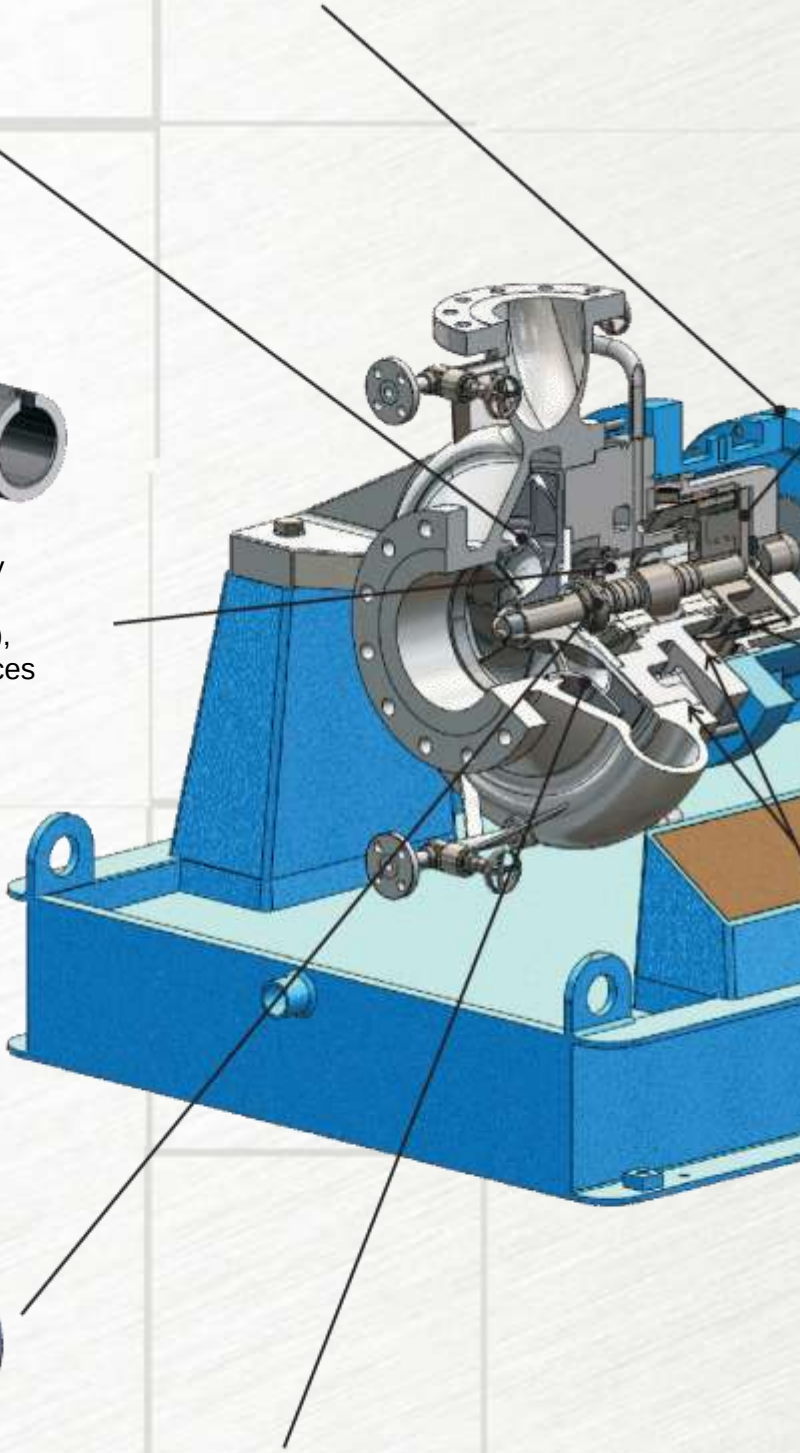
A single stage volute casing design that meets API-610/ 685 moments and forces requirements, is equipped with a fully enclosed impeller, back-pull-out internal and external drive assemblies, with end suction and top discharge flanges. Standard foot mounting provides dimensional interchangeability in accordance with ISO-2858 design standards. Centerline columns are available for high temperatures and/or to meet specific requirements such as API-685. Secondary containment is available upon request. Casing and pressure containing components meet FULL 300 lb. (750 PSIG / 50 BAR) or FULL 600 lb. (1500 PSIG / 100 BAR) MAWP pressure ratings.

Epoxy primer and polyacrylic enamel water based painting for optimal resistance, yet are environmentally safe.

Cast Steel Pump Casing & Impeller w/ AISI 316 Internals. Other materials: CF8M, Duplex SS, Incoloy-825, or Hastelloy-C276 are available.

Epoxy primer and polyacrylic enamel water based painting for optimal resistance, yet environmentally safe.

Field assembling of the product lubricated bearing assembly does not require special tools. The bearing material is available in Silicon Carbide (SIC), or Tungsten Carbide (TC), to meet specific conditions. The use of tolerance rings reduces the sleeve bearing and thrust bearing loads to withstand system upsets without failure, and ensure many years of maintenance-free operation.

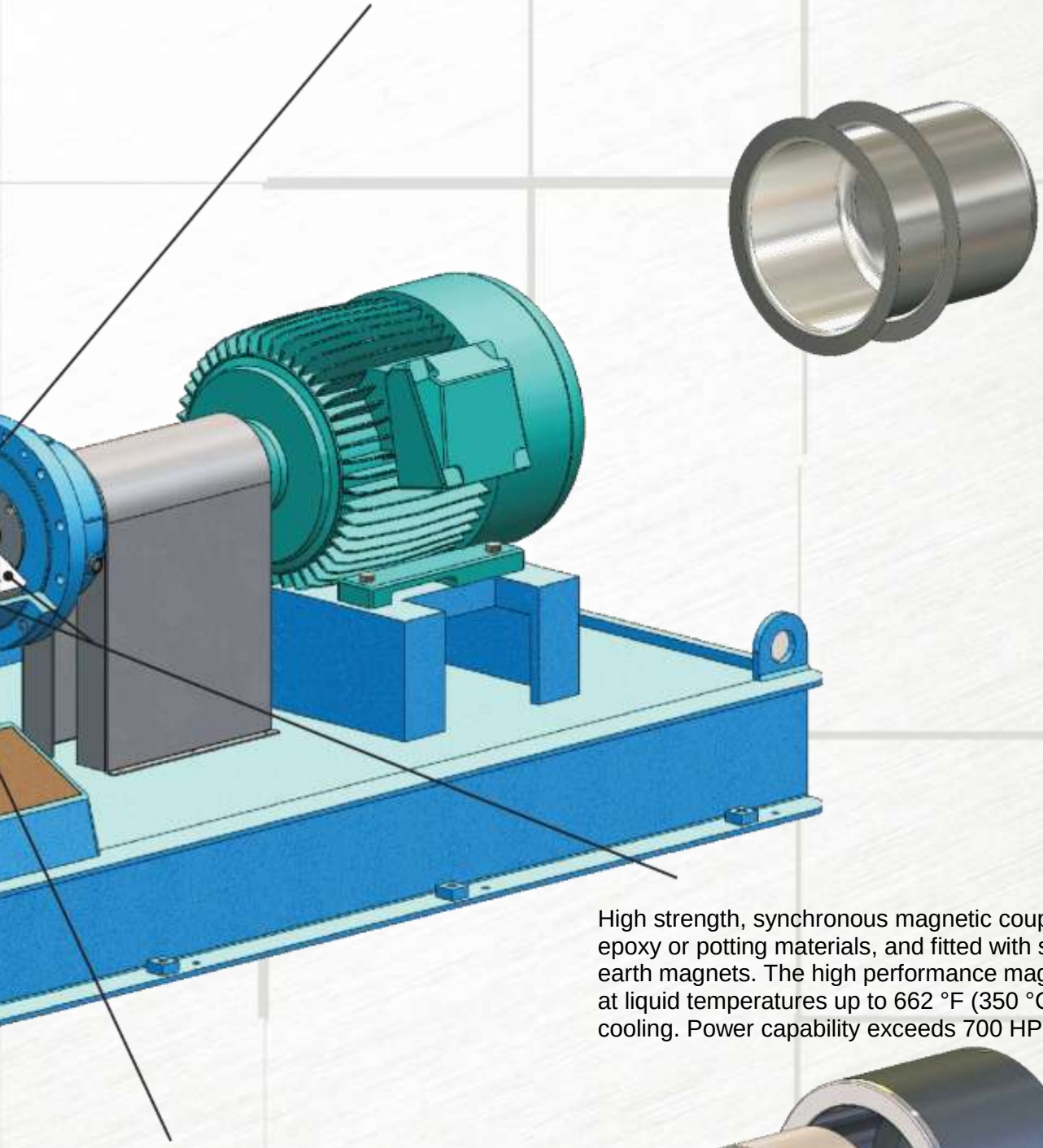


REAR CARTRIDGE KIT with registered fits for quick and easy maintenance procedures.

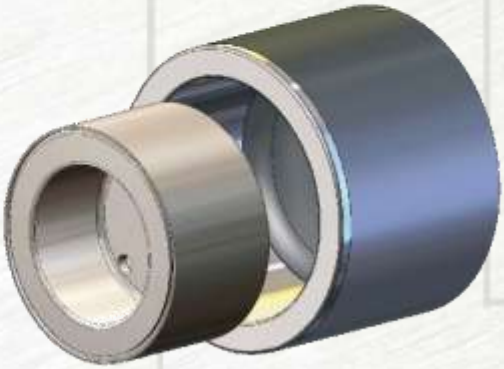
The enclosed impellers are statically and dynamically balanced. The axial thrusts are balanced by back vanes.

API-610 Mechanical Seal Pump Designs Available

Single or dual Hastelloy®-C276 or Titanium rear casings are available - providing a safe and efficient solution with system pressures up to (2200 PSIG) 150 BAR MAWP.



High strength, synchronous magnetic couplings, are free of epoxy or potting materials, and fitted with samarium cobalt rare earth magnets. The high performance magnets can be operated at liquid temperatures up to 662 °F (350 °C) without external cooling. Power capability exceeds 700 HP / 520 kW.



Static confined casing gaskets prevent leakage to atmosphere. Materials available:

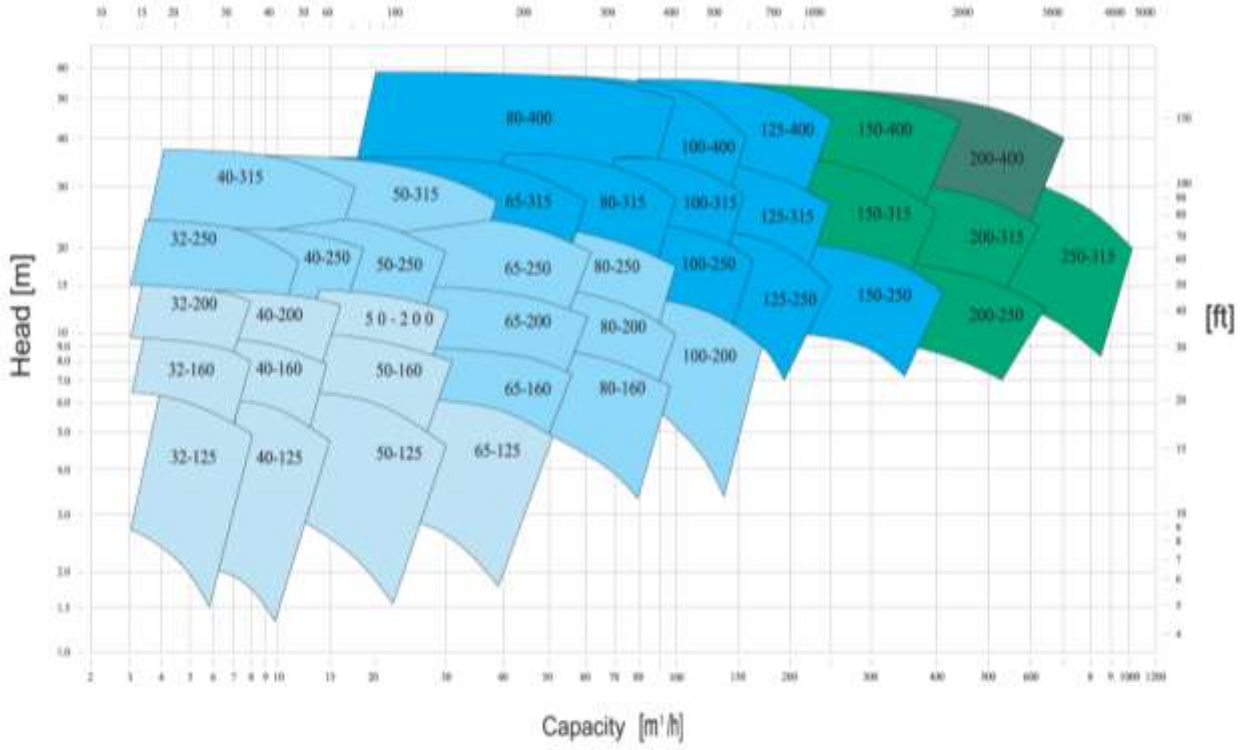
- Graphoil type
- Flexitallic type
- Gylon
- Garlock
- PTFE

API-610 Mechanical Seal Pumps Designs Available

WMCA API- *Curves (1450 and 2900)*

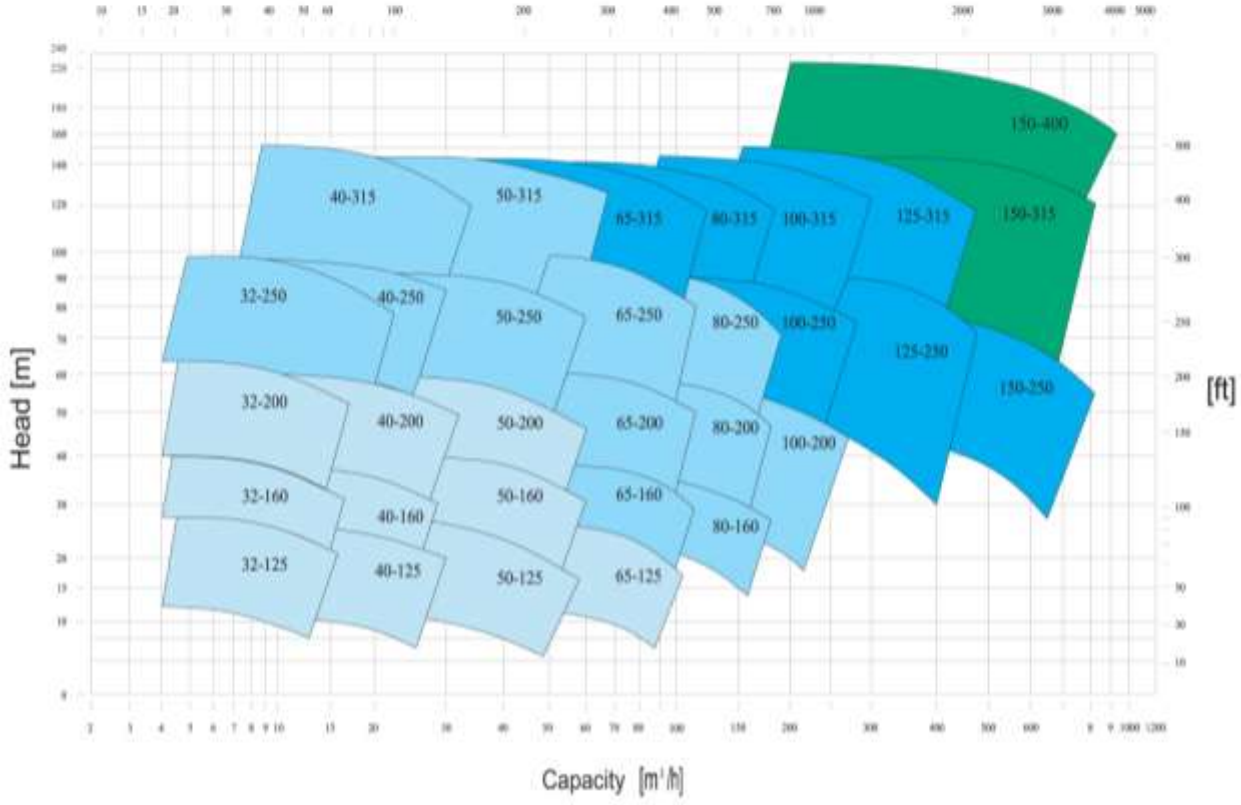
1450 RPM 1450 RPM

US G.P.M.



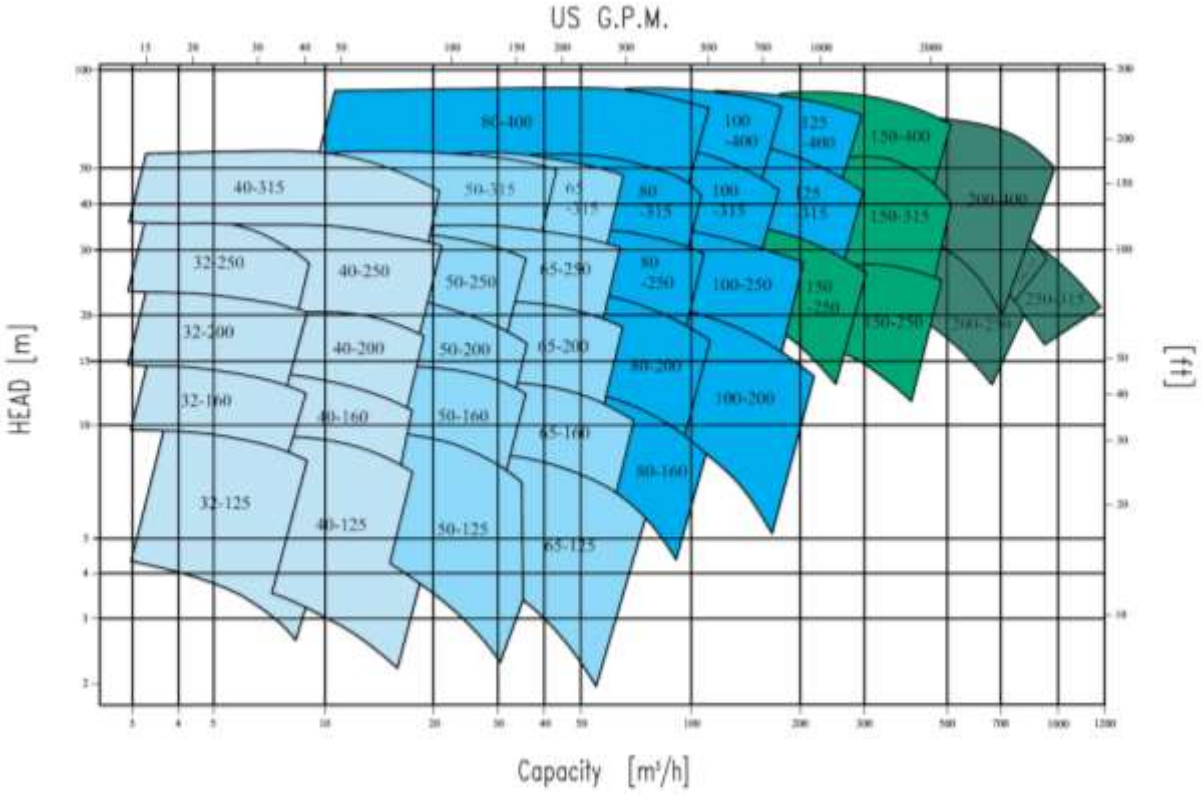
2900 RPM 2900 RPM

US G.P.M.

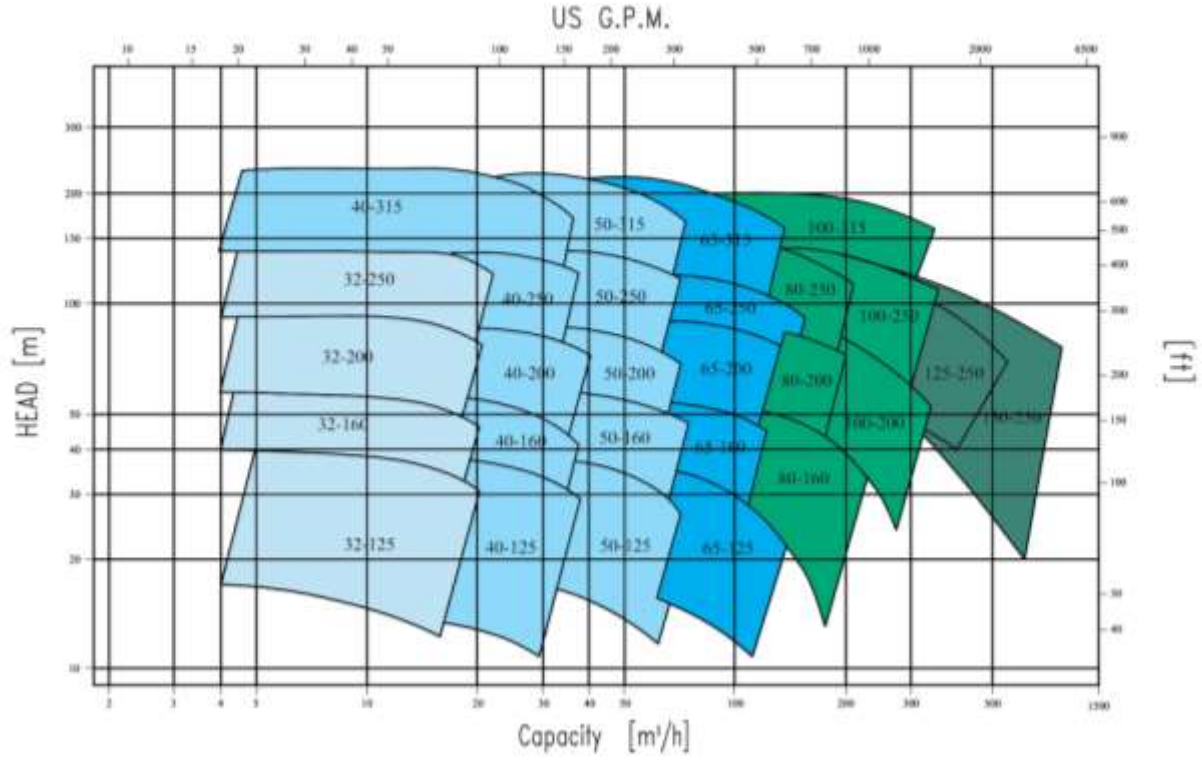


WMCA API- *Curves (3500 and 1750)*

1750 RPM



3500 RPM



TEMPERATURES

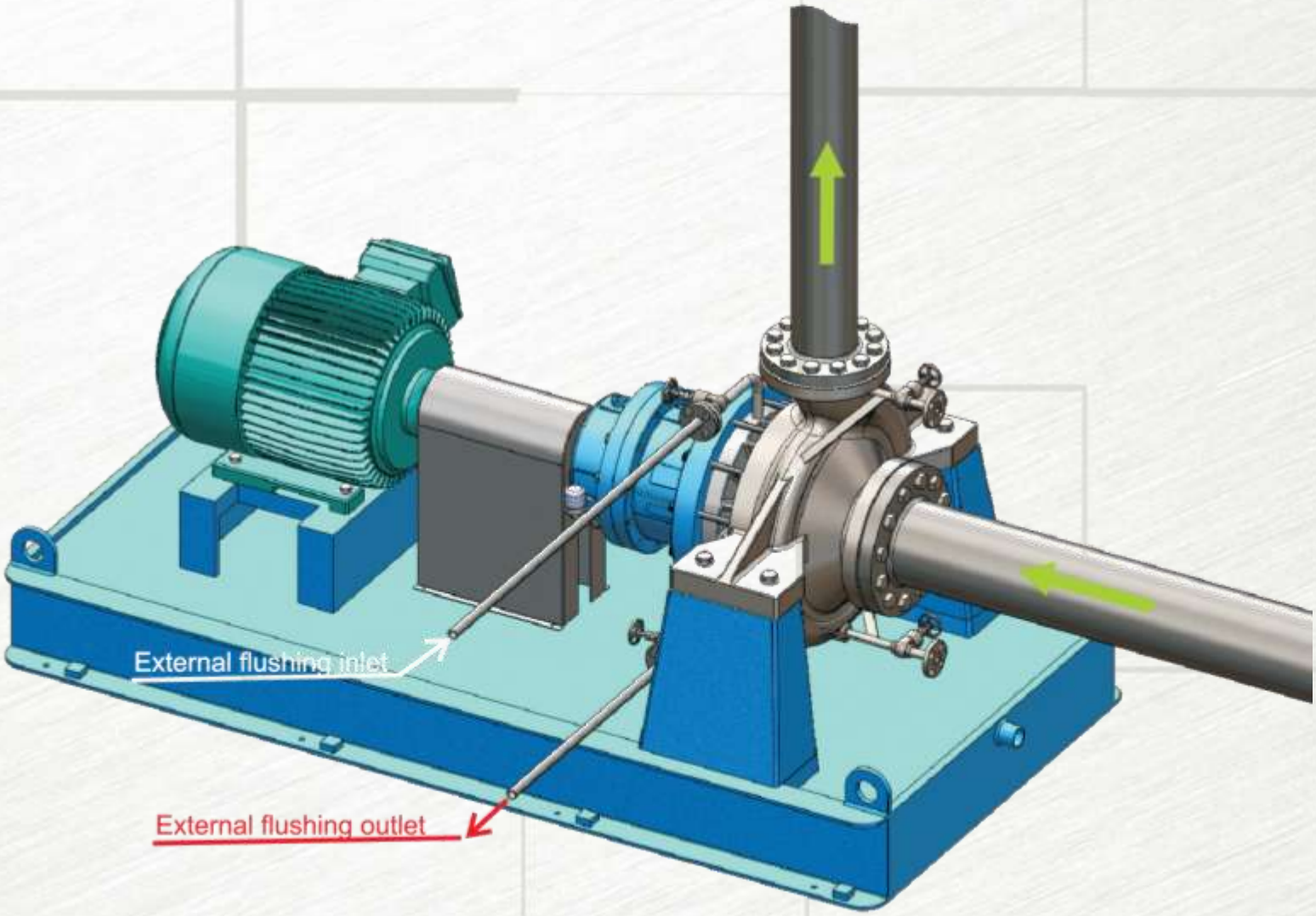
Dual Sleeve, Journal & Thrust Bearings

The shaft is protected by two sleeve bearings The stationary journal bearings are located centrally in the common bearing housing, which ensure proper alignment and running clearances. Standard material is pure Silicon Carbide with Tungsten Carbide available, and highly resistant against corrosion and wear. The Silicon Carbide or Tungsten Carbide bearings are positively located and aligned by tolerance rings, designed for temperatures up to +662°F (+350 °C) without a heat exchanger. Higher temperature configurations are available.

API 685 / 610 Foot Mounted Mag Drive Design w/ Close-Coupled Motor

Low Viscosity Configurations

For critical applications including low viscosities (e.g., super heated water or liquefied gases), or liquids with solid particles, special configurations are available. For extremely dangerous liquids (e.g., phosgene, hydrogen cyanide, extreme high temperatures, etc.) an intermediate seal can be introduced that separates the process fluid from the magnetic coupling, and lubricated by an optional external flushing circuit. If necessary, the external lubrication can be cooled by an external cooling system for withstanding process temperatures up to 840°F (450°C).

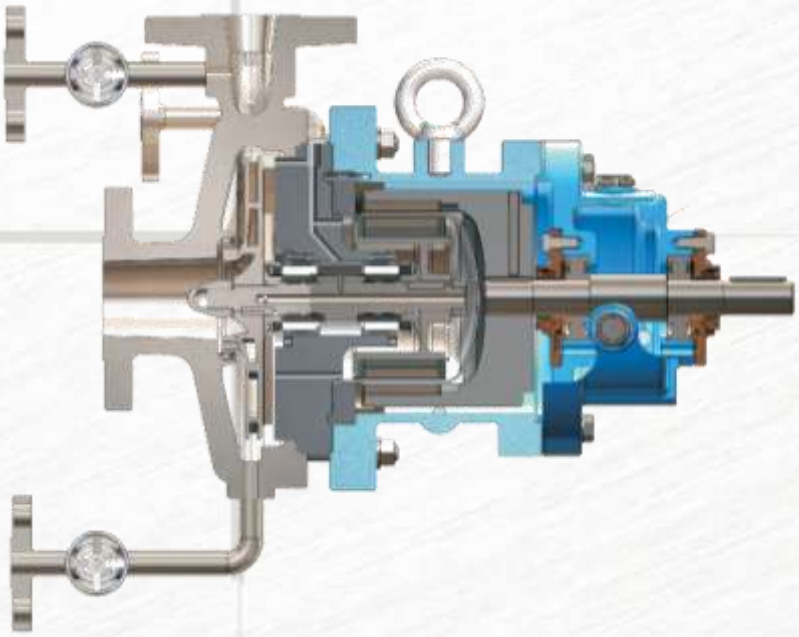


NPSH-Conditions

The combination of low heat induction, a pressurized lubrication/cooling circuit and low Nss values in accordance with DIN / ISO pump design standards virtually eliminates the risk of flashing.

Balanced thrust loads

The thrust loads of the enclosed impellers are balanced by impeller back vanes. Minimum residual forces are carried by dual silicon or tungsten carbide, spring loaded, thrust bearings.



Power Frame

The outer drive shaft is fitted with properly sized ball bearings. The bearings are L10 rated for an average life in excess of 5 years. The oil bath is protected against atmosphere by a lip seal (labyrinth oil seal upon request). The oil level is controlled by a constant level oiler and additionally by a bull's eye sight glass.

Rear containment shell protection

The clearances between the outer rotating external magnet and the rear casing is greater than the clearance between the non-sparking safety ring (upon request) to prevent rubbing and scoring of the rear casing in case of a ball bearing failure.

Pressurized internal lubrication circuit

During operation, the minimum amount of heat is generated by eddy currents and is dissipated through the internal flow circulation. The pressure is increased by the rear impeller back vanes to enhance circulation, with the flow path returning to discharge. Pressurizing the recirculation fluid compensates for the slight heat induction.

Secondary & auxiliary containment

The optional double containment shell consists of two isolation shells placed one into the other. The gap between the two shells allows an effective monitoring via a pressure sensor or vacuum system. Any breach of the interior or exterior shell will produce an alarm signal before any leakage occurs. Upon request, a mechanical seal can be supplied in place of the labyrinth seal. The mechanical seal separates the magnet area from the oil bath and atmosphere, and together with the closed bearing housing form an alternate double containment.

API08/09-REV03/14

WARRENDER, LTD.
821 Sivert Drive
Wood Dale, IL 60191

Phone: 847-247-8677
Toll Free: 888-24 PUMPS
Fax: 847-247-8680
Web site: www.warrender.com
Email: sales@warrender.com

Authorized Distributor: